

From Bodhisattva Earth to Man-Made Meat Essence:  
Famine Foods in Late-Qing, Nationalist, and Maoist China  
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ABSTRACT

This essay examines change and continuity in the selection, conceptualization, and state sponsorship of “famine foods” in late-Qing, Nationalist, and Maoist China. It employs as case studies the following severe famines that struck North China under three markedly different regimes: the North China Famine of 1876-79, the Henan Famine of 1942-43, and the Great Leap Famine of 1958-62. Continuities that cut across the three periods include the particular non-grain foods – beginning with tree bark and wild plants and extending to Bodhisattva Earth (*Guanyin tu*) – consumed at the local level, and a tradition of elite involvement in identifying and endorsing items that could relieve starvation. The terms used to describe survival foods changed significantly, however, as did the rationale for promoting such foods. Moreover, as twentieth-century Chinese modernizers joined their Western counterparts in championing the use of science and technology to address food crises and other disasters, state-run health and scientific agencies played an increasingly active role in testing and promoting recipes for non-grain foods. This trend reached its zenith during the Great Leap Famine, when the government launched a “Food Substitute” (*daishipin*) campaign that aimed to address food shortages without reducing grain quotas by encouraging the mass-production of food substitutes such as chlorella and artificial meat. This campaign can be understood as a sharp departure from Qing China’s grain-centered famine relief policies, a radical extension of rhetoric and priorities laid out during the Nationalist period, and a case of high modernism gone badly awry.

KEY WORDS:

Famine, famine foods, food substitutes, Henan, Late-Qing China, Nationalist China, Great Leap Famine, Food Substitutes Campaign, famine relief, *Guanyin tu*, chlorella

## INTRODUCTION

In August of 1960, as millions of people were starving to death during China's Great Leap Famine of 1958-1962, an inspection team in Sichuan's Qu County reported that from late June on, the practice of digging so-called "Bodhisattva earth" (*Guanyin tu*) out of mountainsides and consuming it had spread "faster than an epidemic."<sup>1</sup> By August people in 18 communes in three different districts were eating "Bodhisattva earth," which the report also calls white clay or mud (*bai niba*). The investigators described the scale of the phenomenon in some detail. In the four major clay-digging sites inspected by the team, approximately 10,000 people had dug out some 500,000 *jin*<sup>2</sup> of clay. At the Puji Mountain site, there were too many people trying to dig clay out of too few holes, so people had to wait in line in the hot sun. Those from outside the locale would stay overnight at a mountainside school so that they could begin digging early the following morning, and some nights the school housed as many as 100 people. Elderly women burned incense and kowtowed at the clay digging sites, and some people assuaged their hunger by eating bits of clay as they dug. After digging up the clay, people soaked it in water, ground it up with wild plants, and made the mixture into small cakes that they consumed or even sold. The practice was very widespread in some areas, continued the investigators. As of August 23, they reported, 755 people in the Qingfeng Production Brigade, or 82.6% of the brigade, had eaten "Bodhisattva earth," and 209 people were still eating it. The rash of earth-eating had spread so quickly, found the inspection team, in part due to the superstitious rumors circulated by those who wished to harm the revolution. "When the masses were short of food," wrote the investigators, "a small number of bad people exploited the situation by using religious superstition to start the destructive rumor that 'white clay is the rice of the immortals – white is flour, yellow is corn.'" Such rumors had hastened the spread of the practice by convincing many people that "Bodhisattva earth" was safe to eat. In fact, argued the investigators, everyone who ate clay suffered from serious digestion problems and constipation, and at least 13 people had died due to eating clay. "This is really an extremely serious matter," stated the inspection team.<sup>3</sup>

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<sup>1</sup> Guanyu Quxian bufen diqu yin shenghuo anpai bu luoshi qunzhong wa chi 'Guanyin tu' de diaocha baogao" (An investigation report on people eating 'Bodhisattva earth' in some areas of Qu County as a result of poor living arrangements), August 1960. Held in *Database of Chinese Great Leap Forward & Great Famine 1958-1962*, second edition (Fairbank Center for Chinese Studies at Harvard University, 2014). The editors of the database caution that the date of the original document was unclear, and it could date from August 1961 instead of 1960. The document was found in an archive in Sichuan.

<sup>2</sup> 1 *jin* is equal to 1 and 1/3 English pounds.

<sup>3</sup> Guanyu Quxian bufen diqu yin shenghuo anpai bu luoshi qunzhong wa chi 'Guanyin tu' de diaocha baogao.

The Qu County report raises several issues key to the study of famine foods. First, given that references to consuming clay, stones, or “Bodhisattva earth” during famine times are found in late imperial as well as twentieth-century sources, this Mao-era example underscores intriguing continuities in the kinds of items that Chinese people turned to on the local level during famine years. Moreover, the fact that starving people made eating clay more acceptable by calling the substance “*Guanyin tu*,” thus linking it to the bodhisattva Guanyin, or the Buddhist Goddess of Mercy, demonstrates how pre-existing cultural beliefs influence the selection and conceptualization of famine foods.<sup>4</sup> Finally, the quantification of earth-eating laid out in the report above, as well as the Maoist state’s condemnation of the practice as a form of religious superstition, highlights shifting degrees of state involvement in the selection and dissemination of famine foods in late-Qing, Nationalist, and Mao-era China. I find that beginning in the Nationalist period but becoming more pronounced during the Mao period, the Chinese state supplanted the traditional role of Heaven even when it came to providing famine food.

Part of a larger project that traces change over time in Chinese responses to famine in North China’s densely-populated and drought-prone Henan Province, this essay looks at famine foods and the role of the Chinese state in creating such foods during three major famines that struck China under regimes with markedly different ideological foundations -- the North China Famine of 1876-79, the Henan Famine of 1942-43, and the Great Leap Famine of 1958-62. The North China Famine of 1876-79, which resulted from a prolonged and unusually severe drought that spread across the five northern provinces of Shandong, Henan, Shanxi, Shaanxi, and Zhili, was the most lethal drought-famine in imperial China’s long history. The weakened late-Qing state proved unable to provide sufficient relief during such a severe crisis, and between nine and thirteen million people died of starvation or famine-related diseases.<sup>5</sup>

The fall of the Qing and the birth of China’s new Republican government in 1912 did not reduce the number, severity, or impact of famines.<sup>6</sup> The Nationalist Party (Guomindang)

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<sup>4</sup> David Arnold, *Famine: Social Crisis and Historical Change* (Oxford: Basil Blackwell 1988), 8.

<sup>5</sup> For more on the 1870s famine, see Kathryn Edgerton-Tarpley, *Tears from Iron: Cultural Responses to Famine in Nineteenth-Century China* (Berkeley: University of California Press, 2008); Hao Ping, *Dingwu qihuang: Guangxu chunian Shanxi zaihuang yu jiuji yanjiu* (Beijing: Beijing daxue chubanshe, 2012); Mike Davis, *Late Victorian Holocausts: El Nino Famines and the Making of the Third World* (London: Verso, 2001).

<sup>6</sup> Lillian M. Li, *Fighting Famine in North China: State, Market, and Environmental Decline, 1690s-1990s* (Stanford University Press, 2007), 283, 307; Xia Mingfang, *Minguo shiqi ziran zainan yu xiangcun shehui* [Republican-era natural disasters and rural society], (Beijing: Zhonghuashuju, 2000), 79, 395-97.

managed to reunify much of the county in 1928, but was beset by threats from internal and external foes, and failed to prevent large-scale famines. The Henan Famine of 1942-43, which occurred in the context of World War II in China, called into question the Nationalist state's commitment to feeding the rural population during a time of intense crisis. Over the course of this wartime disaster as many as 1 to 2 million of Henan's pre-famine population of 30 million people died of starvation and disease, while another 3 million people fled the densely-populated and strategically important northern province.<sup>7</sup> Drought was again the immediate catalyst for this famine, but the Japanese occupation of much of China as well as Nationalist government policy choices made the drought far more lethal.<sup>8</sup> The Chinese Communist Party lambasted the Nationalists for their failure to conquer hunger, and came to power in 1949 promising that not one person would starve to death under their rule.<sup>9</sup> Yet only a decade after taking control, the Party presided over the worst famine in Chinese and world history in terms of the total number of deaths. The Great Leap Famine of 1958-62 was national in scope and stemmed more from utopian thinking and policy errors than drought. As with the 1876-79 and 1942-43 disasters, Henan Province was again one of the most severely affected areas.<sup>10</sup> There is considerable disagreement over the total number of deaths caused by the Mao-era Famine, but many scholars estimate that it resulted in the death of approximately 30 million people.<sup>11</sup> In all three of these famines, severe food shortages led people in the affected areas to search for and consume increasingly unpalatable "famine foods."

