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Lactose Intolerance and the Rise of Milk Culture in China

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In 2006, on a visit to an industrial dairy in Chongqing, China's then-premier Wen Jiabao declared, "I have a dream that every Chinese person—and children foremost—will be able to drink a *jin* [about five hundred milliliters] of milk every day."¹ Considering that in the United States, average milk consumption is many times higher than in China and still is only about two hundred milliliters a day, this does indeed seem like a distant dream for China. But it shows the extent to which fresh milk has come to be seen as an essential food there, and milk consumption an index of a healthy national diet. The Chinese "food pagoda," first produced in 2007 to illustrate the dietary recommendations of the government's Chinese Nutrition Society, accords fresh milk a prominent position (see figure 12.1). The accompanying recommendations, updated in 2016, suggest that a Chinese adult should consume three hundred grams of dairy per day, not quite fulfilling Wen's dream but an aspirational amount nonetheless.²

Whether because of official encouragement or for other reasons, Chinese consumers have rapidly increased their intake of fresh milk. Domestic consumption grew more than threefold in the first decade of the twenty-first century, fueling a dairy industry boom in China and expressions of concern outside of China at the way burgeoning demand was changing the global market.³ Even a milk-contamination scandal that dominated national and international headlines in 2008 did not appreciably dim Chinese enthusiasm for the stuff.⁴ In short, milk has become a good food, par excellence, in China today. By contrast, modern scholars examining foodways in

中国居民平衡膳食宝塔 (2016)

Figure 12.1 The Chinese Food Pagoda, 2016. The left side of the pagoda's second-highest tier represents dairy products. Used with permission from Chinese Nutrition Society, 2016 *Dietary Guideline for Chinese* (Zhongguo jumin shanshi zhinan 2016) (Beijing: People's Medical Publishing House, 2016).

the past have suggested that milk was peripheral to or absent from the Chinese diet for most of history. Anthropologist Frederick J. Simoons, who divided the globe into “milking” and “nonmilking” cultures, saw the Chinese as an example of a nonmilking people; likewise, Andrea Wiley writes about China as a historically “lactophobic” society in which milk was the object of revulsion.⁵ Some have presented the relative scarcity of milk in traditional Chinese diets as a puzzle: “Why did the Chinese fail to incorporate milk and milk products into their food system?” asked H. T. Huang in 2002.⁶ Others have supplied answers to this puzzle by pointing to cultural or physiological factors that worked against dairy’s assimilation in China. E. N. Anderson and Marja L. Anderson, for example, have suggested

that the association of dairy with koumiss-drinking Mongols or yak butter-eating Tibetans—peoples the Han Chinese considered less civilized than themselves—made it less palatable for late-imperial Chinese.⁷ In addition to cultural prejudices, they note, there was a physiological obstacle to the acceptance of fresh milk: for much of the Chinese population, drinking milk induces varying degrees of physical discomfort. Most Chinese bodies beyond infancy produce little to none of the enzyme required to process the sugars in milk, so drinking too much can cause gas, bloating, and diarrhea. Although this is the normal condition of most healthy Chinese adults—indeed, of most healthy adults around the globe—biomedical scientists think of it as a defect and label it “lactose intolerance.”⁸

While it is true that milk products were never central to the Chinese diet, and certainly not a daily necessity as they were for China’s nomadic neighbors, the distinction between historical milkers and nonmilkers, lactophiles and lactophobes, is overdrawn. The Chinese did, in fact, milk livestock and consume dairy before modern times. As early as the Former Han Dynasty (207 BC–9 AD) the imperial household employed an official who collected mare’s milk for “mare’s-milk wine.”⁹ The sixth-century AD agricultural text *Qimin yaoshu* includes careful instructions for milking cows and goats or sheep, and for producing with their milk a fermented beverage called *luo*.¹⁰ It might be more accurate, then, to describe traditional China as a “less-milking” society. Similarly, the descriptor “lactophobe” does not adequately represent a culture that, as Françoise Sabban has shown, demonstrated a quite sophisticated knowledge of milk and its properties, producing a range of dairy foods from fermented milk to butter to cheeselike treats.¹¹ Although descriptions in classical texts are not always clear enough to give a good sense of what exactly these foods were, some (*su*) resembled butter, others (*tihu*) clarified butter, still others milk curds (*rufu*) or a kind of buttermilk or liquid yogurt (*luo*).¹² Chinese medical texts, too, feature diverse milks used in diverse ways, without any hint of aversion to the substance.

This chapter suggests that in twentieth-century China, uneven political power combined with universalizing scientific culture to give milk a new moral meaning. In traditional Chinese medical and dietetic literature, dairy had been, for the most part, a morally neutral substance. Medical and dietetic texts presented it as a food well suited to some bodies under some conditions—northerners, for example, or convalescents. In the modern paradigm, milk became a universal good, and many thought

increasing the whole population's consumption of dairy would make people taller, stronger, more active, and innovative.¹³ Drinking milk, and fostering milk drinking, therefore became duties of good citizens charged with contributing their strength and growth to the nation, and of government officials such as Wen Jiabao responsible for nurturing and protecting the people's health. In the process, bodies unable to easily process milk, the majority across East Asia, came to be seen as "intolerant" of a valuable foodstuff and therefore unable to take advantage of the nutritional benefits it offers. Making fresh milk into a universally good food meant making Chinese bodies into bad bodies.

