SCIENCE NEWS of the week

Researcher Admits Tampering With Data

A medical researcher told SCIENCE NEWS this week that he tampered with data from experiments he helped perform at Harvard University's Dana-Farber Cancer Institute in Boston. "That's correct," Claudio Milanese said in a telephone interview from Turin, Italy, when asked if he had tampered with the data. Milanese recently returned to the University of Turin after a three-year appointment as a visiting Fellow at Dana-Farber.

"I'm trying to forget this thing as soon as possible," Milanese said in the interview.

In a letter to Dana-Farber officials, Milanese admitted that he tampered with the results, Dana-Farber President Baruj Benacerraf told SCIENCE NEWS. The researcher's admission prompted a written retraction last week of a published report of the experimental results, which purported to include the discovery of a molecule that plays a crucial role in stimulating the immune system. In the retraction letter, published in the Nov. 28 SCIENCE, the three authors write that the molecule, "interleukin-4A," which was reported in the March 7, 1986, SCIENCE, does not exist.

The retraction followed unsuccessful attempts in recent weeks to replicate results reported by Milanese, who authored the March 7 paper along with Dana-Farber's Ellis L. Reinherz and Neil E. Richardson. After his Harvard colleagues notified him of their problems, Milanese, who had already returned to Turin, responded with a letter, which, Benacerraf says, "is in our possession."

In the letter, according to Benacerraf, "the type of admissions that have been made" involve "having added some reagents to a [test] tube, without the knowledge of other researchers, to make it appear as though something happened [in the experiment] that did not." Benacerraf said in the telephone interview that he considers the nature of the admissions to involve "tampering" rather than "fabrication" of an entire experiment.

In his telephone conversation with SCIENCE NEWS, Milanese would not comment specifically on how he manipulated the results. "I don't want to say anything about that," he said. But when informed of Benacerraf's statement that Milanese had tampered with the data, Milanese responded: "That's correct. . . . Whatever they [Dana-Farber officials] are saying is [correct]."

Benacerraf says a five-person investigating committee, with members from the institute, Harvard and MIT, has begun to probe the matter. The committee, he says, "will investigate this [incident] and anything [research] this individual has had any remote contact with, as to its authenticity."

In their March 7 paper, Milanese, Reinherz and Richardson reported they had identified a molecule that stimulates resting T lymphocytes, the major class of white blood cells responsible for cell-mediated immunity. The authors reported that the molecule, interleukin-4A, also induced the production of receptors for interleukin-2, which has had preliminary, promising results in the treatment of a limited number of human cancer patients and may hold possibilities in the treatment of AIDS (SN: 12/7/85, p.359).

The Nov. 28 letter is the first published retraction of original data in SCIENCE in about the last 25 years, according to a spokesperson for the journal. In their letter, the three authors write, "In our view, those biological data are not reproducible and are incorrect, and we wish, therefore, to retract the data and the conclusions based on them." Indeed, they write that the reported molecule "with the functional attributes described in that publication" does not exist. They add that a second paper on the subject, published this year in the June 1986 JOURNAL OF EXPERIMENTAL MEDICINE (Vol. 163, No. 6), "is similarly being withdrawn."

Finally, the three authors conclude: "We extend our apologies to the scientific community and trust that certain misinformation presented in that article can be rectified by publication of this retraction letter." Reinherz told SCIENCE NEWS, "I certainly have my views on it [the experiment and retraction] but it's not appropriate for me to comment on it at this time."

—J. Greenberg

Trapping antimatter: Antiprotons on hold

The trouble with trying to study antimatter is that, in our part of the universe at least, it is made only in high-energy activities of ordinary matter. The antimatter therefore comes out with a great deal of energy and a high velocity. To study antimatter precisely, physicists would like to slow it down, even perhaps to stop it. One experiment aimed at doing that at the CERN laboratory in Geneva, Switzerland, has managed to capture antiprotons in a device called a Penning trap and hold them for periods of up to 10 minutes.

"People are used to seeing antiprotons whizzing by at the speed of light," says Gerald Gabrielse of the University of Washington at Seattle, one of the experimenters. "Now we have captured and held them in a container a few centimeters long." The report appears in the Nov. 17 PHYSICAL REVIEW LETTERS.