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<sup>7</sup> Wang Tianjiang et al., *Henan jindai dashiji, 1840-1949* [Major events in modern Henan, 1840-1949] (Zhengzhou: Henan renmin chubanshe, 1990), 418. Most Chinese and English-language publications on the Henan Famine estimate that the famine led to approximately 3 million deaths. In contrast, Anthony Garnaut's newly-published quantitative study puts the number of excess deaths caused by the famine at under 1 million. Anthony Garnaut, "A Quantitative Description of the Henan Famine of 1942," *Modern Asian Studies* 47 (2013): 2009, 2032-2045.

<sup>8</sup> Kathryn Edgerton-Tarpley, "Saving the Nation, Starving the People? The Henan Famine of 1942-43," in Joseph W. Esherick and Matthew T. Combs, editors, *1943: China at the Crossroads* (Ithaca, New York: East Asia Program Cornell University, 2015): 323-364. See also Odoric Y.K. Wou, *Mobilizing the Masses: Building Revolution in Henan* (Stanford, CA: Stanford University Press, 1994), 166, 170, 172.

<sup>9</sup> Li, *Fighting Famine*, 342.

<sup>10</sup> Among China's provinces Henan came in third in terms of the highest total number of "unnatural deaths" experienced during the Great Leap Famine (2.939 million), and sixth in terms of the percentage of unnatural deaths (6.12%). Anhui and Sichuan suffered the highest number of famine deaths. Yang Jisheng, *Tombstone: The Great Chinese Famine, 1958-1962*, translated by Stacy Mosher and Guo Jian (New York: Farrar, Straus and Giroux, 2008), 395.

<sup>11</sup> For recent estimates of the demographic impact of the Great Leap Famine, see Cao Shuji, *Da Jihuang, 1959-1961 nian de Zhongguo renkou* (The Great Famine: China's population in 1959-1961) (Hong Kong: Time International Publishing Co., Ltd., 2005), 282; Yang Jisheng, *Tombstone*, chapter 11; Frank Dikotter, *Mao's Great Famine: The History of China's Most Devastating Catastrophe, 1958-1962* (New York: Walker & Company, 2011), 333; Cormac O Grada, *Famine: A Short History* (Princeton, New Jersey: Princeton University Press, 2009), 93-97.

## WHAT DID PEOPLE EAT WHEN FOOD RAN OUT? CONTINUITIES

The desperate search for items that could fill the belly and prolong life during times of disaster is a key marker of famine across time and place. After a poor harvest, people first resorted to cheaper, less palatable foods that would have been rejected in normal times.<sup>12</sup> Many such foods were items consumed in normal times by poorer sections of a given society, notes Violetta Hionidou in her study of the Greek Famine of 1941-43.<sup>13</sup> Famine conditions, she finds, oblige people to “slide down the ladder of preferred food.” In wartime Greece the poor descended from pulses, such as beans and lentils, to animal fodder such as carobs and acorns, while the more affluent “descended from meat, white bread and cultivated greens to pulses and ‘inferior’ greens.”<sup>14</sup> This phenomenon was seen in China as well. During famine years husks normally used to fatten pigs; black beans usually fed to horses and cows; and bran dust, a “by-product of rice polishing that was normally fed to animals,” all served as famine foods for humans.<sup>15</sup> When in a particular famine severe shortages or sky-rocketing prices put even inferior foods out of reach, people were reduced to eating “famine foods,” defined by historian Cormac O Grada as, “leaves, shoots, pods, seeds, fruits, meats, or vegetables not usually consumed but acknowledged to be edible in times of severe food stress.” Other terms for such foods include ersatz foods, non-grain foods, non-staple foods, or emergency foods.<sup>16</sup>

In China there is a striking continuity in the historical record in terms of the broad types of famine foods people turned to during the late imperial, Nationalist, and Maoist periods, and in what order they turned to such “foods.” In Ming (1368-1644) and Qing (1644-1912) dynasty China, memorials submitted by officials in famine-stricken areas tended to use a stock set of descriptions of the items consumed by famished people. Presumably these tropes both reflected reality and gave officials a short-hand way to highlight the severity of a given disaster. When widespread flooding led to serious famine conditions in northeastern Henan in 1593-1594, for instance, Yang Dongming, an official from Henan, submitted a memorial describing conditions in his home province. Yang reported that as famine conditions worsened, survivors were “reduced to eating the roots of wild grasses and the bark of trees

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<sup>12</sup> O Grada, *Famine*, 73

<sup>13</sup> Violetta Hionidou, “What Do Starving People Eat? The Case of Greece through Oral History,” *Continuity and Change* 26.1 (2011): 119, 122, 125.

<sup>14</sup> Hionidou, “What Do Starving People Eat,” 126.

<sup>15</sup> Pierre-Etienne Will, *Bureaucracy and Famine in Eighteenth-Century China*, trans. Elborg Forster, (Stanford: Stanford University Press, 1990), 33; Li, *Fighting Famine*, 96.

<sup>16</sup> O Grada, *Famine*, 73-74.

mixed with certain kinds of soils.”<sup>17</sup> Similar descriptions appear in official reports concerning an early-eighteenth-century famine in Shanxi, the 1743 famine in Zhili examined by Pierre-Etienne Will, and the North China Famine of 1876-79.<sup>18</sup> Western observers of the 1870s famine described the famine foods they witnessed in more detail. David Hill, a Methodist missionary who distributed relief in Shanxi during the disaster, described villagers living on “the seeds of thorn bushes” or on “wild herbs, which they grind up and mix with a little corn flour” and eat in the form of black-colored buns.<sup>19</sup> Elm trees were particularly sought after for their nutritious inner bark.<sup>20</sup>

### Eating Dirt: Bodhisattva Earth and Slate Stone

While Chinese descriptions of famine foods almost always mention wild grasses and tree bark, some observers also reported that when even these items grew scarce, people turned to eating certain types of earth or ground-up stone. Both famine-era governors of Shanxi Province, the epicenter of the North China Famine of 1876-79, described this grim progression. In a memorial written in the spring of 1877 by Bao Yuanshen, Shanxi’s first famine-era governor, Bao informed the Qing court that once the tree bark had been used up and wild plants no longer grew due to the drought, famished people were “grinding stone into powder,” and mixing it with earth to make pellets (*wan*) to assuage their hunger.<sup>21</sup> Zeng Guoquan, the official who replaced Bao as Shanxi’s governor, also reported that starving villagers were reduced to eating a type of earth. Like the Sichuan-based cadres writing almost a century later, Zeng used a version of the term “Bodhisattva earth” in his report, and also highlighted the dangers of eating earth. When tree bark and grass roots were exhausted, wrote Zeng, “many dug up Guanyin white mud (*Guanyin baini*) and used it to allay hunger and prolong life.” Eating mud led to bloated abdomens and intestinal damage, he continued, which often resulted in death.<sup>22</sup> A famine song recorded by a local-level observer of the

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<sup>17</sup> Roger V. Des Forges, *Cultural Centrality and Political Change in Chinese History: Northeast Henan in the Fall of the Ming* (Stanford: Stanford University Press, 2003), 35, 37.

<sup>18</sup> Will, *Bureaucracy and Famine*, 32-33; Letter from Henan Relief Office, *Shenbao*, 27 February 1878, 2.

<sup>19</sup> Letter from David Hill to Mr. Muirhead, 8 December 1878, reprinted in *North China Herald*, 31 January 1879, 103.

<sup>20</sup> Bernard E. Read, *Famine foods Listed in the Chiu Huang Pen Ts’ao: Giving their Identity, Nutritional Values and Notes on their Preparation* (1946, reprint Taipei: Southern Materials Center, Inc., 1982), 2, 8.

<sup>21</sup> *Guangxu chao Donghualu*, (Guangxu reign period [1875-1908] records from the Eastern Gate), vol. 1, compiled by Zhu Shoupeng, (Beijing: Zhonghua shuju chubans, 1958), 409 (Guangxu 3, 4<sup>th</sup> month, 21<sup>st</sup> day, or 6/2/1877).

<sup>22</sup> *Zeng zhong xianggong quanji, zouyi*, (Collected works of Zeng Guoquan, memorials), Guangxu 3, fifth month, 23<sup>rd</sup> day, (7/3/1877), 485.