Although a number of histories of milk have appeared in recent years, chronicling fresh milk's rise and entrenchment in Western societies and economies, almost all of these histories have been confined to a Euro-American perspective.¹⁴ When they mention lactose intolerance, it is as a kind of aside, a shorthand explanation for why milk did not matter as much in most other parts of the world.¹⁵ At the same time, archaeologists and paleoanthropologists have grown very interested in lactose *tolerance*, a genetic trait that spread through a few small human populations six thousand to eight thousand years ago.¹⁶ Their studies focus on identifying the origins of lactose tolerance and explaining its spread. My approach differs from either of these existing bodies of scholarship. I am interested in how the concept of lactose intolerance was constructed, and how its construction has both reflected and reinforced Western-derived dietary norms. The case of China, where nutritionists have come to see lactose intolerance as a problem as they have promoted higher levels of milk consumption, illustrates this dynamic well.

Milk in Traditional Chinese Cuisine, Medicine, and Dietetics

Let us first examine attitudes toward milk expressed in Chinese texts before the twentieth century. Medical and dietetic sources show that Chinese intellectuals perceived milk as a useful substance for particular kinds of people in particular kinds of circumstances, and did not universally abhor dairy, as some accounts have implied. However, they also did not value milk as a universally good food for everyone. And for the most part, they seem to have ascribed little moral significance to milk.

Scholars have documented diverse uses of milk in Chinese cuisine.¹⁷ But they have paid far less attention to milk's medical uses, even though Chinese people were as likely to encounter dairy in a therapeutic form as in a form meant primarily for delectation. Medical writers did not present dairy foods as a daily necessity or something that most people could consume in large amounts. Instead, they wrote about dairy as appropriate for certain kinds of people, and for certain stages of life. The *Yellow Emperor's Inner Canon* (*Huangdi neijing*), compiled around the first century BC, suggests that people from different regions are constitutionally suited to the consumption of different foods. Milk, in this schema, is for people from the north, probably meaning the frontier region around the Ordos Loop of the Yellow River and what is today Mongolia:

The North,
this is the region where heaven and earth secure and store.

Its land lies at a high elevation,
[its people] live in earthen mounds.

Wind, cold, and piercing frost [dominate].
Its people find joy in living in the wilderness and in consuming milk.¹⁸

Later doctors elaborated on the idea that bodies bore distinctive characteristics of their geographical origins, and that the foods appropriate for a northerner would sicken a southerner and vice versa. In his eighth-century *Materia Medica for Dietary Therapy* (*Shiliao bencao*), for example, Meng Shen writes of seaweed that while “many southerners eat this” with no ill effect, problems have arisen because “they have transmitted [this habit] to northerners. When northerners eat it, it doubly generates the various diseases, and is not suitable for them.”¹⁹ Likewise, milk did not suit southern bodies. As Marta Hanson has shown, this view of northern and southern constitutions as fundamentally different persisted and flourished well into the nineteenth century.²⁰

Physicians perceived milk as having cooling properties, making it useful for illnesses that were caused by heat or were hot in nature (*xing*).²¹ Seventh-century drug formulas recommend consuming pills made with milk to counteract the effects of drinking wine, understood as warming, and eating other foods thought to be heat-producing, such as wheat noodles.²² Milk was also frequently included in suggested treatments for *xiaoke*, a disorder caused by depletion and excess internal heat and

characterized by thirst, hunger, frequent urination, and weight loss.²³ Other formulas incorporate milk for conditions as diverse as chills and fever, infection by ghost *qi*, vomiting in children, and ulcers on the back.²⁴

Some formulas, notably, indicate that milk was also considered a kind of laxative or purgative; they state that inducing diarrhea is the sign of successful treatment with some milk-based decoctions.²⁵ This seems to have been a common perception, historically, among populations with high rates of lactose intolerance, in whom milk consumption is indeed likely to produce loose stools. Older women in Malaysia and Indonesia recount using milk in this way,²⁶ and in Ayurvedic medicine in South Asia milk was thought to facilitate digestion, “even being used as an enema or purgative.”²⁷ In southern Europe, too, where rates of lactose intolerance are higher than in the north, a Renaissance scholar wrote of milk that it served to “loosen the bowels.”²⁸

Importantly, in both its culinary and medical uses, milk was processed: heated, dried, or fermented. As a beverage or food it became koumiss, cheese, or yogurt. In drug formulas, most commonly, it was boiled to produce an herbal and mineral decoction that was then drunk. In some prescriptions it was used to help bind drug ingredients into pill form, or recommended as a way to wash down a dose of pills. Even in the latter case, however, milk was not meant to be drunk cold: almost every mention of the stuff specifies that it is to be boiled (*zhu*) or sautéed (*jian*), and the same formulas that recommend milk to disperse heat also proscribe drinking cold liquids.²⁹ Processing milk in such ways reduces its lactose content, making it more easily digestible.

Milk in pre-modern China does not seem to have possessed any strong or consistent moral meaning. In medical and culinary texts, dairy was morally neutral, neither inherently good nor inherently bad, unlike in India, where cow's milk was considered pure and purifying, reflecting the sanctity of the animal in Hindu traditions.³⁰ In Chinese Buddhism, milk could be freighted with moral meaning, but there its significance was ambiguous: drinking cow's milk could be considered stealing from the calf (therefore, immoral), but using cow's milk in Buddhist ritual was a merit-earning activity (morally good).³¹ In other words, the value of milk in premodern China was highly context dependent; it was appropriate for people from some regions and for those with particular health problems, but not universally health-promoting or universally virtuous. This reflected an “eat what you are” approach to diet: if you were a northerner, a

*xiao*ke sufferer, or a septuagenarian, dairy was for you, though not in the form of fresh milk. If not, it was unlikely to prove beneficial.