This achievement could make it possible, among other things, to precisely measure the mass of the antiproton. The scientists in the group are working on an apparatus to do that. The group members, who include Xiang Fei, Kristian Helmerson, Steven L. Rolston, Robert Tjoelker and Thomas A. Trainor of the University of Washington, Hartmut Kalinowsky and Johannes Haas of the University of Mainz, West Germany, and William P. Kells of Fermi National Accelerator Laboratory in Batavia, Ill., intend to return to CERN with the apparatus late in 1987.

For the last 50 years, acceleration has been a large part of the history of nuclear physics and particle physics. Physicists have built ever more powerful accelerators to endow particles (protons, electrons or ions) with ever higher energies to study finer and finer details of the workings of matter. Now, for antiprotons, the word is *de*celeration. Only in recent years have proton *ac*celerators been powerful enough to produce such large numbers of antiprotons that *de*celeration of the antiprotons seemed like a useful idea. CERN has therefore built an apparatus, the Low Energy Antiproton Ring (LEAR), which takes antiprotons, as they are made, with several billion electron-volts energy and "cools" them to an energy of 21.3 million electron-volts.

The present experiment takes the antiprotons as they come out of LEAR and first puts them through a "degrader" made of beryllium, in which they lose energy by collisions with electrons. The antiprotons come out of the degrader with a wide spread of energies, and the thickness of the degrader is adjusted so that the average energy is zero. This means that half the antiprotons get lost in the degrader, but it also means that a sizable number will have energies just above zero. It is these near-zero-energy antiprotons that are employed in the next step.

The Penning trap itself is a series of three electrodes, which are evacuated cylinders and have a magnetic field running lengthwise through them. In the magnetic field the low-energy antiprotons follow helical paths that corkscrew around the field lines in the cylinders.

When the antiprotons enter the trap, the first electrode, known as the entrance-end cap, and the central one are both grounded. The third electrode, the exit-end cap, is connected to a −3,000-volts potential. Thus when antiprotons with less than 3,000 electron-volts energy reach the region of the exit-end cap, they

bounce back along the magnetic field lines.

After 3,000 nanoseconds, before the antiprotons can get back to the other end, the entrance-end cap is dropped to −3,000 volts, and the antiprotons are caught in the trap, bouncing back and forth. After some trapping period, which has ranged from 1 millisecond to 10 minutes, the exit-end cap is grounded, and the trapped antiprotons exit to an instrument that counts them. The whole thing is done at a temperature of 11 °K for the ultrahigh vacuum the low temperature helps provide.

Antimatter is supposed to be the exact mirror image of matter, except that for properties that have polarity, the polarity is reversed. Thus an antiproton should be just like a proton except for having negative electric charge. Particularly the mass of one should exactly equal that of the other, or, to put it another way, the ratio of the mass of the proton to that of the antiproton should be 1.0000 . . . to an infinity of zeroes.

The experiment Gabrielse and his coworkers are now preparing is intended to measure that ratio by alternately trapping protons and antiprotons in the same trap with the same fields and the same ambient conditions. The size of the helix that a particle makes in the magnetic field depends on its mass, so a comparison of the paths of protons and antiprotons should get the mass ratio directly.

In the past, measurements of the mass ratio have been done by introducing antiprotons into atoms in place of electrons and measuring how the substitution changes the energy-level structure of the atoms. Gabrielse expects that the new method will increase the accuracy of the measurement by a factor of 100 or so. Up to now, nobody has found anything that could be called a deviation of the mass ratio from unity, but who knows what further refinement might turn up?

Other experiments that might now be possible with trapped antiprotons, and that have been suggested from time to time by a number of physicists, include the making of antihydrogen by mixing positrons with trapped antiprotons. Is the structure of antihydrogen the precise mirror image of that of hydrogen?

Another possibility is the making of protonium, a system in which a proton and an antiproton are bound together and orbit each other. The force that holds them is mainly electric, but the strong interaction, the force that holds atomic nuclei together, should contribute a part of it. The strong interaction exerts a powerful attraction between protons and protons, between protons and neutrons, and between neutrons and neutrons. Is it equally strong between proton and antiproton, and is it still attractive?