1870s catastrophe describes famished people eating white earth (*baitu*) as if it were white flour, all the while proclaiming that it was special earth sent down by Heaven.<sup>23</sup>

The practice of eating clay during famine times developed long before the Mao-era famine, and can be traced back to the Ming Dynasty if not before. The custom may be connected to medicinal uses of muds or clays. In his famous pharmacological compendium the *Bencao Gangmu* (1596), for instance, the sixteenth-century physician Li Shizhen listed pharmacological uses for sixty-one different clays, muds, and other earths.<sup>24</sup> Pierre-Etienne Will cites as a possible origin of the “Bodhisattva earth” phrase an instance recorded in a Hubei provincial gazetteer during a famine that struck Hubei in 1578. According to the gazetteer author, “There was a landslide at the hill of the Goddess of Mercy (*Guanyin shan*) that exposed earth as white as rice flour. People rushed to eat it, and it kept a great many of them alive ... Since then the name Guanyin powder (*Guanyin fen*) has been passed on.”<sup>25</sup> The attempt to forge a connection between eating earth and the bodhisattva Guanyin highlights David Arnold’s point that while famine conditions compel people to consume a wide array of non-food items, how such items are selected and conceived of continues to be shaped by pre-existing cultural norms.<sup>26</sup> The bodhisattva Guanyin, popularly known as the Goddess of Mercy, was an important deity in late imperial China. Guanyin originally entered China from India as a male bodhisattva, but became syncretized with Miao Shan, a local Chinese deity who was female. According to the Miao Shan legend, although her father had treated her cruelly, when he fell ill Miao Shan saved him from death by “replacing his withering, putrified limbs with her own healthy ones and giving him her eyes as medicine.” She then visited hell, where she performed acts of deliverance for suffering souls. Through these acts of mercy and sacrifice Miao Shan was ultimately transformed into the bodhisattva Guanyin, whose birthdays were occasions for massive pilgrimages in Qing China.<sup>27</sup> Given this context, it makes sense that famished people turned to the merciful Guanyin and “Guanyin earth” for help during famine times.

The consumption of earth or ground-up stone during the 1876-79 famine appears in the reports of Western as well as Chinese observers. “We saw abundant proofs of men eating

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<sup>23</sup> Liu Xing’s “Huangnian ge” in *Yuncheng zaiyi lu*, (Yuncheng, 1986), 108.

<sup>24</sup> Sera L. Young, *Craving Earth: Understanding Pica, The Urge to Eat Clay, Starch, Ice and Chalk* (New York: Columbia University Press, 2011), 41.

<sup>25</sup> *Hubei tongzhi*, 75, “Zaiyi,” entry of spring 1578, as cited in Will, *Bureaucracy and Famine*, 33.

<sup>26</sup> David Arnold, *Famine: Social Crisis and Historical Change* (Oxford: Basil Blackwell 1988), 8.

<sup>27</sup> Susan Mann, *Precious Records: Women in China’s Long Eighteenth Century* (Stanford: Stanford University Press, 1997), 178-181, 268-269.

clay or stones,” wrote Baptist missionary Timothy Richard from Shanxi in February 1878. “I bought three stone-cakes. The stone is the same as our soft stone pencils. This is pounded to dust and mixed with millet husks, in greater or less proportions, according to the poverty of the people. It does not look bad, but tastes like what it is – dust.”<sup>28</sup> Walter Hillier of the British consular service, who visited famine-stricken Henan and Shanxi in March 1879, reported that in the Taihang mountain border area between the two provinces, “the great majority” of villagers had to “eke out their scanty stock of grain with a large admixture of dust.” Hillier surmised that people mixed it with their grain in order to “delude themselves into the belief that they had had a full meal when they had loaded themselves with as much as they could swallow.”<sup>29</sup>

Reports of famine victims eating earth or stone mixed with other items were common in twentieth-century famines as well. During the serious North China drought-famine of 1920-21, foreign relief workers listed “stone ground up into flour” and “fuller’s earth,” or a porous clay substance rich in Calcium Montmorillonite,<sup>30</sup> in their list of common non-staple foods.<sup>31</sup> Two decades later, the American photojournalist Harrison Forman described in his diary the non-grain foods he observed as he traveled through famine-stricken Henan with *Time* correspondent Theodore White. People ate millet chaff, ground elm leaves, sweet potato vines, cotton seed meal, mulberry bark, weeds, seeds, and straw in an attempt to survive the 1942 famine, he wrote, and “used soap-stone ground up to add body to preparations.” Such “foods,” noted Forman, led to numerous digestive disorders, including intestinal fever, bloating, and constipation.<sup>32</sup> Chinese journalists also reported earth-eating during the 1942-43 disaster. The editor of the Henan-based *Qianfeng bao* described how famine victims ate large amounts of white clay, and then waited for their digestive systems to expel it. A larger provincial newspaper, the *Henan Minguo ribao*, reported that people “lived on chaff, bark,

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<sup>28</sup> *China’s Millions* 39 (1878), p. 114. Here *China’s Millions* is citing a letter from Timothy Richard published in *The Times* in February, 1878.

<sup>29</sup> “Report of Walter C. Hillier, Esq., H.B.M. Consular Service,” in *China’s Millions* (1880), 6. Report dated March 26, 1879.

<sup>30</sup> Robert H.S. Robertson, *Fuller’s Earth: A History of Calcium Montmorillonite*. Hythe, Kent: Voltuma Press, 1986.

<sup>31</sup> Walter H. Mallory, *China: Land of Famine* (New York: American Geographical Society, 1926), 2.

<sup>32</sup> Undated entry, Harrison Forman Diary, China, December 1942-March 1943, in *The Forman Papers*, University of Wisconsin Milwaukee Digital Collections, pp. 23, 31 in online file.

grass roots, and sometimes even earth.”<sup>33</sup> That progression was reported as well by the Communist-run *Jiefang ribao* newspaper.<sup>34</sup>

There are several continuities between these late imperial, Republican, and Mao-era reports of famished people eating earth or ground stone. Not only did observers generally agree that people resorted to eating earth only after wild plants and tree bark were exhausted, but those who commented in more detail warned that the practice entailed serious risks. Elite observers, ranging from Shanxi governor Zeng Guoquan in 1877 and Harrison Forman in 1943 to the Sichuan investigation team in 1960, argued that it resulted in constipation, abdominal problems, and sometimes death. Why, then, was this practice found over such a long time-span and in a wide variety of locations?

In fact, eating certain kinds of dirt or clay is not unique to China, nor is the practice necessarily as dangerous as elite observers assumed. Scholars who research geophagy, or the deliberate consumption of earth, find that the practice “has a worldwide distribution and cuts across ethnic, social, and economic lines.”<sup>35</sup> Although geophagy occurs on all six inhabited continents, it is most common in tropical climates, and among pregnant women and young children.<sup>36</sup> A significant amount of research has been conducted on geophagy in West Africa and the American South. Donald Vermeer, a geographer and foundational scholar of geophagy, found copious evidence of the practice in Nigeria, “in the pouches of edible clays that women wore around their waists; (and) in the marketplaces where clay was sold and sometimes consumed in public.”<sup>37</sup> These clays, like most edible earth, were not surface dirt, but were instead “taken from the band of clay-enriched soil ten to thirty inches below the surface.” They were generally dried or baked before consumption, making them less likely to be contaminated with bacteria or parasites.<sup>38</sup> In the U.S., dirt eating has long been associated with rural African Americans in the South, but also with poor southern whites.<sup>39</sup> Southern plantation owners, like elite Chinese observers, believed that eating clay led to

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<sup>33</sup> *Qianfeng bao*, 6 April 1943, as quoted in Song Zhixin, ed., *1942: Henan da jihuang* [1942: The great Henan famine] (Wuhan: Hubei renmin chubanshe, 2005); *Henan Mingruo ribao*, 10 February, 1943, p. 1; *Jiefang ribao*, 24 October 1942, p. 1.

<sup>34</sup> *Jiefang ribao*, 24 October 1942, p. 1.

<sup>35</sup> Donald E. Vermeer and Dennis A. Frate, “Geophagy in a Mississippi County,” *Annals of the Association of American Geographers* 65.3 (1975), 414.

<sup>36</sup> Young, *Craving Earth*, 7, 132-133, 137; Susan Allport, “Women Who Eat Dirt,” *Gastronomica* 2.2 (Spring 2002), 28.

<sup>37</sup> Donald Vermeer and Ray Ferrell, “Nigerian Geophagical Clay: A Traditional Antidiarrheal Pharmaceutical,” *Science*, New Series 227.4687 (1985): 634-36.

<sup>38</sup> Allport, “Women Who Eat Dirt,” 33; Peter Abrahams and Julia Parsons, “Geophagy in the Tropics; A Literature Review,” *The Geographical Journal* 162.1 (March 1996): 68.

<sup>39</sup> Vermeer and Frate, “Geophagy,” 414-15; Allport, “Women Who Eat Dirt,” 36.

“digestive disturbances,” and discouraged it among their slaves. By the early nineteenth century, “the term ‘dirt eater’ had become a pejorative one for whites as well as blacks.”<sup>40</sup> Yet the practice has persisted in the American South regardless of the stigma. In the 1970s fifty percent of the black women surveyed admitted to eating clay, “about four times the frequency among White women.”<sup>41</sup>

Scholars of geophagy propose several possible reasons why people choose to eat certain types of earth. The long history of geophagy “makes it seem likely to be of overall benefit in group survival,” posit Aufreiter et. al.<sup>42</sup> Some researchers argue that people eat dirt to meet a nutritional deficiency.<sup>43</sup> After studying the mineral contents of the white clay eaten in Ghana and Togo, for instance, researchers found that it provided “a substantial amount of iron,” a nutrient often deficient in pregnant women, as well as other minerals. Thus pregnant women and other undernourished people may eat clay in “an attempt to replenish mineral nutrients.”

