
SCIENCE & TECHNOLOGY

These signposts are human leukocyte antigens (HLA)—protein molecules that float in the cell membrane and trigger a rejection response to foreign substances, such as organ transplants. The antigens also signal the presence of genes that make a person susceptible to certain diseases. Scientists have found eight kinds of antigens that are associated—singly or in combination—with more than 40 afflictions ranging from rheumatoid arthritis to juvenile diabetes.

The HLA known as “B27,” for example, is known to occur in 95 percent of all patients with ankylosing spondylitis, a variety of arthritis also called “poker spine” and frequently misdiagnosed as common low-back pain.

The prediction of susceptibility on the basis of HLA markers can be made for several different types of cancer, multiple sclerosis, chronic active hepatitis, ulcerative colitis, pernicious anemia, and a number of other conditions. Scientists at Rockefeller University, for example, have found that three different markers occur in 75 percent of people with rheumatoid arthritis. The children of some of these patients are now being screened for signs of these markers so that those with proven susceptibility can be monitored and treated promptly before overt symptoms of the disease appear.

While knowledge of susceptibility permits people to follow early preventive measures (e.g., appropriate diet), some scientists are concerned that employers and insurance companies may discriminate against persons tagged as susceptible to HLA-linked diseases. However, Bylinsky concludes that more sophisticated methods of prediction will eventually give rise to prevention and to methods of diagnosis and treatment “more specific, more individualized, less expensive, and considerably more efficient” than those we have now.

Super Machines of the Future

“Mission-Oriented Research for Light Machinery” by Delbert Tesar, in *Science* (Sept. 8, 1978), 1515 Massachusetts Ave. N.W., Washington, D.C. 20005.

U.S. research and development in mechanical technology is in serious decline. As a result, the U.S. trade surplus in manufactured goods dropped from \$20 billion in 1975 to \$5 billion in 1977, contributing to the nation’s overall trade deficit of \$30 billion.

America’s neglect of machine science, writes Tesar, professor of mechanical engineering at the University of Florida in Gainesville, actually dates from the turn of the century when U.S. companies began importing design experts from Europe and American universities virtually abandoned the field. Today, in Georgia, a new tobacco-processing plant, the country’s third largest, uses European machines and is maintained by European technicians. And National Science Foundation funding for basic research is currently 30 times higher per faculty member for physics than for mechanical engineering and mechanics. American industry suffers the consequences; delays of five

SCIENCE & TECHNOLOGY

to seven years between design and production are commonplace.

With oil imports (\$42 billion a year) worsening the U.S. balance of payments deficit, Tesar recommends a vigorous government-university-industry research and development effort focusing on "robotics"—the creation of mechanical devices which combine microelectronics with sophisticated mechanical engineering. Such devices will soon be in great demand worldwide for the remote inspection and maintenance of nuclear reactors, offshore oil drilling equipment, space surveillance vehicles, microsurgery, artificial limbs, and industrial automation.

The United States must quickly shore up its vanishing technological superiority or risk losing valuable markets to Japan, West Germany, and Russia. The United States, says Tesar, "has rested on its industrial laurels too long."

*From Hominid
to Homo Sapiens*

"The Evolution of Man" by Sherwood L. Washburn, in *Scientific American* (Sept. 1978), 415 Madison Ave., New York, N.Y. 10017.

The study of human evolution has undergone radical change in the last 30 years, thanks to new fossil finds, improved understanding of radioactive isotope dating, and revelations in plate tectonics (e.g., that the great land masses of Africa and South America were once quite close). And the application of new specialties, such as molecular anthropology and field observation of primate behavior, offer fresh clues to the relationship between man and other living primates and the dating of their evolutionary divergence.

Evidence gained by specialists in molecular taxonomy (measuring the relationships of species by biochemical techniques) suggests that man is



Field studies of chimpanzees and their use of sticks suggest that, despite his small brain, primitive man might have employed simple tools 4 million years ago.