From “Eat What You Are” to “You Are What You Eat”: Milk and Dietary Determinism in Modern Asia

In the twentieth century, new Western ideas about diet and nation took root in China and began to compete with and transform preexisting ideas and practices. These ideas prominently featured what the historian Rachel Laudan has called “dietary determinism.” In contrast to the “eat what you are” perspective described above, dietary determinism fostered the idea that you are what you eat. Eating like the elite, many thought, would confer on the eater the qualities that had made the elite so successful. By extension, a national diet that reproduced what people ate in the world’s most powerful countries could strengthen a comparatively weak state. Thus, the “power cuisine” of Western Europe and America, full of wheat, meat, and dairy, spread from the elite to ordinary people, and from Western powers to the rest of the world.³² When it came to milk, dietary determinists in the 1920s rhapsodized, “The races which have subsisted on liberal milk diets are the ones who have made history and who have contributed the most to the advancement of civilization.”³³ Others concurred, “The people who have achieved, who have become large, strong, vigorous people, who have reduced their infant mortality, who have the best trades in the world, who have an appreciation for art, literature and music, who are progressive in science and every activity of the human intellect are the people who have used liberal amounts of milk and its products.”³⁴

Such arguments rested on two kinds of parochialism. One was ignorance of the fact that dairying was prominent in some places outside of Europe and America, among people whom Western intellectuals did not consider “large, strong, and vigorous.” Praise of milk’s transformative power “conveniently ignored the long-standing dairy traditions of India,” for example, as Wiley has noted.³⁵ The other was unawareness of how recently the habit of drinking fresh milk had developed in the West. E. Melanie DuPuis writes that in the United States, most dairy had been consumed in the form of cheese or butter as late as the mid-nineteenth century. When Americans had imbibed dairy in liquid form it had usually

been buttermilk, a byproduct of butter making. But the changes that urbanization wrought in women's lives precipitated a decline in breast-feeding and fueled demand for a year-round supply of fresh cow's milk as nourishment for infants. At the same time, religious belief that milk was God's provision for human sustenance combined with scientific efforts to itemize and measure nutrients to give fresh milk the reputation of being a "perfect" or "complete" food. By the early twentieth century, Westerners had come to think of fresh milk as essential to a healthy diet. Moreover, they thought of it—erroneously—as an ancient staple of Judeo-Christian civilization, prominent since Biblical times.³⁶

Even if the claim that drinking fresh milk fueled national supremacy rested on false premises, however, it had tremendous influence in late nineteenth- and early twentieth-century Japan and China. Susan Glosser has shown how Chinese dairy boosters promoted milk consumption as a way to increase China's fitness in the Darwinian struggle for national survival.³⁷ In Meiji and Taishō Japan, as Izumi Nakayama highlights in this volume, eminent political and medical authorities—even the Meiji Emperor himself!—promoted cow's milk consumption as a way to strengthen the nation. This boosterism seems to have worked against the contemporaneous valorization of a mother's own breast milk; Nakayama notes that in practice, significant percentages of well-to-do Japanese women fed their babies cow's milk anyway. Jia-Chen Fu's discussion of soy milk in this volume reveals how strong the milk imperative was in Republican China. Since China lacked the resources to produce a large supply of cow's milk, Chinese nutritionists promoted soy as a substitute, something that could take milk's essential place in the diet.

Underlying these Taishō and Republican attitudes was a belief that milk is good for all people. Modernizers in Japan and China did not perceive cow's milk as well suited to Westerners but inappropriate for themselves, as doctors educated in classical medicine might have done. Chinese nutritionists promoted soy milk not because they considered it better suited to *Chinese* bodies than cow's milk, but because it was cheaper and more accessible.

This fits the broader pattern of how Western standards defined healthy nutrition in modernizing Asia, a dynamic that Michael Shiyung Liu's contribution to this volume explores in detail for 1930s China. Influential organizations such as Shanghai's Lester Institute and the Peking Union Medical College promoted nutritional guidelines crafted by American

scientists and the League of Nations. While physiologists such as Li Ting'an adjusted Western standards in ways that they thought better fit the Chinese population, they did so by decreasing the amounts of various nutrients to account for the smaller Chinese body size, with each nutrient decreased in proportion to the others. When food substitutions were suggested, it was because of economic constraints; in poor, war-torn China, managing to eat all the things recommended in Western dietary guidelines was not possible. Western-trained scientists did not, in other words, think of particular kinds of foods as being unsuited to Chinese bodies. "Experiments throughout the world," proclaimed the Chinese agronomist Wen-yuh Swen and his American collaborator Leonard Maynard, "lead to the conviction that *any diet thus far devised* without milk will be improved by its inclusion."³⁸

