SCIENCE & TECHNOLOGY

cause it neither pickled nor smoked well.

In their search through ante-bellum medical records, the Kiples found a "Negro disease" with pellagra-like symptoms entering the medical lexicon as early as the mid-1840s. Reaching epidemic levels on plantations, this "new" disease struck blacks almost exclusively. Like canine pellagra, which had already been identified, it covered the tongue with a dark, inflamed coating and was called "black tongue." Its other symptoms (now referred to as the four D's of pellagra—diarrhea, dermatitis, dementia, and death) led doctors to mistake it for numerous other maladies, including diptheria, malaria, dropsy, dysentery, and typhoid pneumonia, with unfortunate results for the suffering blacks. The Kiples' conclusion: Pellagra in the ante-bellum South was disguised "by an orgy of diagnostic blundering."

Revolution in Microelectronics

"Microelectronics" by Robert N. Joyce; "Microelectronics and the Personal Computer" by Alan C. Kay, in *Scientific American* (Sept. 1977), 415 Madison Ave., New York, N.Y. 10017.

It all began 30 years ago with the development of the transistor, a small, low-power electric amplifier that replaced the large, power-hungry vacuum tube. Within the last decade, "microelectronics" has once again revolutionized the $80 billion electronics industry.

Microelectronics is the art of etching complex electronic circuits on tiny silicon chips. A circuit on a chip barely a quarter of an inch square (about the area of the cross section of a pea) can carry more electronic elements than the most complex piece of equipment that could be built in 1950. At the same time, the cost of producing these "integrated circuits" has gone down by 25 percent every year. Joyce, chairman of the Intel Corporation, credits this double breakthrough with most of the technological achievements of the last 10 years, from maps of Mars to the digital watch.

Some of the most far-reaching effects have come in the computer field. Computers need a large number of active circuits; a pocket calculator, for example, requires 100 times as many transistors as a television receiver. But a single chip can carry as many as 6,200 transistors and execute 770,000 instructions per second. Current microcomputers take up 1/30,000th the volume of the first electronic prototype; they are 20 times faster, far more reliable, and cost 1/10,000 as much.

Meanwhile, further miniaturization proceeds. As photoengraving methods reach their optical limits, electron beams and x rays are being substituted for visible light to reduce the dimensions of the "etchings" even further. Kay, a scientist at Xerox's Palo Alto Research Center, predicts the advent of small "personal computers" by the mid-1980s. These will be cheap, portable home devices able to reproduce graphic displays and manipulate the equivalent of several thousand pages of information. Moreover, he says, personal computers will use a simplified programming "language" a 6-year-old can understand.