

ON HUMAN NATURE

Melvin Konner



Unknown artist, *The She Wolf Suckling Romulus and Remus*, c. 1450

The Nursing Knot

Around a hundred million years ago—give or take, say, twenty or thirty million—our ancestors, the early mammals, ushered a brand-new physiological function into the realm of vertebrate biology. Lactation, the production of milky fluids for sustenance of the young, is today viewed as a hallmark of the mammalian class, along with body hair, homiothermy (precise stabilization of body temperature), and a well-developed limbic system—that amalgam of cerebral tissue that plays a key role in emotion, learning, memory, and motivation. We think of these signal adaptations not only as the defining characteristics of our class (the things we had to remember about it to pass high school biology) but also as the key to our success. This was the secret code that somehow unlocked the potential of our ancestors, enabling them to achieve that vast evolutionary expansion known as adaptive radiation and to leave the dinosaurs in the dust.

Of course, we have lately come to view dinosaurs as more dignified. New fossil discoveries and fresh analyses of existing evidence suggest that they too may have

been homiotherms and perhaps even cared for their young. Indeed, some paleontologists no longer attribute the extinction of the dinosaurs to the animals' inadequacies (a blame-the-victim notion that never did seem very polite) but rather to some catastrophe at the end of the Cretaceous period.

Be that as it may, the mammals *did* make it, and have continued to make it for at least seventy million years. They filled the earth with their kind and have resulted, ultimately, in us. This gives us a forgivable bias toward other mammals, and an intense curiosity about what our precursors did right.

The nursing knot sits tightly wound at the center of this puzzle, and it is a knot in two senses. The first and more obvious is that of a scientific-problem knot, being picked at by investigators of many stripes. How does nursing work? What are the relative roles of hormones and nerve circuits? What is the real nutritional value of mother's milk? Answers to these questions can partly explain how lactation helped fuel the mammals' rapid proliferation and thus how it secured a place in our

genetic endowment. Additional clues may come from examining the second, metaphoric nursing knot: like almost nothing else in the annals of vertebrate life, nursing ties two creatures into a critical dependency, a prolonged and almost constant mutual regulation that affects the physiology and behavior of mother and offspring alike. For the one, the rewards are physical pleasure, a salutary adjustment of fertility patterns, and that evolutionary sine qua non, transmission of the genes; for the other, the reward is life itself. Perhaps it is in this complex bond of mutual influence, more than in any nutritional benefit, that the evolutionary value of nursing is to be found.

I did not pay much attention to the nursing knot until I went to Africa. I had grown up in New York City during the fifties, when nursing, having been sternly discouraged by pediatricians, was not exactly seen on every street corner. Many physicians had concluded that bottle-feeding—for humans, in any case—was medically superior for all concerned. Meanwhile, despite the insistence of

Freudians that an infant's lifelong sense of security is forged during its "oral" stage, behavioral scientists were accumulating evidence that it didn't much matter how you were fed as long as you got, first, enough nutrition to thrive and, second, enough love to keep you interested. American women in droves abandoned breast-feeding.

It is not surprising, then, that when I went to northwestern Botswana in 1969 to study infants among the !Kung San hunter-gatherers, my infant-observation protocol—a kind of behavioral scientists' shorthand—did not even have a symbol for *nurse*. This omission presented itself immediately as a glaring one. !Kung toddlers, rarely separated from their mothers, would nurse several times an hour until at least age three, and in the absence of a younger sibling until age six. (One boy observed by another anthropologist, Patricia Draper, was his mother's coddled last child and would take an occasional suck until age eight, when the ridicule of playmates induced him to stop.) As for the infants, it was barely possible to squeeze in a fifteen-minute observation of their play habits between bouts of nursing, and I finally quit trying.

In this culture, nursing was central not only in the life of the infant; the mother could count on spending most of her life either nursing or pregnant, from her first fertile period, in her late teens, until her last, sometime around age forty. Menstruation was not the more or less constant round common in the West but a relatively infrequent event, suppressed by nursing for nearly two years after each birth and then by the almost inevitable ensuing pregnancy. After adolescence a woman's breasts were no longer primarily objects of sexual attention; they would be freely accessible to a succession of insatiable little creatures—a situation made tolerable only by great forbearance and, presumably, great quantities of love.

As I discovered after returning from the field in 1971, virtually all nonquestrian hunter-gatherer societies that have been studied—particularly those in warmer climates—have or had nursing habits roughly similar to those of the !Kung. Indeed, such habits have been observed in many other nonindustrial small-scale societies. The continual breast-feeding of infants and toddlers seems to be a basic human pattern and thus offers a solution to a long-standing paradox.

In the early 1970s, the ethologist Nicholas Blurton Jones, of the University of California at Los Angeles, noticed that the higher primates—the monkeys and apes that are our closest relatives—share certain characteristics of lactation with mammals whose young remain in continuous contact with their mothers, clinging to them tenaciously or, perhaps, being

carried around indulgently. The milk of these mammals is relatively watery, yet still adequate for its purpose; the young nurse frequently but suck slowly. On the other hand, mammals that leave their young in caches or nests—rabbits are an example—tend to nurse less frequently. (Among some tree shrews, at the extreme of this continuum, the mother shows up only once every forty-eight hours.) In contrast with "carrying" creatures, "caching" ones have rich thick fatty milk, and their young suck at a prodigious rate whenever given the chance.

There are many variations in the milk composition of mammals, but this cache-and-carry continuum seems to cut across them all—except, it has long seemed, in the case of our species; humans in industrialized societies space their nursing sessions at least several hours apart and deposit their young in cachelike cribs and playpens, yet they have thinnish milk and the infants have low sucking rates. The intense nursing pattern of the !Kung seems to explain the anomaly: we are by nature a carrying species and were urged into the cache mode only by the dictates of modern life, long after our basic genetic composition had congealed.