The Growth of Milk Consumption and Production in China

However compelling Chinese and Japanese elite may have found the prospect of strengthening the nation through milk, in the early twentieth century fostering widespread consumption in either country remained aspiration rather than reality.³⁹ But after World War II the habit of milk drinking began to spread to large numbers of people outside of the cultures in which dairying had been centrally important. As Deborah Valenze has chronicled, European and American dairy producers in the postwar decades were churning out milk, butter, and cheese in amounts that domestic markets could not possibly absorb: "'Milk lakes' and 'butter mountains' had become bywords in the European Economic Community in the early 1960s, not as visions of an ideal world but as signs of a significant, even alarming overproduction of dairy products."⁴⁰ Dairy producers also struggled to find markets for the byproducts of their industry, such as lactose. In the 1950s, lactose was being produced so abundantly in the United States, as a byproduct of cheese making, that dairy scientists were being urged to find new uses for it. Mass production of penicillin was absorbing some, as adding lactose to the feed of *Penicillium notatum* increased the yield of the drug. But the American dairy industry was by then producing some ten billion pounds of lactose-containing whey every year, and only about 7 percent of the lactose was being put to use.⁴¹

In response, new government nutrition programs purchased large amounts of milk and promoted its consumption by formerly non-dairy-eating populations, both domestically and abroad. As an example of domestic propagation, when the American government passed the National School Lunch Act of 1946, milk was the first item on the menu, and butter was included as well. A decade later Congress authorized seventy-five million dollars to be spent over three years “to increase the consumption of fluid milk by children,” a program that continued to be renewed through the 1960s.⁴² Internationally, the passage of Public Law 480 made the United States “the world’s primary source of food aid” starting in 1954. The law was designed not only to provide humanitarian assistance and promote goodwill toward the United States in the context of the Cold War but also to provide an outlet for excess agricultural production, including dairy.⁴³

The flood of milk into other parts of the globe affected Japan long before it did China. Japan, after all, was a major recipient of American food aid in the wake of World War II. This largesse, whether humanitarian or self-interested, altered Japanese eating habits and cuisine, as scholars have documented. The tons of wheat shipped from American farms prompted a boom in *ramen* and other wheat flour-based dishes, at the expense of more traditional fare.⁴⁴ And milk became for the first time the drink of Japanese schoolchildren, thanks to a daily lunch program launched by the US occupation government that included “bread, biscuits, and powdered milk.”⁴⁵

The politically isolated People’s Republic of China (PRC) received no comparable influx. Dairy remained rare there. Racked by the turmoil of shifting policies in the early 1950s, the great famine in the late 1950s, and the Cultural Revolution in the 1960s and ’70s, and exhorted by Mao Zedong to “take grain as the key link,” Chinese farmers did not see raising dairy cows as a priority. One indicator of milk’s scarcity in the early PRC is Chinese drug makers’ search for a suitable fuel to use in making antibiotics. In the West, as mentioned, pharmaceutical companies used a small fraction of the dairy industry’s surplus lactose to maximize their penicillin yield. In China, by contrast, lactose was neither abundant nor cheap. Chinese drug makers therefore looked for other substances more common in their country that might serve a similar function. A 1954 article in the *China Pharmaceutical Journal* by Shanghai public health officials observes that in their city one hundred tons of lactose had been used in the previous year to make drugs, and most of that had been imported from abroad. In

order to preserve the national treasury, therefore, the authors suggested that it was important to follow the example of the Soviets and find ways to use lactose sparingly in drug production—by substituting sugars from grain, for example.⁴⁶ Unlike Americans, Chinese were clearly not swimming in milk.

This began to change in the mid-1970s as political and economic priorities changed. In 1974 the journal *China Dairy Industry* began publication, featuring reports on the dairy industries of other countries as well as on efforts within China to increase production and consumption. In 1979, at the dawn of the reform-and-opening period that Deng Xiaoping's policies ushered in, *China Dairy Industry* could proudly report that China's farmers had produced "more than 46,000 tons" of dairy foods in the previous year, "the highest level since the founding of the PRC."⁴⁷ This may have been a lot by the standards of the early PRC, but it was still a very small industry compared to dairy giants such as the United States; in 1980 American farmers produced more than sixty-four million tons of milk.⁴⁸ As reform and opening proceeded, however, dairy production and consumption both rose quickly, accelerating most dramatically since 2000. By 2008 Chinese consumption of milk had grown 1700 percent compared with 1970, and Chinese milk production had grown five times larger than it had been only eight years before.⁴⁹

The rise of milk culture was not explicitly underpinned by dietary determinism, which in its crudest form had receded by this time. One does not find prominent scientists and public health officials in 1980s China arguing, as did their counterparts in 1950s Japan, that wheat and dairy eaters are more innovative than rice eaters or that their own rice-eating people have "an approximately twenty percent weaker mind" than wheat-fed Westerners.⁵⁰ Nonetheless, Western standards still influenced Chinese dietary guidelines. When the Chinese Nutrition Society formulated its nutritional guidelines in the late 1990s, it hewed closely to those that the US Department of Agriculture had advanced in 1992. The food pagoda illustration produced to accompany these guidelines (see figure 12.1) bears an unmistakable resemblance to the USDA's food pyramid (figure 12.2).

Apart from the curved roofs on the pagoda, there is little to distinguish one set of guidelines from the other. Even the location of dairy products on the Chinese graphic is the same: second tier, left-hand side. Although the justification for including dairy has changed—it is said

Figure 12.2 The Food Guide Pyramid of the United States Department of Agriculture, 1992. Dairy products are located on the left-hand side of the second-highest tier, just as in the later Chinese food pagoda. Courtesy of the U.S. Department of Agriculture.

to reduce the risk of chronic disease rather than to boost strength and initiative—the faithfulness of the imitation suggests that American dietary ideals have a normative influence similar to what they exercised in 1930s China.⁵¹

Making Bodies Bad: The Invention of Lactose Intolerance

A significant challenge to the assumption that drinking fresh milk is universally good was the increasingly apparent fact that it causes gastrointestinal distress in a large number of people. As growing numbers of people who had not regularly drunk fresh milk before—including African Americans, Asian Americans, Ugandans, Japanese, Thais, and other Southeast Asians—began to imbibe it thanks to new patterns of trade and humanitarian assistance, it started to become clear that their bodies' responses to it differed markedly from those of most Caucasians. Over the course of a decade or so, the concept of lactose intolerance began to take shape. It was the apotheosis of milk's new moral significance: if milk was a good food, fuel to make bigger, stronger, healthier citizens, then bodies that could not process it easily were bad bodies, "intolerant" of the very substance that stood to reinvigorate the nation.