<sup>44</sup> In terms of China, a team of researchers who conducted geochemical analysis of three similar soil samples from Hunan Province that had been eaten during the Great Leap Famine of 1958-62 found a significant amount of iron in the samples, and smaller amounts of calcium, vanadium, magnesium, manganese and potassium. The consumption of such clays, they argue, “could be a substantial source of mineral nutrients at times of starvation.” Moreover, the presence in these soil samples of smectite clay, which has a tendency to hold water and swell, may have meant that eating it “produced a feeling of fullness, giving some physical comfort to the consumers.”<sup>45</sup> At the same time, while all three soil samples from Hunan looked quite similar in terms of texture and color, local information provided with soil sample A called it “Guanyin soil” and described it as “edible,” while consumption of samples B and C “reportedly was followed by gastric complaints.”<sup>46</sup> Given these findings, it appears that some soils in China could be consumed without causing ill effects, while others that looked similar caused intestinal problems when eaten.

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<sup>40</sup> Deanne Stephens Nuwer, “I’ll be blamed if I hanker after making my bowels a brick-yard”: Dirt Eating in the Antebellum and Early Modern South,” *The Southern Quarterly* 53.3/4 (Spring/Summer 2016), 141.

<sup>41</sup> Allport, “Women Who Eat Clay,” 36.

<sup>42</sup> S. Aufreiter et.al, “Geochemistry and Mineralogy of Soils Eaten By Humans,” *International Journal of Food Sciences and Nutrition* 48 (1997): 294.

<sup>43</sup> Abrahams and Parsons, “Geophagy in the Tropics,” 69.

<sup>44</sup> Francis Tayie, G. Koduah, and S A P Mork, “Geophagia Clay Soils as a Source of Mineral Nutrients and Toxicants,” *African Journal of Food, Agriculture, Nutrition and Development* 13.1 (2013); Abrahams and Parsons, 69.

<sup>45</sup> Aufreiter et.al, “Geochemistry and Mineralogy,” 294, 299, 303.

<sup>46</sup> Aufreiter et.al, 294, 299-300, 302.

Clay eating also appears to help undernourished people tolerate the ingestion of toxic or hard-to-digest wild plants. Sera Young, who examines a range of medicinal, religious, and physiological contexts for geophagy in her recent book-length study, finds that the “best supported explanation” of earth eating is that “it functions to protect and detoxify.”<sup>47</sup> Geophagy has served as “a kind of buffer, or protective device, for quelling gastrointestinal stress induced by barely tolerable wild plants or pangs of hunger,” concurs Timothy Johns, and the practice can also counter the effects of gastrointestinal parasites.<sup>48</sup> Researchers also note a human preference for the ingestion of kaolin, also known as “white dirt, chalk, or white clay.”<sup>49</sup> The kaolinitic composition of clays, find Vermeer and Ferrell, is “strikingly similar to that of the clays in the pharmaceutical Kaopectate,” which is used to counteract diarrhea and irritated intestines.<sup>50</sup> Among the three Chinese soil samples from Hunan, sample A, the one called Guanyin soil, contained kaolinite, “whereas less or no kaolinite was found in the other two samples.”<sup>51</sup> Given these examples, it seems likely that some *Guanyin tu* was a type of kaolinitic clay. If that is the case, starving Chinese villagers may have mixed clay with wild plants and other food substitutes not only to create the feeling of fullness, but also because they had learned over time that ingesting edible clays both replenished mineral nutrients and helped them digest the wide array of barks and wild plants consumed during famine times.

## ELITE AND STATE INVOLVEMENT IN SELECTING AND PRODUCING FAMINE FOODS

### Late Imperial China: Famine Relief Herbals

While the type of non-grain foods consumed at the local level during major famines shows a striking degree of continuity from late imperial through Maoist times, the degree of state sponsorship of particular non-grain foods, as well as the terminology and methods used to describe and disseminate such foods, changed significantly between the Qing, Nationalist, and Maoist periods. China has a long tradition of elite involvement in identifying plants that could be used as famine foods. A foundational example is the *Jiuhuang bencao* (Famine

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<sup>47</sup> Young, *Craving Earth*, 137.

<sup>48</sup> Timothy Johns and Martin Duquette, “Detoxification and Mineral Supplementation as Functions of Geophagy,” *American Journal of Clinical Nutrition* 53 (1991), 455; Timothy Johns, “Well-Grounded Diet,” *The Sciences* (September/October 1991), 43.

<sup>49</sup> R. Kevin Grigsby, Bruce Thyer, Raymond Waller, and George Johnston, “Chalk Eating in Middle Georgia: A Culture-Bound Syndrome of Pica?” *Southern Medical Journal* 92.2 (February 1999), 190; Aufreiter et.al, 302.

<sup>50</sup> Vermeer and Ferrell, “Nigerian Geophagical Clay,” 635.

<sup>51</sup> Aufreiter et.al, 302, 303.

Relief Herbals), a Ming dynasty encyclopedia compiled by Zhu Su (1360-1424), the Hongwu emperor's fifth son. Zhu Su, who was enfeoffed in Kaifeng, Henan in 1381 and made the prince of Zhou, responded to successive years of famine conditions in his fief by collecting and studying a wide array of plants in the Kaifeng area of Henan.<sup>52</sup> His work identifies 414 species of plants -- 138 of them drawn from earlier works on *Materia Medica*, and 276 newly identified species -- which could be consumed during a famine. Zhu Su organized these items into the following five classes: 245 kinds of herbs or grasses, such as ragwort, safflower, or wild basil; 80 types of trees ranging from elm to dogwood; 20 cereals such as buckwheat or wild millet; 23 fruits including jujube and wild cherries; and 46 vegetables ranging from celery to alfalfa. He also grouped items based on the part of the plant that could be eaten -- such as the leaf, stem, root, bark, fruit, flower, or seed.<sup>53</sup> Each species of plant was accompanied by a detailed woodblock print illustration, and the volume included ways to process toxic plants so that they could be consumed.<sup>54</sup>

A particularly famous compilation on pharmacology and natural history, the *Bencao gangmu* (1596), was authored by Li Shizhen (1518-1593), the above-mentioned late-Ming physician and naturalist lauded by many as “a precursor of modern science.”<sup>55</sup> Li's masterpiece drew in part on Zhu Su's *Jiuhuang bencao* to discuss medicinal uses of famine relief plants. Li, like the authors of medical texts from as early as the Song period, also tested or examined prescriptions for himself when possible. Many *bencao* texts “suggested trying things for oneself as the best way of distinguishing the true (*zhen* or *zheng*) from the fake (*wei* or *jia*) when sorting through drugs, valuable natural objects, and foodstuffs in the market,” explains Carla Nappi.<sup>56</sup> “At several points in the *Bencao*, Li claimed to have personally consumed a remedy to check on particularly questionable qualities attributed to plants and animals.” Perhaps because experiencing the efficacy of a remedy firsthand “was one important way for

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<sup>52</sup> Des Forges, *Cultural Centrality*, 15-16; Zhu Su (Ming, 1406), Wang Jiakui, Zhang Ruixian, Li Min et.al, *Jiuhuang bencao jiaoshi yu yanjiu* (Beijing: Zhong yi guji chubanshe, 2007), 1, 11.

<sup>53</sup> Read, *Famine foods Listed in the Chiu Huang Pen Ts'ao*; Zhu Su (Ming), Wang, Zhang, and Li et.al, *Jiuhuang bencao jiaoshi yu yanjiu*, 11.

<sup>54</sup> Zhu Su (Ming), and Wang, Zhang, and Li et.al, *Jiuhuang bencao jiaoshi yu yanjiu*; Wang Zichun and Cheng Baochao, *Zhongguo gudai shengwuxue, di yi jie, Zhu Su “Jiuhuang bencao,”* <http://www.readers365.com/wenhua/wh059/44.html>; Li, *Fighting Famine*, 35.

<sup>55</sup> Carla Nappi, *The Monkey and the Inkpot: Natural History and Its Transformation in Early Modern China*, (Cambridge: Harvard University Press, 2009), 6, 14.

