flush with new information but not quite sure just how it all fits into a comprehensive, and comprehensible, framework.

During the last few years, there have been some observations about the structure of the immune system that have significantly changed the course of immunological research. Of particular significance is the discovery that the immune system is divided into two parts. One, composed of lymphocytes that make antibodies, is known as the B cell system. The other, known as the T cell system, is made up of lymphocytes whose role is to ward off viral infections, protect against cancer, and recognize and reject foreign tissues. Recent advances in techniques for looking at these two types of cell populations have stimulated considerable research, and the nature of B and T cells is one of the hottest topics in contemporary immunology (see *Science*, 6 April).

Progress in understanding the fundamental aspects of the immune system has directly affected clinical experimentation in the field; that clinical work, in turn, has pointed the way to more basic observations.

The clinical studies that have contributed so much to an understanding of how the immune system is designed have been with patients suffering from primary immunodeficiency diseases. These genetic disorders occur with a variety of subtle manifestations but, generally speaking, involve a defect of the B cell system, the T cell system, or both.

One experimental approach to treating immunodeficient individuals, who are likely to die of overwhelming infection if their immune systems cannot be restored, is transplantation of bone marrow or thymus tissue. Bone marrow is the organ from which both B and T cells come. Therefore, bone marrow transplantation should be the answer for people with combined immunodeficiency disease, in which both B and T cells are missing, and for those with B cell defects.

Although bone marrow is the source of T cells also, these cells emerge from the marrow in an immature state and travel to the thymus gland, where they develop. Hence, thymus transplants could be the way to treat people who cannot produce mature T cells.

Marrow and thymus transplantation for the correction if immunodeficiency diseases has been, and is still being, tried. Each apparently works—some of the time. A few lucky patients have lived. Many have died. Bo Dupont's patient may be one of the lucky ones.

Attempts to correct immune deficiencies by bone marrow and thymus grafts began in earnest about 6 years ago, largely as a result of information about the two parts of the immune system and about tissue typing that fell into place at the Sanibel conference. Today, immunologists count at least 16 youngsters in the world whose immune systems have been reconstituted with apparent success by transplanted marrow. Two of them—one a patient of Good's, the other of Bach's—have been doing well since the summer of 1968.

Dupont's patient was suffering from combined immunodeficiency disease (CID), one of the most severe of the many forms of immunodeficiency that have been characterized. Approximately 200 cases of CID have been reported since it was first described in the early 1960's. Its victims often die of massive infection before they are 2 years old.

Dupont, of course, would have liked to use an HL-A identical sibling as the marrow donor for his patient, but there was none. So, he looked for a genetically compatible relative. In selecting the boy's HL-A mismatched uncle, Dupont apparently relied on the fact that the uncle was compatible by another measure—the mixed leukocyte culture (MCL) test, a technique developed by Bach and Amos. In MLC, cells from the patient and his potential organ donor are mixed together. If the patient's cells recognize foreign antigens on the surface of the donor's cells, they will react by enlarging and dividing. If they do not recognize the donor's cells as nonself, there is no reaction. Because some persons who are HL-A identical do react in the mixed cell culture, Bach and others have speculated that something other than HL-A antigens deter-

NAE Council Opts for Split

The governing council of the National Academy of Engineering has formally recommended to the NAE's 360 voting members that the academy dissolve its 9-year partnership with the National Academy of Sciences and reorganize itself under the aegis of a new and independent foundation. The council's decision requires the approval of NAE members at their next two meetings—scheduled for 3 May and 24 October—but establishment of the new foundation does not. NAE officials are expected to file incorporation papers in the District of Columbia shortly.

The council's decision was announced on 26 March in a spare, 150-word statement signed by NAE president Clarence H. Linder. It confirms in essence but adds no detail to an earlier report (*Science*, 30 March) that long negotiations between the NAE and NAS concerning joint operation of the National Research Council had come to naught.

"This action has been taken with much regret," Linder said in his statement. "It arises from the existence of apparently irreconcilable differences in arranging for the joint governance of the National Research Council."

Last November Linder announced that he would resign his post after this year's main meeting in October.

His statement went on to express the hope that the academy of engineering could "continue its cooperation" in study projects with the NAS. However, in a telephone interview from his home in Schenectady, New York, Linder was reluctant to speculate about the form that future relations with the NAS might take. "There is an infinite variety of ways we can work together," he said. "The council and I fully intend to find a way of working with the NAS that is both viable and highly visible."

As one example, Linder suggested that a "purely ad hoc" relationship might be arranged for each project of mutual interest to the two academies. (He did not rule out the possibility, however, that a standing liaison group might be established as a permanent link between the NAS and the NAE.) Linder was equally hesitant to talk about the proposed foundation, except to say that its organization would be "pretty standard" and that funds would probably come from NAE members and other private sources as well as from government contracts.—R.G.