It is tempting to characterize the phenomenon of lactose intolerance as a discovery. It is, of course, a biological reality. All healthy human babies produce an enzyme called lactase that breaks down lactose, the main sugar in any kind of milk, and makes it digestible. But after early childhood, three-quarters or more of the world's bodies cease producing lactase, or produce very little; consequently, many people cannot drink much milk without experiencing unpleasant symptoms such as bloating and diarrhea.⁵² This is what, gradually, scientists discovered in the 1960s and 1970s. But the scientists who discovered this interesting variation in human biology, mostly of European descent and accustomed to thinking of Western European bodies as normative, framed it as a medical condition. Pathological designations accreted around the response of healthy adult bodies to fresh milk: *lactose intolerance*, *lactase deficiency*, *lactase insufficiency*, *hypolactasia*. That lactase production usually ceases after infancy was a discovery, in other words, but "lactose intolerance" as a medical problem was an invention.

The first studies to highlight racial difference in lactase levels appeared in the United States in 1965 and 1966. One of these was the report of Theodore Bayless and Norton Rosensweig, from Johns Hopkins University, in the *Journal of the American Medical Association*. They studied twenty white and twenty black inmates at a prison, all in good health. They tested for lactase deficiency by having the men ingest fifty grams of lactose and

then provide blood samples six times over the subsequent two hours, testing for a rise in glucose level that would indicate the presence of lactase. Bayless and Rosensweig also biopsied and assayed the men's jejunum, a part of the small intestine, to assess lactase levels directly. They concluded that most of the black inmates were lactase deficient.

Interestingly, the overwhelming majority of black inmates had themselves reported, before any of these invasive procedures were undertaken, that milk altered their digestion. The men did not phrase it as "milk intolerance," a medical condition. Rather, they saw the loose stools associated with milk consumption as reflecting a characteristic of the milk itself, viewing it as "a mild laxative": "many extolled [milk's] virtue as a producer of 'regularity.'"⁵³ In this, their perspective resembled those expressed in classical Chinese medicine and Ayurveda, where milk acted as a useful purgative.

For the white researchers, however, low lactase levels were "inborn errors of metabolism." They speculated that this defect might be inherited.⁵⁴ Bayless and Rosensweig's study sparked more research into racial differences in lactose digestion, and garnered attention in the popular press.⁵⁵ At first scientists sought to explain the evolutionary origins of lactose intolerance. Like many researchers after them, Bayless and Rosensweig assumed that intolerance was an aberration from the dominant state of humankind, speculating that it might be a "recessively inherited condition" that required "homozygosity for appearance of the trait." They proposed an explanation that is the inverse of what scientists now believe, hypothesizing that over many generations, Africans may have *become* lactose intolerant because they did not drink milk after weaning. In a milk-free environment, they reasoned, producing lactase would have wasted energy and resources, so when random mutations yielded lactase nonpersisters in Africa they would have had a slight competitive edge over those whose bodies labored to produce useless lactase.⁵⁶

Scientists struggled to grasp that a trait unlike the one found in people of northern European descent could, in fact, be more typical. As research began to accumulate in the late 1960s indicating that not only African Americans but also Asian immigrants, Ugandans, and Thais and other Southeast Asians produced little or no lactase as adults, a fierce debate developed over whether this "abnormality" was genetic or acquired.⁵⁷ Some reasoned along the same lines as Bayless and Rosensweig that lactase deficient populations had mutated away from the original template over many

generations, while others suggested that whether individuals continued to produce lactase after weaning might, in fact, simply reflect whether they continued to consume milk. Conversely, this latter camp supposed, one could perhaps induce lactase production in deficient individuals by feeding them lactose—that is, perhaps it was possible to turn lactose-intolerant persons tolerant by exposing them to milk.⁵⁸ It was the geographer Frederick J. Simoons who, in 1970, first proposed that lactase nonpersistence might have been the original state, and lactase persistence the mutation. By looking at what was then known about the distribution of lactose intolerance in milk-producing and non-milk-producing societies, he concluded that lactase persistence had probably developed as a beneficial mutation in milking societies. As he observed, “It seems more promising to view the Western pattern, of high levels of intestinal lactase and of lactose tolerance throughout life, as the aberrant one which must be accounted for. This is because the Oriental pattern is like that of almost all land mammals . . . and the Western pattern is strikingly different.”⁵⁹

This viewpoint came gradually to be the scientific consensus. By 1981 the director of the National Institute of Child Health and Human Development at the US National Institutes of Health could write definitively in a volume on lactose digestion, “Lactose intolerance is a normal physiological condition, shared by every adult animal except for certain ethnic and racial groups in man, most of whom are located in the United States or in northern parts of Western Europe. It is lactose tolerance rather than lactose intolerance, as initially assumed, that is most significant. The ability to digest lactose is the abnormal state, while lactose intolerance is the usual, normal condition in the human adult world population.”⁶⁰

Consensus did not, however, change the way scientists and physicians framed lactase nonpersistence; they continued to write about it as a deficiency. Although the introduction quoted above acknowledges that “lactose tolerance . . . is most significant,” most of the book it prefaces is devoted to chapters treating lactose *intolerance* as a problem, examining diagnosis and screening, clinical consequences in adults and children, and promoting the development of low-lactose dairy products so that those suffering from this deficit could still consume milk.