<sup>56</sup> Nappi, 41-42.

an author to establish credibility,” both late-Qing and Nationalist-era officials also reported testing famine-relief foods on themselves.<sup>57</sup>

Although a wide array of edible plants that could be used as survival foods during famine times were included in Ming and Qing *materia medica* compilations, identifying and distributing non-grain foods was not in fact a key aspect of official or elite-run famine relief efforts in late imperial China. Instead, during the eighteenth-century “golden age of late imperial famine administration,” the high-Qing state aimed to prevent natural disasters from resulting in famines in the first place by selling state grain at below-market prices (*pingtiao*) in stricken areas in order to stabilize food prices, and by reducing or cancelling taxes for those areas. When famine conditions did ensue, officials tried to avert social unrest by providing the starving with grain. Relief officials classified households in affected areas according to their degree of disaster, worked with local elites to open soup kitchens and shelters, and most crucially, distributed large allotments of grain from massive state-run granaries to famished households free of charge.<sup>58</sup> By the 1870s the Qing granary system was in shambles, so the late-Qing state increasingly provided relief in cash rather than grain. Still, the focus of state relief campaigns continued to be providing starving people with grain, or with cash that could be used to purchase grain. When Shanxi governors Bao Yuanshen and Zeng Guoquan described famished people relying on grasses, tree bark, or Bodhisattva earth, they did so to highlight the severity of the 1870s disaster, not to encourage the consumption of such items. In sum, while famished people certainly sought out non-grain foods on their own during disaster years, mobilizing people to collect or produce emergency foods during a dearth was not a significant part of the Qing state’s grain-centered famine relief repertoire.

Similarly, when Chinese philanthropists from Shanghai, Suzhou, and other parts of the wealthy Jiangnan region traveled north to distribute relief to their starving compatriots during the 1870s famine, their primary focus was raising relief funds; distributing grain, cash, or clothing; burying the corpses of the starved, and redeeming women and children who had been sold by their starving families. Identifying or distributing non-grain foods generally was not part of their agenda.<sup>59</sup> I have found one example of an elite attempt to create and test

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<sup>57</sup> Nappi, 31, 33-34.

<sup>58</sup> Will, *Bureaucracy and Famine*, 188, chapters 7-8; Li, *Fighting Famine*, chapter 8; Pierre-Etienne Will and R. Bin Wong, *Nourish the People: The State Civilian Granary System in China, 1650-1850* (Center for Chinese Studies, 1991), chapter 3.

<sup>59</sup> Edgerton-Tarpley, *Tears from Iron*, chapter 6, 192-208; Zhu Hu, *Difangxing liudong ji qi chaoyue: wan Qing yizhen yu jindai Zhongguo de xinchen daixie* (The fluidity and transcendence of localism: Late-Qing

an “anti-starvation pellet” or “no starvation pill” (*buji wan*). In a letter that Jiangnan philanthropist Ling Gan sent to his fellow philanthropists in Suzhou in the spring of 1878, he notes that he had brought the “anti-starvation pellet” as requested, and a Mr. Wu Futang had tested the pellet by eating one. However, Wu soon experienced such fullness and flatulence that he became ill, and had only recently recovered. Showing a pragmatic willingness to change course in the face of evidence, Ling counseled that such pellets should not be distributed to the starving. “As for those who suffer hunger for a long time,” he wrote, “their intestines and stomach are vulnerable. This pellet is absolutely not suitable for them. They should not try it again.”<sup>60</sup> Such pragmatism would be sorely missing from Mao-era attempts to rely on “food substitutes” in place of grain.

### Republican-Era Shifts: Primacy of Science and the State

After the collapse of the Qing Dynasty in 1912 and the establishment of a new Republican form of government, the Chinese state began to play a more active role in encouraging the use of non-grain foods during famines. The ascendance of modern state authorities and revolutionary ideologies did little to reduce the number or severity of famines, but it did give rise to new ideas about how to interpret and respond to disaster. Republican-era modernizers from a broad array of political persuasions rejected the long-held Confucian view that disasters were Heaven’s way of warning the ruler that he had offended Heaven and should change course or risk losing the mandate to rule, and joined many nineteenth-century European elites in interpreting famines as “technical problems that modern social and natural science will eventually resolve.”<sup>61</sup> As militarism and civil war intensified in the 1920s the China International Famine Relief Commission (CIFRC), a joint Sino-foreign organization that maintained a one-man majority of foreign executives, came to dominate famine prevention and relief efforts.<sup>62</sup> Many foreign observers identified famine and malnutrition as among China’s worst problems, “and attributed them to China’s lack of scientific mind.”<sup>63</sup> The assumption that modern science was the best guard against food shortages reflected as

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charitable relief and the supersession of the old by the new in modern China) (Beijing: Zhongguo renmin daxue chubanshe, 2006).

<sup>60</sup> Ling Gan, “Zhi Nanzhong shu,” 5/25/Guangxu 4 (1878), in *Huangchao jingshi wen xubian*, vol. 75, *Jindai Zhongguo shike congkan* (Taipei: Guofeng chubanshe, 1963), 1022.

<sup>61</sup> Kathryn Edgerton-Tarpley, “From ‘Nourish the People’ to ‘Sacrifice for the Nation,’” *The Journal of Asian Studies* 73.2 (May 2014): 455-56; Edkins, *Whose Hunger?*, xv, 15-18.

<sup>62</sup> Li, *Fighting Famine*, 302; Fuller, “Changing disaster relief regimes,” 157.

<sup>63</sup> Seung-joon Lee, *Gourmets in the Land of Famine: The Culture and Politics of Rice in Modern Canton* (Stanford: Stanford University Press, 2011), 1.

well an increasing interest in wartime and interwar Europe in the promise of “artificial foods,” that could be produced in laboratories via chemical synthesis.<sup>64</sup>

The Nationalist Party (Guomindang), which under Chiang Kai-shek defeated warlord armies and managed to reunify much of China in 1928, was deeply committed to finding scientific solutions to China’s chronic food shortages. Many Chinese nutritionists who had earned higher degrees overseas returned to China in the 1920s and 30s, bringing with them ideas about minimizing food waste while improving nutritional intake.<sup>65</sup> By the early 1930s China’s food problem “had become more urgent than anything else,” writes Seung-joon Lee. To Nationalist leaders “the devising and pursuing of scientific solutions to the food problem . . . would be the very first step to end China’s history of thousands of years of natural disasters that mainly caused famines,” as well as “a stepping stone for China’s leap forward to a new scientific era that would permit it to vie with technologically advanced Western countries.” Guomindang technocrats embraced statistics, documentation, quantification, macroeconomics, and Western agricultural and nutrition science as the best methods of preventing or relieving famine.<sup>66</sup> The Japanese invasion of China in July 1937, which marked the beginning of World War II in China, sharply reduced the Nationalist state’s ability to fight famine and malnutrition. The Japanese conquest of the entire Lower Yangzi region by the spring of 1938 “accounted for a 45 percent decrease in the amount of revenue over which the Nationalists had control.”<sup>67</sup> Yet the beleaguered wartime state did not abandon its interest in nutrition science. In an effort to meet the dual demand of feeding both soldiers and civilians, the government launched dietary reform campaigns that aimed to reduce the overall consumption of rice by encouraging patriotic citizens to eat more miscellaneous grains as well as “the nutritious parts of foodstuffs customarily considered non-edible, such as brans, peels, and sprouts.”<sup>68</sup>

One of the greatest disasters of World War II in China was the Henan Famine of 1942-43, which was initiated by drought but greatly exacerbated by Henan’s position as an important battle theater throughout the war. By the time the drought began in the spring of 1942, the Japanese were occupying 43 of Henan’s 111 counties, while the Nationalists controlled 68

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<sup>64</sup> “Artificial Foods,” *Scientific American* (September 10, 1898): 162-163.

<sup>65</sup> Seung-Joon Lee, “The Patriot’s Scientific Diet: Nutrition Science and Dietary Reform Campaigns in China, 1910s-1950s,” *Modern Asian Studies* 49.6, 2015: 1817, 1820.

<sup>66</sup> Lee, *Gourmets in the Land of Famine*, 1, 13-14, 114-15. See also Li, *Fighting Famine*, 308.

<sup>67</sup> Felix Boecking, “Unmaking the Chinese Nationalist State: Administrative Reform among Fiscal Collapse, 1937-1945,” *Modern Asian Studies* 45.2 (2011), 283.

<sup>68</sup> Lee, “The Patriot’s Scientific Diet,” 1810, 1811, 1824, 1830.

counties in southern and western Henan, and the Chinese Communists were active in their bases behind Japanese lines in northern and eastern Henan.<sup>69</sup> Both the Chinese Nationalists and their Communist rivals actively promoted the use of non-grain foods during the Henan Famine. A pronounced focus on identifying, testing, and disseminating such foods reflected the modernist drive to find scientific solutions to famine. In February 1943, for instance, the *Henan Minguo ribao*, a major newspaper in the stricken province, reported that as many people in Henan were starving to death on the roads, a government staff person named Liu Daoquan had followed an ancient prescription to prepare three kinds of “famine relief foods” (*jiuhuang shipin*).<sup>70</sup> Liu, like his Ming and Qing forbearers, tested the three famine relief foods on himself before moving forward, and found the results favorable. The head of the Henan Provincial hospital then examined Liu, and found him to be in good health. The provincial disaster relief committee thus decided to allocate 100,000 yuan in order to prepare and distribute large quantities of Liu’s famine relief foods for Henan’s disaster victims.