But the question remains: Why did nursing arise in the first place? And what compelled humans, during the hunting-gathering phase of our evolution, to carry it to such an extreme? Nutrition, of course, is one primary benefit. A more subtle, and fascinating, answer centers on the transfer of disease immunity. Human milk contains antibodies, and, with each suck, the infant also ingests millions of macrophages that can assault gut bacteria. This is not just general protection. The mother forms specific antibodies against germs to which she is exposed and transfers the antibodies to the infant, who almost certainly has been exposed to the same germs and is therefore in need of exactly this protection. (It could even be argued that, because of the exponential growth of bacteria in the gut, it was advantageous to deliver the macrophage-laden milk as often as every fifteen minutes to keep the child's gastrointestinal tract under surveillance and control.)

Perhaps the most interesting evolutionary rationales for nursing have to do not with what is transmitted by the milk but with the act of nursing—its effect on the behavior of mother and offspring and on the family's reproductive future. Take, for example, protection through proximity. During higher-primate evolution, an infant separated from its mother was likely quite vulnerable to predation. Frequent nursing, then, may have been just one of evolution's tactics for keeping mother and infant together. It may also have been a kind of automatic family

planning, a possibility suggested by the work of Nancy Howell and Richard Lee, of the University of Toronto. They have shown that the !Kung population grows much more slowly than other third-world populations, at a rate just barely above zero population growth. Since mortality is not unusually high, the explanation must lie in the four-year !Kung birth interval, which is about twice as long as that found in most other parts of Africa.

In 1975, after my second trip to Botswana, Carol Worthman, now of Harvard University, and I explored the possibility that the solution to this puzzle lay in the effect of frequent nursing on the hormonal system. We found that !Kung women, besides not menstruating for nearly two years after giving birth, had profoundly suppressed levels of estrogen and progesterone in their blood. We suspected that this was caused by the hormone prolactin, which inhibits the ovarian cycle while promoting milk production, and that frequent nursing stimulated the release of prolactin just often enough to preclude pregnancy. Later we measured prolactin directly, and found it in levels far above normal. Studies of frequently nursing American women, conducted by Judith Stern, of Rutgers University, and Seymour Reichlin and Talia Herman, of the New England Medical Center, confirmed these hormonal consequences, under more rigidly controlled conditions. In addition, laboratory studies of monkeys have shown that frequent nursing could interfere with reproduction by disrupting the secretion of gonadotrophic (ovary-stimulating) hormones from the pituitary gland, even without mediation by prolactin; this suggested a second mechanism linking frequent nursing to prolonged birth spacing.

Thus, it is possible that the mammals of the Mesozoic era discovered not only a strategy for infant nutrition and protection against disease and predators but also a means of regulating birth spacing to maximize the number of surviving offspring. (After all, the higher primates require an extraordinarily long period of parental nurturing and teaching, so an overabundance of offspring in an early hunter-gatherer society might have left them all ill equipped to face their environment.) This mechanism, though imperfect, operates almost everywhere in the developing world today; more births are prevented by nursing than by any other means of contraception.

In an evolutionary sense, love and lactation arose in one great phylogenetic breath. The neuroanatomist Paul MacLean views the main accomplishment of the early mammals as the invention of the paleomammalian brain, including the limbic system, which arose some two

hundred million years ago, during the reptilian phase of evolution, but did not reach full flower until at least one hundred million years later, when nursing too was gaining a foothold. MacLean and his colleagues have shown that the limbic system suffices to orchestrate the basic behaviors of mammalian motherhood; one can deprive a female hamster of the neocortex (the neomammalian brain) at birth, and still she will grow up capable of most functions in the reproductive realm, including courtship, sex, and parental care. In coordinating these functions, the limbic system likely mediates sensations that are the emotional precursors of what we call love.

It was on the foundation of love and lactation (as well as that of homoiothermy) that the mammals would later build their great complex of vigorous activity, braininess, and learning. Is it farfetched, then, to read the three central achievements of the early mammals—homoiothermy, lactation, and the development of the limbic system—as *warmth, interdependency, and emotion*? Perhaps. But such a reading at least raises a worthwhile question: Once we have explained lactation in mechanistic terms—pinpointed its diverse contributions to the survival and transmission of the genes—what is left to say about its psychological effect, its relation to the organism's inner life? Sadly, very little, for the time being anyway. Science has provided no solid evidence that nursing has a lasting effect within the individual human life cycle. In one recent study, Marjorie Elias, of Harvard University, compared intensively nursed infants with infants nursed much less frequently and weaned much earlier. In a wide-ranging battery of tests of social, emotional, cognitive, and motor development, she found no major differences attributable to nursing between the groups.

So, are the arguments for breast-feeding entirely evolutionary and hence outmoded? Does nursing provide merely those things, such as nutrition, immunity, and birthrate regulation, that we can now provide in other ways? I would be more inclined to think so were it not for an experience I have had innumerable times—telling a nursing mother there is no evidence that it matters, only to see her give me a beatific, pitying smile that tells me I am an utter fool. Perhaps questioning the benefits of nursing is like saying there is no evidence that, on balance, sex has a positive permanent psychological effect on you—an observation that needs only the response, "So what?" ●

MELVIN KONNER, author of *THE TANGLED WING: BIOLOGICAL CONSTRAINTS ON THE HUMAN SPIRIT*, teaches anthropology at Emory University, in Atlanta, and has just completed medical school.