At the same time that clinicians, geneticists, geographers, anthropologists, and others were puzzling over the evolutionary origins of lactase nonpersistence, some grew concerned that lactase nonpersistence—characterized in a *Washington Post* op-ed as a problem of “dark-skinned

people”—threatened the effectiveness of food aid provided to poor populations, both domestically and internationally.⁶¹ In their 1966 study, Bayless and Rosensweig had mentioned, almost as an aside, “Milk intolerance may also have some sociologic significance since some welfare programs provide powdered milk for impoverished recipients, many of whom are Negro and who might be expected, on the basis of this study, to have lactase deficiency.”⁶² By the early 1970s this concern had developed into a debate. Some argued that giving milk to a malnourished lactose-intolerant person would not improve his state of nourishment (because he would simply refuse to drink it) or worse, that it would exacerbate the problem by giving him diarrhea.⁶³ In malnourished children in the Third World, the extra loss of fluid could even be fatal.⁶⁴

In retrospect, this moment seems like it might have opened an opportunity to reevaluate the ideas about a universally healthy diet that had emerged in the early twentieth century, and had been built on Euro-American cuisine and observations of Caucasian bodies. Could other sorts of diets—perhaps even diets without dairy—promote health and growth and vigor? In the event, however, milk was too entrenched—in the global economy and in the convictions of nutritionists and policymakers—for observations about racial variability to unseat it. The United Nations’ Protein Advisory Group wrote in 1972, “Milk is considered a virtually complete food and in the developing areas of the world, where protein deficiency is widespread and protein-calorie malnutrition a serious childhood problem, the use of milk for child feeding programs is strongly advocated by all nutrition experts.”⁶⁵ With backing from such international authorities, those arguing to retain milk as part of domestic and international assistance programs won the day. Milk powder has remained an important part of international food aid—more prominent when donor countries have agricultural surpluses to shed, less prominent when those surpluses dwindle⁶⁶—to the present.

In China, as the idea that milk is a universally good food gained broader acceptance, the idea that lactase impersistence is a pathology accompanied it. The Chinese terms coined for the phenomenon were pejorative and negative, just like the English originals: *rutang bunai zheng*, “unable-to-bear-lactose syndrome,” and *rutangmei quefa*, “lactase deficiency.” They expressed, like the English originals, the conviction that Caucasian bodies were normal and that the far more numerous others were deviations from that norm. Initially, however, Chinese researchers

seem to have approached lactase impersistence as an index of racial identity and difference rather than as any kind of public health challenge. The first original Chinese article on lactase deficiency appeared in 1983.⁶⁷ By the mid-1980s, Chinese scientists were finding high rates of lactose intolerance among Han Chinese (80–85 percent in most studies) and comparing those rates with rates among ethnic minority groups such as Uyghurs.⁶⁸ Articles presenting lactose intolerance as a *problem* requiring a solution mostly appeared in dairy industry journals, not medical or nutritional literature.

Since the 1980s, however, as milk has become more prevalent in China, lactose intolerance has increasingly been presented as a problem not just for dairy producers but for public and individual health as well. Dairy industry representatives have allied themselves with experts in nutrition and preventive medicine, and articles on lactose intolerance have spread beyond industry journals to appear with greater frequency in medical literature. Increasingly, state resources have been devoted to developing low-lactose dairy products to help Chinese consumers overcome this perceived problem. In 2001, the Chinese Nutrition Society and the China Dairy Industry Association jointly organized a conference on lactase and low-lactose dairy products with DSM, a Dutch manufacturer of lactase. The conference brought together researchers from respected institutes such as the Chinese Academy of Preventive Medicine and provincial medical colleges. Their participation constituted a tacit endorsement of the idea—congenial to the dairy industry and DSM—that lactose intolerance is a problem requiring attention, and that adding lactase to dairy products (not, for example, consuming less dairy) is its best solution.⁶⁹ Even more recently, the dairy imperative in a lactose-intolerant population has reached what one might see as its logical culmination: on April 24, 2012, scientists at Inner Mongolia Agricultural University introduced to the world the first cow genetically engineered to produce low-lactose milk. Her name in Hanyu Pinyin is Lakesi, variously rendered in the English-language press “Lucks” or “Lakes,” and the scientists who created her predicted that she would begin producing China-friendly milk within a few years, after birthing her first calf. “Her birth,” a celebratory account proclaimed, “brings glad tidings to the lactose-intolerant consumers of the world.”⁷⁰

That differential lactase production is seen as a medical concern deserving such an investment of effort and resources even in a place like China, where lactase impersistence is typical, shows the extent to which

Western “power cuisine” of the late nineteenth century remains globally normative today. Official dietary guidelines have overshadowed older Chinese ways of thinking about dairy, as a food and medicine with properties that made it suitable for particular people under particular circumstances. In the place of those older ideas, public health campaigns have promoted the idea that fresh milk is a universally good food. Traditional China is thus presented as a nonmilking, lactophobic society that, with a few minor exceptions, was unwilling and unable to make use of this “most nearly perfect food.”⁷¹

At the official level, the moralizing message that responsible citizens drink milk, and responsible officials promote it, remains strong. Milk’s status as a morally good food continues to be reinforced by influential bureaucracies such as the United Nations, by patterns of trade and food aid, by the continuing growth of the Chinese dairy industry, and by scientific discourse that frames lactose intolerance as a protodisease.⁷² The 2016 edition of *Dietary Guidelines for Chinese* highlights this. To the updated food pagoda pictured in figure 12.1 it has added a new illustration: the “balanced diet plate” shown in figure 12.3.

