

Although he realizes that because he is chairman of the cancer panel he may be accused of having a dog-in-the-manger attitude on the issue of the biomedical panel, Schmidt openly opposes it. "The cancer panel has been an effective tool because the President has genuinely shared the priority it was designed to implement," he said in cables to Kennedy and Javits. "As an instrument to oppose the President's priorities, the panel would not, in my opinion, be effective."

Schmidt also believes that the very uniqueness of the cancer panel has contributed substantially to whatever effectiveness it has had. As cancer chairman, he devotes a considerable amount of his time (about one-third) to the national cancer program. Anyone who assumed the chairmanship of the biomedical panel would, he says, have to treat it as a full-time job. Such a full-time person, operating outside of regular HEW-NIH channels could, he thinks, easily

become a nuisance rather than an effective spokesman.

Nevertheless, Schmidt shares the senators' feeling that biomedical research needs help. "I am highly hopeful that, with a little more time, we can obtain the desired priorities with respect to other biomedical research with the present organization, without risking the loss of the momentum in the cancer program by changing the setup in midstream," he says, although the reason for his hope is not apparent.

He has spoken frequently during the last several months of his disappointment with the Administration's lack of response to the needs of biomedical research.

In recent testimony before Congress, for example, Schmidt declared:

At the time we were urging on the Congress and the Administration a greater effort in cancer, we were very explicit in the position that the increased cancer effort should not be at the expense of other biomedical research. I am not sure that

the cancer effort has been the cause of these other institutes receiving less, but it is difficult to prove to the contrary when the cuts have in fact taken place. Also, regardless of what would have been the case in other circumstances, the fact is that this country cannot afford to reduce the research efforts of these other NIH institutes. . . .

Schmidt has also been adamant in saying that the decision to eliminate training programs is wrong, and he has gone to the White House more than once in an effort to get them restored. "The panel has done its best to present the arguments for this program, and we are disappointed by our inability thus far to get this program fully reinstated," he says.

It is optimistic to think that a panel of advisers the President does not want will fare any better. And, to a President who did away with his entire Science Advisory Committee, a panel for biomedical science might seem like a mini-reincarnation.

—BARBARA J. CULLITON

Bottle-Feeding: Adverse Effects of a Western Technology

Changes in national diet, George Orwell once suggested, are probably more important events in a country's history than changes of dynasty or religion. Orwell might have regarded as particularly significant a change in diet which also represents a deep-rooted shift in social mores—the substitution in infant feeding of the bottle for the human breast.

In the United States, the breast has been gradually transmogrified from its nutritional role into a cosmetic and sexual symbol so potent that an American woman may no longer nurse her baby in public. The trend is beginning to reverse: over the last decade there has been a grass-roots movement to resume breast-feeding, a back-to-nature reaction against the unwarranted intrusion of technology into an intimate aspect of family life. Ironically, just when American mothers are putting babies back to the nipple, women in underdeveloped countries are imitating in droves the Western fad for the bottle.

The flight from nipple to nozzle may be relatively harmless for American

babies. For developing countries, the practice presents some highly insidious aspects. Early abandonment of breast-feeding, especially in poor families, "can be disastrous to infants," warns the Protein Advisory Group of the United Nations. Only in the last 2 years or so have nutritionists begun to appreciate the full extent of the damage, and their concern has yet to be translated into substantial improvement of the situation.

Human milk, strange to say, is the ideal food for human infants. It usually fulfills all the child's nutritional needs for the first 4 to 6 months of life, and up to three-quarters from the 6th to the 12th month or beyond. It is, moreover, hygienic and cheap. Under the conditions common in third world countries, cow's milk is neither. A laborer in Uganda, say, may need to spend a third of his daily wage to buy milk for his baby (in Chile, 20 percent; in Tanzania, 50 percent). The packaged dried milk formulas are even more expensive. The national costs of wasting human milk are formidable. For Kenya, the

yearly loss in breast milk is estimated at \$11.5 million, which is one-fifth of the country's average foreign aid. In Chile, where the proportion of children being breast-fed at 13 months fell from 95 to 5 percent during the last decade, the annual loss of human milk is equivalent to that produced by 32,000 cows.

For the developing world as a whole, the cost of wasted human milk can be put at more than three-quarters of a billion dollars at the very least, and losses are "more likely in the billions," according to Alan Berg, World Bank deputy director for nutrition.*

Such estimates do not take account of medical costs, which are usually ten times greater for bottle-fed babies than for breast-fed. Women in developing countries often lack the resources and domestic skills to prepare formula food hygienically, or even to understand the instructions on the package. Because of its expense, the milk may be often diluted with unclean water. Illnesses such as diarrhea are more common among bottle-fed infants, to such an extent that their mortality rate is much higher than that of babies that are exclusively breast-fed.