—D. E. Thomsen

Ecological energy: Bigger is better

A large bird like the wild turkey takes in more food than, say, a sparrow. Moreover, despite their typically smaller numbers, large birds as a group may use a disproportionately large share of the resources available within an ecological community, two ecologists now report. Although small birds tend to be much more numerous, this doesn't compensate for their lower food needs per individual.

The finding that larger animals seem to dominate an ecosystem may help answer some evolutionary questions and appears to contradict earlier studies concluding that species of small body size use at least as large a proportion of the resources within ecosystems as their larger relatives. "Our evidence suggests that this is not the case," says James H. Brown of the University of Arizona in Tucson. "On the average, the energy flow through the larger species outweighs that through the smaller species." He and Brian A. Maurer of Brigham Young University in Provo, Utah, report on their work in the Nov. 20 NATURE.

Brown and Maurer analyzed data covering the population density and individual body mass of related species within an ecosystem. They looked at birds in a variety of habitats across North America, rodents in a desert environment, marine fish in tidal pools and perennial plants in five different desert habitats. In all of these groups, the researchers say, species made up of large individuals account for most of the energy flow and resource use within local ecosystems.

What isn't clear is whether the results apply over the whole range of animals or plants within large areas. "I'm quite willing," says John Damuth of the Smithsonian Institution in Washington, D.C., "to accept the idea that within [groups of related species] in local communities, there might very well be an advantage to large size." Nevertheless, he says, according to his analyses, that advantage may disappear on larger scales across broader groups of animals.

Brown and Maurer say their results may help explain evolutionary patterns in which small organisms eventually give rise to gigantic forms that often become extinct. "There are certain roles in communities that can be filled efficiently only by these large species," says Brown, but population densities and sizes also go down. The evolutionary process pits the advantages of being an individual of large size (greater likelihood of survival, more mobility, etc.) against the greater probability of species-wide extinction because of smaller populations and slower growth.

—I. Peterson

Lasers advancing on heart problems

Lasers are making a rapid advance on heart disease. They have already reamed out clogged heart arteries during coronary bypass operations (SN: 11/23/85, p.327), and at the recent American Heart Association meeting in Dallas, researchers detailed initial human trials of lasers to treat erratically beating hearts as well as a simpler approach to atherosclerotic arteries.

While showing promise on two of the major problems of cardiology, lasers have their limitations. Using them to bust the clots involved in heart attacks, for instance, "would be like trying to burn Jell-O," one researcher says.

Several groups have used lasers to treat ventricular tachycardia, a condition in which part of the heart does not properly conduct the electrical signals that trigger beating. The heart contracts erratically, and death can result.

The condition is conventionally treated by drugs; for people who don't respond, operations to freeze or surgically remove the problem area are sometimes done. The laser treatment, say its developers, can benefit people whose arrhythmic areas are difficult to reach with scalpels or freezing devices, and once it is developed it may prove simpler and safer than either cutting or freezing.

Laser destruction of arrhythmias was first done a couple of years ago in France. At the Dallas meeting, Robert H. Svenson and his colleagues at the Sanger Clinic in Charlotte, N.C., described their use of the procedure in 21 patients, and Sanjeev Saksena of Newark (N.J.) Beth Israel Medical Center described its use in 12 patients. In both trials the patients had not responded to drug therapy.

In the Beth Israel procedure, worked out after years of animal trials, surgeons put patients on a bypass machine. With the hearts still beating but not pumping blood, the surgeons cut into the hearts with scalpels or lasers. They checked the heart's conduction patterns by applying electrical current and vaporized problem spots on the inner wall with lasers.

Eleven of the 12 people treated had no more tachycardia; the twelfth responded to drug therapy, says Saksena. About half of them would have been dead within a year, he estimates.

The Charlotte group used a laser tuned to kill but not vaporize the erratically firing cells. One patient died during the procedure and one shortly after; of the remaining 15, all but one appeared to be free of tachycardia, Svenson reported at the meeting.

Lasers have also been used on a more common problem, clogging of the arteries that feed the heart muscle itself. While lasers have been used point-blank