Like the pagoda, the plate’s aesthetics invoke traditional Chinese culture; the four recommended food categories (grains, vegetables, fruits, and fish-meat-eggs-and-beans) assume the shape of a yin-yang symbol, and the utensils next to the plate are Chinese: a spoon and a pair of chopsticks. But the content of the diagram still reflects the perspective that nutritional recommendations developed primarily in the West over the course of the past century and a half are universally applicable. In particular, the diagram elevates dairy by giving it an independent place, represented as a cup full to the brim of fresh milk. Not only is dairy presented as essential—taking the place of water in the pagoda diagram—but it appears as liquid milk, not cheese or yogurt or any of the other lactose-reduced forms of dairy found in premodern East Asia.

Nevertheless, beneath the confident uniformity of official recommendations, older ways of thinking about milk persist. Chinese eaters, like those everywhere, rely on multiple sources of dietary advice, some of which contradict one another.⁷³ In some venues alternative narratives about milk are flourishing. A recent article in a popular Chinese health magazine, for example, titled “Drop These ‘Western Habits,’” advises readers not to drink a glass of cold milk in the morning, because it is not suited to Chinese bodies—an argument that the authors of the *Yellow Emperor’s Inner Canon*

Figure 12.3 2016 Balanced Diet Plate for Chinese. Used with permission from Chinese Nutrition Society, *2016 Dietary Guideline for Chinese* (Zhongguo jumin shanshi zhinan 2016) (Beijing: People's Medical Publishing House, 2016).

might have recognized.⁷⁴ Moreover, the normative power of last century's elite Western diet may be starting to erode. As rates of obesity have risen in rich Western countries, and China's political and economic power have grown, the proposition that eating like Americans or Europeans confers strength and health has lost credibility. It seems, then, there is room for alternative narratives about milk to grow or even to be revived, rehabilitating "bad" bodies as they reassess what constitutes a good food.

Notes

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2. "'Zhongguo jumin shanshi zhinan' 2016 shou cang ban! Hexin tuijian ji zhaiyao," Chinese Nutrition Society, accessed September 26, 2016, <http://www.cnsoc.org>.

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4. Tania Branigan, "Chinese Figures Show Fivefold Rise in Babies Sick from Contaminated Milk," *Guardian*, December 2, 2008, accessed November 30, 2015, <http://www.theguardian.com>.
5. Frederick J. Simoons, "The Traditional Limits of Milking and Milk Use in Southern Asia," *Anthropos* 65, no. 3/4 (1970): 547–593, map 3; and Wiley, "Milk for 'Growth'."
6. H. T. Huang, "Hypolactasia and the Chinese Diet," *Current Anthropology* 43, no. 5 (December 2002): 816. Frederick J. Simoons frames the topic in much the same way in *Food in China: A Cultural and Historical Inquiry* (Boca Raton, FL: CRC Press, 1991), 458.
7. E. N. Anderson, Jr., and Marja L. Anderson, "Modern China: South," in *Food in Chinese Culture: Anthropological and Historical Perspectives*, ed. K. C. Chang (New Haven, CT: Yale University Press, 1977): 341.
8. Ibid. See also Huang, "Hypolactasia and the Chinese Diet."
9. H. T. Huang, *Fermentations and Food Science*, part 5 of *Biology and Biological Technology*, vol. 6 of *Science and Civilisation in China* (Cambridge: Cambridge University Press, 2000), 248.
10. Jia Sixie, *Qimin yaoshu* (Taipei: Taiwan shangwu yinshuguan, 1968), 1:89.
11. Françoise Sabban, "Un savoir-faire oublié: Le travail du lait en Chine ancienne," *Zinbun: Memoirs of the Research Institute for Humanistic Studies, Kyoto University* 21 (1986): 31–65.
12. Huang, *Fermentations and Food Science*, 248–257.
13. See the chapter by Jia-Chen Fu in this volume.
14. For example, Deborah Valenze, *Milk: A Global and Local History* (New Haven, CT: Yale University Press, 2011); Peter Atkins, *Liquid Materialities: A History of Milk, Science, and the Law* (Surrey, UK: Ashgate, 2010); Anne Mendelson, *Milk: The Surprising Story of Milk through the Ages* (New York: Knopf, 2008); and E. Melanie DuPuis, *Nature's Perfect Food: How Milk Became America's Drink* (New York: New York University Press, 2002). Two prominent exceptions to the Euro-American focus are the work of Andrea Wiley and that of Françoise Sabban. Andrea S. Wiley, "The Globalization of Cow's Milk Production and Consumption: Biocultural Perspectives," *Ecology of Food and Nutrition* 46 (2007): 281–312; Wiley, "Milk for 'Growth'"; and Andrea S. Wiley, *Cultures of Milk: The Biology and Meaning of Dairy Products in the United States and India* (Cambridge, MA: Harvard University Press, 2014). Sabban, "Un savoir-faire oublié"; and Françoise Sabban, "The Taste for Milk in Modern China (1865–1937)," in *Food Consumption in Global Perspective: Essays in the Anthropology of Food in Honour of Jack Goody*, ed. Jakob A. Klein and Anne Murcott (Basingstoke, UK: Palgrave Macmillan, 2014), 182–208.
15. Valenze, *Milk*, 3; Atkins, *Liquid Materialities*, xv; and DuPuis, *Nature's Perfect Food*, 28.
16. Y. Itan, A. Powell, M. A. Beaumont, J. Burger, M. G. Thomas, "The Origin of Lactase Persistence in Europe," *Public Library of Science Computational Biology* 5, no. 8 (2009): e1000491; and Andrew Curry, "Archaeology: The Milk Revolution," *Nature* 500, no. 7460 (July 31, 2013): 20–22.