As breast-feeding has passed out of vogue in the last two decades, severe forms of malnutrition have started to

* A. Berg, *The Nutrition Factor* (The Brookings Institution, Washington, D.C., 1973). \$3.50. This survey is the source of most of the statistical data quoted here.

appear in babies at a younger age—at an average age of 8 months instead of 18—a trend which is especially ominous because of the importance of good nutrition at this age for brain development.

Of particular significance for developing countries, breast-feeding has a definite contraceptive effect. Recent studies have corroborated the folk belief that breast-feeding (provided it is uninterrupted and not supplemented with other foods) prolongs the interval after delivery during which a woman does not have periods. Among the Rwanda, lactation has been found to exert a pregnancy spacing effect of 15

months. According to one calculation, prolonged lactation in a highly fertile community could prevent up to 20 percent of births.

The breast being so much better than the bottle, why do mothers in developing countries have any truck with cow's milk? The flight from the breast is largely an urban phenomenon. There is a strong tendency in towns for women to follow the example of a small, Westernized elite. They bottle-feed not because they have to go out to work—in Latin America less than one woman in four of childbearing age holds a job—but because the bottle has become a status symbol. Breast-feeding is con-

sidered a vulgar peasant custom, to be abandoned as part of the process of urbanization.

The continuing momentum of this trend owes much to the commercial activities of the baby food industry, together with the failure of pediatricians to put up any determined resistance. A leading critic of bottle-feeding in third world countries is Derrick B. Jelliffe, professor of pediatrics and public health at the University of California, Los Angeles. Accusing the companies of fostering "commercial-genic malnutrition," Jelliffe suggests it is time to reconsider their benign self-image. The pediatric nutritionist in developing countries, he writes, "is left increasingly frustrated by the well-financed, steamroller marketing techniques of the food industry to sell totally unaffordable and inappropriate infant foods in impoverished communities, while mouthing sanctimonious platitudes about their world role in improving child nutrition."

Other nutritionists believe that the pediatricians themselves are as much to blame as the companies. "If pediatricians are willing to be so easily manipulated, if they fail to observe clearly the needs of the poor client, this is as serious a problem as inappropriate advertising," says Max Milner, director of the secretariat for the U.N. Protein Advisory Group. (Milner stresses that this is his personal and not official view.) The Protein Advisory Group has held several meetings with the baby food companies' representatives in an effort to persuade them to reconsider their methods of promotion. To any suggestion that they may be doing harm as well as good, the companies' reaction is one of shock and amazement, says Milner. "'We never lift a finger until we have the complete concurrence of the medical profession,' is their reply. But I think they are fudging because they know the medical profession is easily manipulated."

According to Jelliffe, the baby food companies are experts at "fixing the pediatrician," at manipulation by assistance. When a department of pediatrics was established at an African university, a large baby food company offered a pediatrics prize and a \$1000 research grant. "Here for a very little outlay they had modified the action of the pediatrics department."

Most companies do not overtly claim that bottle-feeding is better than breast-feeding. (An exception is an Indian company whose copy line urges that its



The decline in breast-feeding has prompted the Zambian government to issue this advertisement.

baby food be used "as a substitute for breast milk . . . right from the first week.") An advertisement showing an upper class mother, a healthy baby, and the product name probably makes any explicit claim of superiority unnecessary. What seems more than likely to make some mothers give up breast-feeding far earlier than desirable is the companies' practice of having saleswomen approach mothers right after birth to push their product. According to P. S. Venkatachalam, of the Protein Advisory Group, some companies hire nurses, dress them in uniforms similar to those worn in hospitals, and send them to visit mothers in the maternity ward and, later, in their homes. "They convert them because these mothers will accept anything from someone dressed in a white coat."

The largest baby food company active in developing countries is the Swiss firm Nestlé. In the second rank are three American companies (Ross Laboratories of Columbus, Ohio; Mead Johnson of Evansville, Indiana; and Wyeth Laboratories of Philadelphia) and two English firms (Cow and Gate, and Glaxo). Bob A. Benton, director of nutritional research at Ross Laboratories, does not deny that the companies send nurses into maternity wards. "It's a highly competitive market, and hospital is an obvious place to reach the new mother. We don't tell them to bottle-feed instead of breast-feed—in fact, our nurses are trained to teach all aspects of mothercraft, including breast-feeding—but the problem is you want to get the women started off on your product before someone else's."