After introducing these “famine relief foods” to its readers, the *Henan Minguo ribao* printed the formula for each of the three “special foods.” The first recipe asked users to soak five *dou* (pecks) of soybeans and three *dou* of sesame seeds in water for hours, remove their peels, dry the beans and seeds in the sun until they became powder, boil the powder in water and dry it in the sun again three times, knead the powder into dough, and make steamed bread out of them. “Eating it once can prevent hunger for seven days,” claimed the article, and encouraged people to make digesting the mixture easier by drinking tea made from sesame or sunflower seeds. The second and third recipes were simpler, and eating one *liang* (one ounce) of them per day could keep famine victims feeling full for a whole day. The second recipe entailed collecting, peeling, chopping, frying, mixing together, drying, and grinding into powder one *jin* of red dates, persimmons, and chesnuts, respectively, and two *jin* of soybeans. The third recipe called for frying seven *sheng* of soybeans and three *dou* of sesame seeds together and then grinding them into powder.<sup>71</sup>

The 328-page official report on the Henan famine that was compiled by the Henan Provincial Government and submitted to the central government in December 1943 highlights the

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<sup>69</sup> Edgerton-Tarpley, “Saving the Nation, Starving the People? The Henan Famine of 1942-43,” 323-364; Wou, *Mobilizing the Masses*, 166-172.

<sup>70</sup> “Jiuhuang shipin shiyan jieguo chengxiao shenja” (The result of tests on famine relief foods find them very effective), *Henan Minguo ribao*, 14 February 1943, 2.

<sup>71</sup> *Henan Minguo ribao*, 14 February 1943, 2. One *sheng* is a bit less than one English pint.

degree of institutional support for selecting and disseminating Liu's famine relief foods. The section of the report titled "Assembling Famine Relief Foods" (*peizhuang jiu Huang shipin*) introduces Liu Daoquan as a staff member of the provincial government's finance department, and explains that after Liu tested his three famine relief foods on himself, they were tested and found effective by multiple institutions -- the Department of Health, the Provincial Hospital, the Management Office, and other organs.<sup>72</sup> At that point the Henan provincial relief committee allocated 100,000 yuan for making and distributing large quantities of these foods for Henan's disaster refugees. Moreover, according to the report the Henan Provincial Government ordered all counties under its control to use these recipes to make famine relief food, and staff members in departments ranging from finance to education donated funds and materials so that local authorities could make more of it. County officials who prepared the foods reported that the third recipe was the most popular. "The results were outstanding," judged the report, and went on to provide detailed instructions for making the relief foods.<sup>73</sup> The ingredients used in these famine foods -- ranging from soybeans to persimmons -- were also present in Ming and Qing "famine foods," and would have been familiar to local people. The methods of preparation, such as boiling, drying, or grinding ingredients, also echo practices found in late imperial China.<sup>74</sup> The precise measurements and step-by-step instructions published by the *Henan Minguo ribao* and the official report, however, highlight a twentieth-century attention to quantification, documentation, and nutritional requirements. Moreover, the provincial government's decision to have state institutions as well as individuals test the famine foods, and its subsequent attempt to mass-produce and distribute the foods on the provincial and county level, showcase a new level of state interest in non-grain foods.

Calls to practice self-reliance by planting and eating non-grain foods was another noteworthy emphasis during the 1942-43 famine. Editorials printed in the *Qianfeng bao*, for instance, a small private newspaper based in a Nationalist-controlled area of Henan, prodded county officials to foster self-reliance rather than waiting for government grain. This could be done by encouraging people to plant drought-resistant vegetables and preserve wild herbs so

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<sup>72</sup> "Peizhuang jiu Huang shipin" (Assembling foods that can rescue from famine), in "Henan sheng zhengfu jiu zai zong baogao" (December 1943), File AB6-588, pp. 66-67, Henan Provincial Archives; also held in file 20-00-03-009-02, Institute of Modern History Archives (IMH), Academia Sinica.

<sup>73</sup> "Peizhuang jiu Huang shipin," Henan Provincial Archives, pp. 66-67.

<sup>74</sup> Read, *Famine foods Listed in the Chiu Huang Pen Ts'ao*; Edgerton-Tarpley, "Saving the Nation," 331-335.

famine refugees could collect them.<sup>75</sup> Relief cadres operating in the Communist base areas located behind Japanese lines in northern Henan echoed such calls, and also began a new practice of calling for the use of “food substitutes” (*dai shipin*) in the context famine relief.<sup>76</sup> In August 1943, the Communist-run *Jiefang ribao* (Liberation daily) reported that the Jin-Ji-Lu-Yu Border Region government had instructed people in the drought-stricken Taihang base area to “struggle against nature” by growing vegetables such as radishes and turnips that could substitute for scarce grain, and to fight starvation by storing food substitutes (*dai shipin*) and non-staple foods (*fu shipin*) such as wild herbs or unripe fruits which fell to the ground.<sup>77</sup> A second article from August 1943 praised soldiers in the Taihang region who had collected over 1900 *jin* of edible wild herbs to help relieve famine conditions and ease the people’s burden.<sup>78</sup> As we have seen, rural families had a long history of seeking out wild plants and other non-grain foods on their own during famine times. To some degree, then, the Communist drive to mobilize the masses during the 1943 famine could be viewed as a way of both validating and taking control over a time-honored local survival strategy. Calling on soldiers and cadres to take part in collecting food substitutes was also a way for the Party to forge connections with rural people during a time of intense suffering.

In sum, during the Henan Famine of 1942-43 both the Nationalist government and its Communist rivals played a more active role in promoting the use of non-grain foods than had the late imperial state. The items used in these famine relief foods were quite traditional, however, as were the methods of preparation. Spurred by wartime and postwar food science research conducted in Europe, the United States, and Japan as well as by famine conditions, in China the transition from “famine relief foods” to “food substitutes” accelerated in the

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<sup>75</sup> *Qianfengbao*, March 16, 1943, March 38, 1943, April 1, 1943, in Song Zhixin, 129-136. See also “Henan sheng jiuzai gongzuo zhi jiantao,” *Henan Mingguo ribao*, August 2-3, 1943; *Henan Mingguo ribao*, August 15, 1943.

<sup>76</sup> Jin-Ji-Lu-Yu border area government, “Taihang qu sier, sisan liangnian de jiuzai zongjie,” [Summary of disaster relief in the Taihang area in 1942 and 1943, dated August 1, 1944], in Henan Finance Department and Henan Provincial Archives, eds. *Jin-Ji-Lu-Yu kang Ri genjudi caijing shiliao xuanbian, Henan bufen* [Selected historical materials on the finance and economy of the Shanxi-Hebei-Shandong-Henan anti-Japanese base, Henan section] (Beijing: Dangan chubanshe, 1985), 136-174. The Chinese term for food substitutes, “*dai shipin*,” appears in medical periodicals as early as the 1920s in connection with heat-related illnesses, but does not seem to have been used in relation to food shortages or famine relief until the 1940s. For examples of medicinal use of the phrase see Zhou Zhen, “Xueshu yanjiu zhengqiu renfu rebing dai shipin” (Academic researching seeking food substitutes for maternal fevers), (*Yiyao*, 1921); and Zhou Xiaonong, “Ji wenshi fushu dai shipin” (Recording food substitutes for humid summer heat), *Zhongyi zazhi* 5 (1923): 16-17.

<sup>77</sup> “Taihang genjudi junmin relie dongyuan jiji hanzai,” *Jiefang ribao*, 12 August 1943.

<sup>78</sup> *Jiefang ribao*, 13 August 1943; 14 August 1943.

1950s. By 1960, scientifically-produced food substitutes were championed as a way to prevent hunger without lowering unrealistically high grain procurement quotas.

### Wartime and Postwar Global Experiments with Food Substitutes

When faced with the Great Leap Famine of 1958-62, the Chinese state encouraged villagers to collect non-staple foods, but launched as well a full-scale campaign to manufacture scientific food substitutes. Many of the food substitutes described in literature from the Mao period, such as chlorella (an alga “familiar as the cause of much of the green scum that forms on cattle ponds”), leaf protein, or “man-made meat essence,” sound like bizarre and unpalatable stand-ins for food.<sup>79</sup> It was not just Maoist utopianism that gave rise to such questionable “foods,” however; some Western and Japanese scientists in the decades before, during, and after World War II were equally optimistic about their potential. On the eve of World War I, for instance, a Belgian scientist, M. Effront, managed to use “a remarkable process for industrial preparation of nitrogenous foods” that “resemble ordinary meat in a striking degree.” Effront extracted a food albumen from brewery or distillery refuse products. “The refuse material is first washed, then pressed and treated by sulphuric acid and afterward by lime,” explained *Scientific American*. The result was “a pastry extract which has a very pronounced taste of meat and has three times the food value of the latter.”<sup>80</sup> Similarly, when Germany faced serious food shortages during World War I, German chemists responded by striving to produce new foodstuffs.<sup>81</sup> One of Germany’s wartime food substitutes that garnered considerable attention was a protein-rich “yeast powder” that could be added to the human diet.<sup>82</sup> According to an enthusiastic overview in *Scientific American*, mineral yeast grown in a mixture of water, molasses, and ammonium sulfate had a nourishing power “twice as large as that of beef,” and would be less expensive to obtain. The yeast had been added to German soups and other dishes “without in the least altering the taste of these dishes.” The method, continued the magazine, was “valuable not only for present use in Germany, but for general adoption everywhere at any time, even after the war.”<sup>83</sup> German, British, and U.S.

