Biomedicine

Spot check on measles

In 1958, the United States was bespeckled with nearly 800,000 cases of measles. Although that number fell by half the following year, real gains in controlling the disease didn't come until after the licensing of a vaccine in 1963.

Although the cases reported in 1986 represent only a fraction of those prevalent in prevaccination days, the total more than doubled from the previous year. A total of 2,822 cases were reported in 1985, compared to more than 6,200 reported in 1986, with no deaths recorded, according to the May 29 MORBIDITY AND MORTALITY WEEKLY REPORT. This is the highest figure of any year since 1980, when 13,506 cases were reported.

New York City alone accounted for 945 reported cases, followed by New Jersey with 911 and Illinois with 710. More than half of all cases originated from 10 outbreaks of more than 100 cases each. The highest incidence was among children less than 5 years old, who accounted for 40 percent of all cases in 1986.

The Atlanta-based Centers for Disease Control (CDC), which published the report, cited two major reasons for the increase in cases: unvaccinated preschool-aged children and vaccine failures in school-aged children. If more preschoolers had been properly vaccinated and other preventive measures had been taken, 36 percent of last year's cases could have been averted, according to CDC. In addition, revaccination during selected outbreaks may be a strategy to combat vaccine failures.

Bridging the gap

In the last 10 years, scientists have shown that cells in the peripheral nervous system – those outside the spinal cord and brain – are capable of limited regeneration. But it has remained much more difficult to get damaged cells in the central nervous system to heal (SN: 3/29/86, p.204).

Now, scientists at the University of California at San Diego report that they have successfully induced nerve cell regeneration in the brains of rats – marking the first time such regeneration has been achieved with the use of human tissue as a nerve growth medium. The researchers implanted tiny "bridges" made of human placental tissue into surgically inflicted gaps in the animals' neuronal bundles. The research team, led by neuroscientist Fred H. Gage, used placental tissue because it is rich in "promoting factors," which normally stimulate the growth of fetal nerve fibers. The neurons grew across the placental bridge and reconnected with neurons on the other side of the surgical gap, raising hopes that some types of brain damage may someday be reparable. However, the team reports in the May 29 SCIENCE, further tests will be needed to show that the regenerated nerve cells function normally.

Targeting tumors

Scientists attending the annual meeting of the American Association for Cancer Research in Atlanta last month expressed optimism about a newly developed chemical that selectively kills tumor cells. J. Martin Brown, director of the radiation biology division at Stanford University School of Medicine, reported that he and his colleagues have designed a new compound that is naturally metabolized into a toxic form in the oxygen-depleted environment characteristic of many tumors. Solid tumors are often low in oxygen, or hypoxic, because they have outgrown their own blood supply.

Like other so-called bioreductive agents, the chemical, SR 4233, has been shown to release DNA-damaging free radicals at tumor cells in mice, especially when administered with other drugs that make tumors even more hypoxic than usual. Brown says the new chemical is "at least an order of magnitude more selective for hypoxic cells than previously used compounds," and so is less apt to harm healthy cells.

Earth Sciences

Energetic electrons: An ozone killer?

High-energy electrons riding the earth's magnetic field lines, 40,000 kilometers above the surface of the planet, have already been implicated in the malfunctions and failures of several satellites. Now, scientists from the Los Alamos (N.M.) National Laboratory propose that these electrons rain down from their high-flying orbits and possibly contribute to the loss of stratospheric ozone over Antarctica each year (SN: 5/23/87, p.326). Scientists are concerned with stratospheric ozone because it protects life on earth by absorbing harmful ultraviolet radiation from the sun.

Large populations of these electrons regularly appeared in the earth's magnetosphere every 27 days from late 1981 to 1984, a time that corresponds to a minimum in the 11-year cycle of sunspot activity. In recent years, as the solar cycle builds toward a maximum, the Los Alamos scientists have measured smaller, less periodic fluxes of these electrons, which travel at nearly the speed of light.

Most of the electrons remain trapped in the magnetosphere, but a small portion of them could precipitate out near the earth's poles and penetrate as far down into the atmosphere as 40 km above the surface, Los Alamos's Dan Baker reported at a recent meeting in Baltimore of the American Geophysical Union. These electrons would then ionize air molecules and in turn produce odd nitrogen compounds, which catalytically remove ozone from the stratosphere. In support of this theory, Baker points to a correlation between the years of greatest ozone loss and largest electron fluxes.

Researchers are unsure of the source of the accelerated electrons. In one proposed mechanism, solar winds energize electrons already present in the earth's magnetosphere. A rival theory relies on electrons that originate outside the magnetosphere and are accelerated by Jupiter's magnetic field.

Variations on a Pacific theme

Since the 1983 El Niño, when abnormal winds and temperatures wreaked havoc on the Pacific climate and on those whose lives are affected by it, many studies have focused on year-to-year variations in the climate of the tropical Pacific (SN: 1/24/87, p.55). Researchers have devoted much less energy to studying long-term variations in that climate. However, scientists are increasingly turning to records of winds and temperatures kept by merchant ships in order to decipher changes in the climate on the scale of decades.

By sifting through millions of wind observations from the years 1920 through 1983, a group of British researchers has discovered several decade-scale variations in the wind patterns of the tropical Pacific. In the May 21 NATURE, researchers from the Hooke Institute for Atmospheric Research in Oxford report that from 1940 to 1944 the easterly trade winds, which travel with an average speed of 5 meters per second, slowed to an average speed of 4 m/s. The researchers also report that the years 1950 to 1981 showed a trend toward increasing trade winds over the Pacific.

This later trend, say the researchers, could explain other long-term climate variations such as the dramatic decrease in rainfall in the Sahel region of Africa, which caused the disastrous African droughts of the last two decades.

Studies of decade-scale trends will help scientists identify subtle human effects on the climate by providing information on the climate's natural variability. However, many climatologists are wary of the merchant marine data, as they were compiled by sailors rather than scientists, and say that future studies must verify these observations by analyzing independent sets of data. Researchers have raised the possibility, for instance, that the trend in the 1940s could be an artifact of poor data coverage during the Second World War.