According to Benton, the baby food companies are simply "fulfilling a need." The strong desire of women to bottle-feed—a "mystical feeling that the formulas have something"—has nothing to do with the industry's advertising, he says. Benton concedes that some women may change over too soon from breast to bottle. "Maybe we as an industry can try to change our advertising in this respect. That would need an agreement between the various companies, and we are working with the U.N.'s Protein Advisory Group toward such an end."

Lactation is an ancient process even by evolutionary standards, and on teleological grounds it is reasonable to suppose that the milk of each species is specially adapted to its needs. Whale milk, for example, is laden with high-calorie fat, which is suitable for animals that live in cold waters; rabbit

milk is particularly rich in protein, which is probably related to the very rapid early growth of their offspring. Within the last few years, it has become increasingly clear that human

milk, too, is uniquely suited to the human child. The biochemistry of the milk is exactly matched to that of the infant. Human milk possesses unidentified factors which protect against

DOD Said to Admit to Weather War

A growing number of unofficial reports and public statements indicate that, at a top secret briefing on Capitol Hill last week, the Department of Defense (DOD) at last acknowledged to civilians that it engaged in cloud-seeding operations for military purposes over Southeast Asia in the Vietnam war. Some of the reports indicate that the activities continued into 1972—or throughout the first term of the Nixon Administration. Allegations of cloud-seeding, known as weather modification, were made in the *Pentagon Papers* (*Science*, 16 June 1972) and by the *New York Times*. However, the Pentagon has never confirmed or denied the charges in their entirety.

At the briefing on 20 March, however, two high-ranking military officials described cloud-seeding efforts aimed at muddy infiltration routes in Laos, Cambodia, South Vietnam, and North Vietnam from 1967 until 1972, according to reliable sources close to the briefing. The briefing is said to have described a series of over 1000 sorties and to have given estimates of how successful the military thought they were in artificially inducing rain, according to these sources. The program was, and still is, "at the highest level of classification," according to yet another source. The briefing was given by Dennis J. Doolin, Deputy Assistant Secretary of Defense for East Asia and Pacific Affairs, and Raymond B. Furlong, a brigadier general who is principal Deputy Assistant Secretary of Defense for Legislative Affairs. The persons briefed were Senator Claiborne Pell (D-R.I.) who has led Senate inquiries into weather modification and proposed a treaty banning environmental warfare, Senator Clifford Case (R-N.J.), congressional staffers, and executive agency officials.

These background reports appear to tally with public statements by Senator Pell, who has a reputation for being tight-lipped on national security matters. In an awkward exchange with reporters after the classified session, Pell was reported by the *Providence Journal* as having said, "There's no question that they produced the activities," and he is quoted as having referred to the Pentagon as having "added to the rains." When queried by *Science*, Pell flatly declined to discuss these remarks or the substance of the briefing on national security grounds. But he added, "Nothing in the briefing dissuaded me from my view that we may have engaged in these activities in Southeast Asia."

Pell said that he thinks the material discussed in the briefing should be declassified in its entirety and that he believes the DOD is moving to do so. "I could not see a single word" that would jeopardize national security by its release, he said. "The whole program and the sensitivities about it are all inflated." In a new move the National Security Council has requested DOD to review its policies on weather modification and other forms of environmental warfare, and Congress intends to press DOD for the results.

In addition, the *Providence Sunday Journal* in mid-March reported the existence of a classified letter—from Melvin R. Laird, Nixon's first Secretary of Defense, to the Senate Foreign Relations Committee—in which he altered his 1972 testimony that the DOD "is not and has not" engaged in cloud-seeding "over North Vietnam." Laird reportedly wrote that the testimony was "correct as far as it applies to the period of time that I was Secretary of Defense." The fact that Laird is trying to set the record straight and DOD has finally briefed Congress indicates that fuller DOD revelations could be on the way.—D.S.

staphylococcal infections, and other ingredients which may defend against influenza virus.†

Cow's milk, unsurprisingly, does not possess these qualities, its only advantage being its usefulness for feeding babies in Westernized urban societies whose mothers go out to work.