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<sup>79</sup> “Algae for Food Explored,” *Science News Letter*, August 20, 1949: 118. For vivid descriptions of Chlorella and other food substitutes consumed during the Great Leap Famine, see Jung Chang, *Wild Swans: Three Daughters of China* (New York: Simon and Schuster, 1991), chapter 12.

<sup>80</sup> “Artificial Meat,” *Scientific American* (October 4, 1913): 253.

<sup>81</sup> English abstract of M. Kling, “New Feeding-Substances used in Germany during the War,” *International Review of the Science and Practice of Agriculture* (June 1917): 892-899.

<sup>82</sup> “Government Control of Food Supplies in Germany,” *Monthly Review of U.S. Bureau of Labor Statistics* Vol. 4, No. 5 (May, 1917): 714-715.

<sup>83</sup> “A New Cheap Substitute for Meat,” *Scientific American*, February 17, 1917: 172.

researchers continued their efforts to produce alternative sources of food “by new scientific or technical processes” during the interwar and World War II periods.<sup>84</sup> During the Great Leap Famine, Chinese food scientists would repeatedly cite Western experiments with food substitutes in their own attempts to produce “manmade meat essence” and other artificial foods.

European, American, and Japanese research into chlorella, another food substitutes heralded by Chinese scientists during the 1958-62 disaster, started in the immediate post-war period in response to the global food crisis. With half of the world’s people facing hunger on a regular basis in the late 1940s and global population on the rise, scientists felt the need to develop “radically unorthodox food sources” to feed an increasingly crowded world.” *Chlorella pyrenoidosa*, “a high protein algae that grows rapidly using inexhaustible sunlight and carbon dioxide,” was viewed as an especially promising high-tech solution to the world food crisis.<sup>85</sup> From the late 1940s through the 1950s major research institutions including the Rockefeller Foundation, the National Institute of Health, the University of California, Berkeley, Stanford University, and the Tokugawa Institute for Biological Research in Tokyo in cooperation with the Carnegie Institute, sponsored pilot projects on chlorella, and reputable periodicals reported many positive early results.<sup>86</sup> “Each chlorella cell is completely edible. Each is crammed with such dietary essentials as protein, amino acids, fats and vitamins,” wrote the author of a glowing report on the alga published in 1955. “Here, scientists believe, may be an answer to the great question facing future generations: how to feed hundreds of millions of more human beings as the population of the world soars.”<sup>87</sup> During the 1950s researchers experimented with producing chlorella in controlled environments that provided sunlight, water, nitrogen, and carbon dioxide. In some studies the protein-rich end product, “a bright green vegetable paste,” was dried and used in powdered form to enrich foods such as French bread, noodles, Japanese-style green tea, and ice cream. The chlorella powder was said to

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<sup>84</sup> George Gerhard, “The Nazis Turn to ‘Ersatz,’” *The North American Review* Vol. 238, No. 5 (November, 1934): 462-463; George L. Clarke, “Plankton as a Food Source for Man,” *Science* Vol. 89, No. 2322 (June, 1939): 602-603; Chancey Juday, “The Utilization of Aquatic Food Resources,” *Science*, New Series, Vol. 97, No. 2525 (May, 1943): 456-458.

<sup>85</sup> Warren Belasco, “Algae Burgers for a Hungry World? The Rise and Fall of Chlorella Cuisine,” *Technology and Culture* 38.3 (1997), 608-609.

<sup>86</sup> Belasco, 609; “Chlorella as Human Food,” *Nutrition Reviews*, January 1955, 13.

<sup>87</sup> Hartley E. Howe, “Chlorella and Mr. Malthus,” *Challenge* 3.9/10 (June-July 1955): 23.

give these foods an “agreeable” light green color, and some of the Japanese and American adults who sampled the foods pronounced them “tasty.”<sup>88</sup>

In the West enthusiasm for chlorella as a solution to global hunger ebbed in the late 1950s due to increasingly serious doubts about “the economic viability of a mass-marketed chlorella cuisine.”<sup>89</sup> The large-scale processing of chlorella, cautioned one author, “involves the handling of enormous quantities of water, and this entails expensive equipment and power.” Due to the necessity of maintaining sterile conditions and the cost of constructing and operating the culture system, he concluded, “the capital investment in a plant for the production of Chlorella would be very large as compared with that required for the production of the usual agricultural crops.”<sup>90</sup> In short, when the difficulty and expense of mass-producing chlorella became clear, support for the endeavor evaporated in the U.S. and Europe. In late 1950s China, on the contrary, the chlorella craze was just beginning.

#### From Famine Relief Foods to Food Substitutes: The Great Leap Famine

The 1958-62 famine occurred in the context of the Great Leap Forward, a utopian campaign that aimed to accelerate China’s industrialization to such a degree that it would surpass Great Britain in industrial output within fifteen years by unleashing the productive energies of China’s mobilized masses. Part of the problem occurred when local cadres submitted increasingly exaggerated estimates of their grain yields in order to avoid being branded as rightists. The Chinese state, which based its procurement requirements on these wildly-inflated estimates, then requisitioned dangerous amounts of grain in its effort to provision the cities and fund rapid industrialization in 1958, 1959, and 1960. The state also rejected international aid, and even exported more grain abroad in order to earn foreign exchange currency. China’s net grain exports rose from 1.88 million tons in 1957 to 4.74 million tons in 1959.<sup>91</sup> Drought and adverse weather exacerbated the situation. The harvest of 1959 was a miserable failure. Short of food, the communal mess halls depended on by most rural Chinese during the Great Leap era repeatedly cut rations and in some cases completely ran

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<sup>88</sup> Hartley, “Chlorella and Mr. Malthus,” 25; “Chlorella as Human Food,” 13.

<sup>89</sup> Belasco, 609, 621.

<sup>90</sup> H.A. Spoehr, “Chlorella as a Source of Food,” *Proceedings of the American Philosophical Society* 95.1 (1951): 66-67.

<sup>91</sup> Penny Kane, *Famine in China, 1959-1961: Demographic and Social Implications* (London: Macmillan Press, 1988), 137; Dali Yang, *Calamity and Reform in China: State, Rural Society, and Institutional Change Since the Great Leap Famine* (Stanford: Stanford University Press, 1996), 66.

out of grain. Families attempted to hide grain in their homes, but officials desperate to meet procurement targets used violence to ferret out and forward to the state as much grain as possible. Over the winter and spring of 1959-60 widespread starvation ensued in multiple provinces across China. Rural residents suffered 89% of the excess mortality.<sup>92</sup>

A key issue that laid the groundwork for the Food Substitutes Movement during the Great Leap Famine was the fact that as famine conditions grew more severe, it became increasingly dangerous for cadres on all levels to admit that a famine was occurring. As late as 1957, finds Felix Wemheuer, letters complaining about hunger could still be published in the *People's Daily* newspaper. When peasants and rural cadres made increasingly sharp critiques of rural-urban disparities in food, however, Chinese Communist Party (CCP) leaders grew alarmed that hunger was being used as a way to undermine Great Leap policies, and the state-run media began attacking such critiques as wrong and false. By early 1959 statements such as “the peasants do not have enough to eat” or “grain quotas are too high” could no longer appear in newspaper reports, though such topics continued to be covered in the *Neibu Cankao*, or the internal news reports for high-ranking cadres.<sup>93</sup> The situation became even more restrictive after the Lushan Conference in July 1959, when “famine as a topic became taboo not just for the media, but also within the internal information system of the party.” At that point the only acceptable narrative concerning food shortages was that “quotas were not being fulfilled because peasants were underreporting production and hiding grain.” This narrative gave rise to the violent campaigns against supposed concealment of grain.<sup>94</sup> In the late summer and fall of 1959, the only way to discuss the crisis occurring in the countryside was to attribute it to locusts and severe drought, and to champion rural efforts to “war against nature” and obtain a bumper harvest in spite of drought conditions.<sup>95</sup>

After the state procured much of the already-poor harvest of 1959, famine conditions in Henan and many other provinces worsened rapidly – for many the most deadly period of the famine was between October 1959 and January 1960. In Henan as many as one million

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<sup>92</sup>Ralph A. Thaxton, *Catastrophe and Contention in Rural China: Mao's Great Leap Forward Famine and the Origins of Righteous Resistance in Da Fo Village* (Cambridge University Press, 2008), chapters 4-5; Hu Angang, *The Great Leap Forward: 1957-1965*, trans. Hu Guangyu and Vivian C.W. Hui (Singapore: Enrich Professional Publishing, 2014), 117-118.

