deep spiritual despair, searched his history and found in Beatrice a vision of Beauty, Truth, and Goodness. His *Divine Comedy* is an allegory of his search and an affirmation of the path he found. By contrast, Sartre, immersed in his celebrated "nausea," found life meaningless and made meaninglessness his standard. Were Dante writing today, Gardner suggests, he would be considered "freakish." Modern culture lionizes the artist for his angst, not his wisdom.

Contemporary novelists do little more than toy with moral standards, and when a Norman Mailer calls a Charles Manson "intellectually courageous," the line between morality and escapist fiction begins to blur. "The brave pursuit of truth," says Gardner, "changes utterly when truth becomes a matter of whim." He finds E. L. Doctorow "meretricious" because the writer avoids involvement in his characters' lives; Donald Barthelme may be an important and serious artist, but from his satire of despair no truths emerge. The doubting or sentimental artist who cannot offer positive models of virtue is a second-rate moralist.

Fiction should inspire but it should not lie. Moral art must speak of what is universal. And moral criticism, Gardner concludes, must be "a spur toward nobler action."

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Black Tongue and the Pellagra Puzzle

"Black Tongue and Black Men: Pellagra and Slavery in the Antebellum South" by Kenneth F. and Virginia H. Kiple, in *Journal of Southern History* (Aug. 1977), Tulane University, New Orelans, La. 70018.

Pellagra, a malady caused by niacin deficiency, reached epidemic proportions among blacks and poor whites in the American South at the turn of the century. Though now nearly extinct, pellagra continues to puzzle scientists. Why did it appear so suddenly, and why had it not infected the pre-Civil War slave population? (The slave "hog-and-hominy" diet was almost perfectly pellagra-producing.) In fact, according to the authors, ante-bellum blacks did *not* escape the disease; its "protean" symptoms simply baffled 19th-century doctors.

First observed in 18th century Europe, pellagra usually strikes heavy consumers of Indian corn, which yields insufficient quantities of tryptophan, a niacin-producing amino acid. The staples of modern diets—milk, vegetables, and beef—all contain sufficient tryptophan, but these were not the staples of the slave diet. Most blacks are lactose intolerant (70–77 percent of U.S. blacks are unable to metabolize milk, compared to 5–19 percent of whites). Moreover, on Southern plantations, many vegetables were disdained as "fodder," and beef was rarely used be-

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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.