This seems hardly sufficient to explain why breast-feeding in the United States became so unpopular—the proportion of women breast-feeding their babies by the time they left maternity hospital had fallen to 38 percent by 1946, 21 percent by 1956, and a decade later to only 18 percent. Another probable factor in the decline is the Western fetish for the breast as sex symbol. Women fear that nursing a child will impair the shape of the breasts and their sexual attractiveness. (According to Dr. Spock, this fear is groundless. Provided that a suitable brassiere is worn to keep the skin from being stretched during lactation, the breasts return to their usual size after weaning.)

The philosophical basis of the modern decline, according to Jelliffe, lies in the technology-dominated medicine of the latter half of the 19th century, in which the scientific aspects of medicine were emphasized at the expense of the biological. Pediatricians thought it quite natural for a man-made formula to be an adequate substitute for mother's milk. The same attitude is re-

flected in the hospital routine of separating mothers from their babies. This "mechanistic" practice, as Jelliffe calls it, seemingly designed "for quasimilitary regimentation of patients and for the convenience of the medical staff rather than for families in distress," continues to this day, despite the developing awareness of the emotional importance of close mother-child relationships.

The recent revival of breast-feeding in the United States seems to be in large part a reaction against the success of modern medicine in dehumanizing the bonds between mother and child. The revival is most evident among educated women—according to national surveys taken in 1971, 32 percent of college-educated mothers breast-fed, compared with 8 percent of grade school-educated women. Although many individual doctors recommend breast-feeding, the medical profession as a whole has stood on the sidelines throughout this minor social revolution. "The medical profession was not supportive of the decision to breast-feed," says Helen A. Guthrie, professor of nutrition at Pennsylvania State University, who conducted a survey in 1965 to find out what was influencing women to breast-feed. A major U.S. textbook on pediatrics allocates only one and a half of its 1600 pages to breast-feeding, and these fail even to mention let-down reflex, the physiological mechanism that allows the milk to flow. Medical schools still devote

very little attention to breast-feeding, not because they have anything particular against it, but because nutrition in general is a subject too unimportant to take up much room in the curriculum. The only organized activity to promote breast-feeding comes from La Leche League, a voluntary women's group.

The stigma against breast-feeding began to spread from the United States and Europe to third world countries following World War II. One thing that made possible this somewhat surprising imitation of Western habits—animal milk is not regarded as kosher in many Eastern cultures—was the fact that a copious by-product of the butter industry is dried skim milk, large quantities of which have been made available in developing countries under the Food for Peace program.

Western-trained pediatricians and the foreign expansion of the European and American baby food industries completed the conditions under which bottle-feeding could flourish.

Yet the bottle, wherever it usurps the breast, is a Western export that third world countries could do well without. Reeducation of pediatricians and regulation of the more pernicious promotional activities of the baby food industry would seem to be obvious steps to take. If there is any technology in need of assessment, that of replacing mother's milk would seem to be a leading candidate, both at home and abroad.—NICHOLAS WADE

† P. György, *Am. J. Clin. Nutr.* 24, 970 (1971).

Metrication: Craft Unions Seek to Block Conversion Bill

At House hearings last year on metric conversion in America, Lord Ritchie-Calder, former chairman of the United Kingdom Metrication Board, said: "I don't know what will be the battleground for metrication in the United States. In Australia it was the schooner [about 20 ounces, usually of beer], and in Britain it was, and still is, the sacred pint."

Now, as Congress edges toward a vote on whether the United States should embark on a coordinated program to go metric, it appears that

the battlegrounds, at least in the early stages, are the tool kits of electricians, carpenters, and machinists.

The House's metric conversion bill (H.R. 11035) was expected by many to breeze through. Instead, it was held up in the rules committee for some 4 months while AFL-CIO lobbyists, as well as committee chairman Ray Madden (D-Ind.), sought strenuously to kill it. They lost that stage of the battle when the bill, with Madden finally concurring, was granted a rule in early March. [The Senate's bill, intro-

duced by Claiborne Pell (D-R.I.) and Daniel Inouye (D-Hawaii), is sitting still in the Commerce Committee, while the Senate awaits House action. Both bills call for a 10-year, voluntary changeover coordinated by a metric conversion board.]

Basically, there are two groups who fear the economic impacts of conversion. One is a coalition of three powerful AFL-CIO unions: the International Brotherhood of Electrical Workers (IBEW); the International Association of Machinists and Aerospace Workers, whose membership exceeds 600,000; and the United Brotherhood of Carpenters and Joiners of America. Representatives from these unions say that workers will need reimbursement up to \$5000 for buying metricated tools; that mammoth retraining efforts will be necessary and that many workers, particularly older ones, face obsolescence. What may worry them even more is