17. Edward H. Schafer, "T'ang," in *Food in Chinese Culture: Anthropological and Historical Perspectives*, ed. K. C. Chang (New Haven, CT: Yale University Press, 1977), 105–107; Sabban, "Un savoir-faire oublié"; and Huang, *Fermentations and Food Science*, 248–257.

18. *Huang Di nei jing su wen: An Annotated Translation of Huang Di's Inner Classic—Basic Questions*, vol. 1, trans. Paul U. Unschuld and Hermann Tessenow (Berkeley: University of California Press, 2011), 214–215.

19. Meng Shen, *Shiliao bencao*, ed. Xie Haizhou et al. (Beijing: Renmin weisheng chubanshe, 1984), 10.

20. Marta Hanson, "Robust Northerners and Delicate Southerners: The Nineteenth-Century Invention of a Southern Medical Tradition," *Positions* 6, no. 3 (Winter 1998): 515–550.

21. These examples come from the *Wai tai mi yao fang*, a large formulary compiled in the mid-eighth century from other texts then circulating. Wang Tao, *Wai tai mi yao fang*, ed. Gao Wenzhu (Beijing: Huaxia chubanshe, 1993), 127.

22. *Ibid.*, 198, 752.

23. *Ibid.*, 196, 198, 200, 202–204, 206, 231.

24. *Ibid.*, 203 (chills and fever); 243 (ghost qi); 718 (vomiting children); 757 (ulcers on the back).

25. *Ibid.*, 752.

26. Personal communication, Geoffrey Pakiam, July 2015.

27. Wiley, *Cultures of Milk*, 101.

28. *Ibid.*, 104.

29. Its appearance in a formula for a "cold decoction" (*yinzi*) implies but does not explicitly state that the milk is to be used cold in that case. Wang Tao, *Wai tai mi yao*, 530.

30. Wiley, *Cultures of Milk*, 60.

31. Simoons, *Food in China*, 456, 458.

32. Rachel Laudan, *Cuisine and Empire: Cooking in World History* (Berkeley: University of California Press, 2013): 255–257.

33. Samuel J. Crumbine and James A. Tobey, *The Most Nearly Perfect Food: The Story of Milk*, as quoted in Wiley, *Cultures of Milk*, 109.

34. National Dairy Council pamphlet, as quoted in DuPuis, *Nature's Perfect Food*, 117.

35. Wiley, *Cultures of Milk*, 109.

36. DuPuis, *Nature's Perfect Food*, chaps. 2 and 3.

37. Susan Glosser, "Milk for Health, Milk for Profit: Shanghai's Chinese Dairy Industry under Japanese Occupation," in *Inventing Nanjing Road: Commercial Culture in Shanghai, 1900–1945*, ed. Sherman Cochran (Ithaca, NY: Cornell University Press, 1999), 207–233.

38. Wen-yuh Swen and Leonard A. Maynard, "Nutrition," in *Land Utilization in China*, ed. John Lossing Buck (Shanghai: Commercial Press, 1937), 433; emphasis mine.

39. Sabban calls milk in Republican China "a consumption habit for a happy few," and shows how this expensive beverage was restricted to the elite; Sabban, "Taste for Milk," 186–187.

40. Valenze, *Milk*, 274.

41. M. E. Hull, "Commercial Production of Lactose," *Journal of Dairy Science* 41, no. 2 (February 1, 1958): 330–331.

42. Milk Program Act of 1958, Pub. L. No. 85–478, 68 Stat. 849.
43. Sophia Murphy and Kathy McAfee. *U.S. Food Aid: Time to Get It Right* (Minneapolis, MN: Institute for Agriculture and Trade Policy, 2005), 3–4.
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46. Zhang Weishen et al., “Qingmeijun zhu 133 chansheng Qingmeisu de yanjiu” (A study of 133 strains of *penicillium* that produce penicillin),” part 4, *Acta Microbiologica Sinica* 4, no. 1 (May, 1956): 127–136.
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50. Solt, *Untold History of Ramen*, 78–79.
51. “Zhongguo jumin shanshi zhinan!” See also the chapter by Michael Shiyung Liu in this volume.
52. Curry, “Archaeology,” 20–22; Huang, “Hypolactasia and the Chinese Diet”; Marlene Zuk, *Paleofantasy: What Evolution Really Tells Us about Sex, Diet, and How We Live* (New York: Norton, 2013), chap. 4; and K. David Patterson, “Lactose Intolerance,” in *The Cambridge World History of Food*, ed. Kenneth Kiple, 1057–1062 (Cambridge: Cambridge University Press, 2000).
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