gene into the bone marrow of mice to see if the critical enzyme is then produced. Undegraded fat in Gaucher's disease is stored predominantly in cells derived from bone marrow.

There are indications, notes Ginns, that a "pseudogene" missing parts necessary to code glucocerebrosidase moves into the region of the functional gene and creates the mutation. — *B. Bower*

New plan drafted to save the panda

Despite extensive efforts to protect the giant panda, over the past 10 years its population in China appears to have been more than decimated, according to a study conducted by the Chinese Ministry of Forestry and the Swiss-based World Wildlife Fund (WWF) International. The decline results from sustained human encroachment on the animal's habitat. To counter this threat, WWF consultant John McKinnon and Qiu Minjiang, a Chinese environment official, have drafted a management strategy calling for an immediate strengthening of measures by the Chinese government to protect that habitat. WWF expects the joint plan, currently under study by the Chinese government, to win the government's formal approval within a few months.

It calls not only for greater enforcement of regulations in China's existing 12 panda reserves, but also for establishing a new class of forests called "panda management ranges." As at the reserves, the plan would prohibit hunting, grazing, human settlement, agriculture and burning in the ranges. Logged areas would be reforested with indigenous species and bamboo. On panda habitats outside ranges and reserves, the strategy recommends halting all new human settlement, maintaining forest cover and strictly enforcing panda protection laws.

Another key recommendation is the reestablishment and protection of panda migration corridors to link small, now-isolated subpopulations. Satellite photos indicate that most pandas — shy, solitary inhabitants of China's mountainous bamboo forests — live in groups of fewer than 50, many in groups of as few as 10. Once a group falls to 20 pandas, its members "can be expected to become extinct within a few generations," WWF says.

England's Prince Philip, president of WWF International, announced the strategy last week at the press conference launching a fund-raising campaign to help finance China's efforts to save the remaining 800 to 1,000 wild pandas. Said Prince Philip, "Without this joint effort by the Chinese and WWF we would be condemning the panda to extinction as surely as if we were to go out and deliberately exterminate them."

— *J. Raloff*

Future 'patchwork' cure for hemophilia?

Researchers at the Fred Hutchinson Cancer Research Center and the University of Washington, both in Seattle, are giving a genetic-engineering twist to basic procedures used in skin grafting. Using fibroblast cells infected with viruses carrying specific genes inserted in the laboratory, they hope to cure genetic disease with cell grafts.

Some genetic diseases are characterized by a lack of certain substances, such as a particular enzyme. According to the scientists, patches of fibroblasts that contain genes coding for the missing components may be induced to supply them, thereby reversing the disease.

Unpublished data presented by the scientists at last week's DNA/Hybridoma Congresses in San Francisco suggest this gene-therapy technique may have the potential to someday cure hemophilia, the genetic disease characterized by lack of a blood component essential to normal clotting. Because of this deficiency, hemophiliacs are susceptible to serious blood loss following minor cuts or tooth extraction.

While others are looking at tumor-derived fibroblasts as gene carriers, the Seattle group uses fibroblasts taken from normal individuals or from patients with the deficiency being treated. *In vivo* work has begun in rats and will later move to dogs. Also, because substances produced by the added gene may not effectively reach the plasma from a skin patch, other routes of fibroblast introduction are being studied.

On March 2, the Food and Drug Administration announced the approval of a new drug called tranexamic acid, which protects the weak blood clots formed in hemophiliacs undergoing surgery. Although the drug is an important step for hemophiliacs, its efficacy is affected by severity of the disease. Gene-therapy techniques like that being studied in Seattle may offer a better solution.

In addition, a report from the Seattle scientists in the February PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.84, No.4) describes a similar system that restored production of adenosine deaminase (ADA) in fibroblast cells from a patient with severe combined immunodeficiency syndrome. Without the ADA enzyme to destroy them, certain substances accumulate in the blood of ADA-deficient patients and cause immune system malfunction. Transfer of ADA-coding genetic material made the patient's fibroblasts produce 12 times as much ADA enzyme as was produced by cells from normal individuals. — *D.D. Edwards*

Keys to help unlock photosynthesis

"If we fully understood photosynthesis, it might be possible to build solar chemical factories to make food and fuel faster and with higher overall quality than nature can," says James Norris, a chemist at Argonne (Ill.) National Laboratory. Though scientists are a long way from understanding photosynthesis that well, they are making important inroads. Among the most recent is the discovery of two key photosynthetic structures.

Argonne scientists have just revealed the three-dimensional structure of a molecule known as the photosynthetic reaction center. "It's responsible for converting sunlight into chemical energy — the first step in photosynthesis," explains Marianne Schiffer, a crystallographer in the group.

They worked with *Rhodopseudomonas sphaeroides*, a purple bacterium, for which the constituent subunits of its photosynthetic reaction center were already known. By crystallizing the molecule and studying it with X-ray diffraction techniques, "we now know where they [the subunits] are and how they're related to each other," Schiffer says. This should help others interpret spectroscopic information for related molecules whose structures have not been characterized, she says, such as the more complicated photosynthetic reaction centers in green plants.

Also using X-ray crystallographic techniques, researchers from three West German institutes report in the Feb. 19 NATURE that they have found the structure of the enzyme (RuBPCase) that initiates the reduction of atmospheric carbon dioxide into organic molecules during photosynthesis. (Reduction can involve either the removal of oxygen or the addition of electrons or hydrogen.)

Writing in the same issue of NATURE, plant physiologist Jim Barber from the Imperial College of Science and Technology in London points out that every molecule of carbon incorporated into some compound in the biosphere originates from the catalytic activity of this enzyme. However, he explains, because the enzyme "does not work at maximum efficiency," it constrains the productivity of photosynthesis. Many scientists believe it will be necessary to genetically alter this enzyme or its activities if the efficiency of photosynthesis is to be improved, he says. First, however, its structure had to be determined.

— *J. Raloff*