<sup>93</sup> Felix Wemheuer, *Famine Politics in Maoist China and the Soviet Union* (New Haven: Yale University Press, 2014), 99-101, 107-110, 119-121.

<sup>94</sup> Wemheuer, *Famine Politics*, 107-110, 119-121. See also Thaxton, *Catastrophe and Contention*, 191-192.

<sup>95</sup> *Neibu Cankao*, 31 July 1959, 14-15; 18 August 1959, 13-14; *Henan ribao*, 19 July 1959, 1; 20 July 1959, 1; 21 July 1959, 1; 11 August 1959, 3.

people died in Xinyang Prefecture, the most infamous site of state-sponsored violence and terror during the Great Leap disaster.<sup>96</sup> As Yang Jisheng explains, grain supplies dwindled only a month or so after the fall harvest, and “most communal kitchens had shut down by October and November 1959.” When grain ran out in many counties in Xinyang commune members, like their late-Qing and Nationalist-era counterparts, tried to survive by eating elm bark, wild herbs, rats, roots, and eventually human flesh.<sup>97</sup> Not a hint of this appeared in Henan’s major newspaper, though. Instead, in late 1959 the *Henan ribao* carried numerous triumphalist articles heralding the movement to breed more pigs, both to increase the amount of manure collected and to provide people with meat.<sup>98</sup>

In late 1959 and early 1960 the CCP, still unable to admit that famine was occurring, spearheaded a campaign that aimed to use new cooking processes to increase the amount of food available without actually reducing the grain quota. In January 1960 cadres in Henan gave this effort a scientific name, the “food augmentation method” (*liangshi zengliang fa*).<sup>99</sup> According to a *Neibu Cankao* report, communes in Henan employed three augmentation methods, all of which entailed washing and cooking grain, grinding it into a paste or powder, adding yeast, and making steamed buns out of it. The report claimed that with traditional methods one *jin* of flour made only one or two *jin* of steamed buns, but with the new augmentation method “one *jin* of grain can make 5 *jin* of steamed buns, 3 at the least.” With this method in place, it continued, “there is no limit to the amount of food people can eat.”<sup>100</sup> By March 1960, notes Gao Hua, “All over China various augmentation methods were being invented.”<sup>101</sup> The food augmentation movement marked a transition point between the traditional practice of mixing together natural ingredients such as soybeans or dates to make “famine relief foods,” and a concerted attempt to use scientific processes to produce man-made or artificial “food substitutes.”

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<sup>96</sup> For detailed accounts of terror, repression, and violence in Xinyang and elsewhere, see Yang Jisheng, *Tombstone*, 23-86; Dikotter, *Mao’s Great Famine*, 287-319; Zhou, *The Great Famine*, 17-42; Thaxton, *Catastrophe and Contention*, 191-198.

<sup>97</sup> Yang Jisheng, *Tombstone*, 37-43.

<sup>98</sup> *Henan ribao*, 21 December 1959, 1, 21 November 1959, 1, 28 November 1959, 1. On the death toll in some Xinyang communes see Yang Jisheng, 43.

<sup>99</sup> Gao Hua, “Food Augmentation Methods and Food Substitutes during the Great Famine,” in Kimberley Ens Manning and Felix Wemheuer, eds., *Eating Bitterness: New Perspectives on China’s Great Leap Forward and Famine* (UBC Press, 2011), 172.

<sup>100</sup> *Neibu Cankao*, 20 January 1960, 8-9. For additional reports extolling Henan’s success at using advanced cooking methods or using straw and wild plants to produce edible starch, see *Neibu Cankao*, 29 3 1960, 16-18; 31 March 1960, 18-19.

<sup>101</sup> Gao Hua, “Food Augmentation Methods,” 171, 173, 181-185.

In May 1960 leaders in Beijing finally began to acknowledge the extent of the food problem in rural China.<sup>102</sup> In June articles about the urgent need to overcome disaster then appeared in the *Henan ribao*, though disaster conditions were always blamed on flood or drought.<sup>103</sup> Once Party leaders began to admit that a problem existed, their response was two-fold. They joined mid-twentieth-century Western researchers in turning to science for a solution to the food crisis, but also made the search for food substitutes into a mass campaign, thus employing one of the CCP's most cherished methods. In summer 1960, twenty-two different departments in the Chinese Academy of Sciences began to conduct research on producing food substitutes.<sup>104</sup> Examining foreign research on artificial foods was part of the endeavor. Researchers in Shanghai, for instance, compiled an overview of nearly two dozen Japanese publications on food substitutes.<sup>105</sup> In August, Mao Zedong delivered a speech encouraging the collection of more food substitutes, and in September the Central Committee issued instructions on "lowering rural and urban grain quotas." At this point both *Neibu Cankao* reports and the state-run media began to publish more frequent coverage of disaster conditions and the importance of food substitutes.<sup>106</sup> In October 1960, preliminary results of the Chinese Academy of Sciences' research on food substitutes were published in the *Neibu Cankao*. Of the dozens of possibilities explored since June, stated the Academy, eight food substitutes appeared to have great potential. Chief among them were edible yeast called "man-made meat essence," leaf protein, chlorella, powder made from wheat or corn root, and acorns.<sup>107</sup> Just as carobs and other items that were normally used as animal food became human food during the Greek Famine of the early 1940s, so chlorella, though with far more state involvement than was present in wartime Greece, "instantly went from being a food supplement for pigs to a food source for people" during the Mao-famine.<sup>108</sup>

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<sup>102</sup> Gao Hua, 181.

<sup>103</sup> *Henan ribao*, 13 June 1960, 1.

<sup>104</sup> "Yong yesheng zhiwu nongfu chanpin dai liangshi da you kewe: kexueyuan yanjiu liangshi dai yong pin de chubu chengguo" [Preliminary results of research by the Academy of Sciences on food substitutes], 17 October 1960, *Neibu Cankao*, held in *Database of Chinese Great Leap Forward & Great Famine 1958-1962*, second edition (Fairbank Center for Chinese Studies at Harvard University, 2014).

<sup>105</sup> Shanghai kexue jishu qingbao yanjiu suo (Shanghai Institute of Scientific and Technological Information), "Ribei dai shipin yanjiu ziliao jianjie," (Summary of Japanese research materials on food substitutes), 30 November, 1960, File A72-2-460-7, Shanghai Municipal Archives.

<sup>106</sup> Gao Hua, "Food Augmentation," 184-185.

<sup>107</sup> "Yong yesheng," 17 October 1960, *Database of Chinese Great Leap Forward*.

<sup>108</sup> Gao Hua, "Food Augmentation," 185; Central Committee, "Hu Qiaomu's suggestions regarding promoting production of such food substitutes as chlorella," 3 November 1960, in *Database of Chinese Great Leap Forward*.

In November 1960, party members from the Academy of Sciences submitted a lengthy overview of their recommendations concerning food substitutes. This document provides a fascinating window on the Academy's attempt to draw on local experience and indigenous methods as well as scientific experiments and trials conducted abroad.<sup>109</sup> Rural people possessed rich experience in using wild plants as substitutes, acknowledged the report, but there were many items they had previously been unable to eat due to their toxicity or bitter taste. Researchers were identifying ways of extracting harmful elements from certain plants, thus rendering them both edible and nutritious. Acorns, for instance, were rich in starch, but because acorn starch contains tannic acid, it was too bitter to swallow and led to constipation. Researchers from the Academy of Sciences, however, had found a simple way to extract the tannins from the acorns by removing the shell, smashing the nut into small pieces, and soaking it in a sodium carbonate solution for one to two days. This process leached out the tannins, making acorns a good non-grain food. Similarly, many leaves were rich in protein but could not be eaten directly due to the chlorophyll or toxic substances they contained. Scientists had found a way to extract the protein out of leaves so that it could be consumed. British scientists had been researching the production of leaf protein for some time, continued the report, but they used expensive machinery to extract it. In contrast, the Academy's method was simple and could be used in communes and factories.<sup>110</sup>

The report also championed the production of man-made meat essence (*renzao roujing*), or a food substitute made from edible yeast. Again the authors contrasted the costly and mechanized processes Western countries used to create food substitutes with the methods pioneered in China. Man-made meat essence had been developed in wartime Germany to address wartime shortages, stated the report, but German scientists had used chemical and microbiological methods to produce it. The Academy of Sciences had developed an indigenous method that boiled rotten fruit, vegetable roots, non-toxic leaves, wild grasses, or stalks and husks into a liquid culture, put strains of *Geotrichum candidum* (a fungus) into it, and kept it warm until it dissolved into a sticky liquid cooked at a higher temperature. Once this "man-made meat essence" dried, it could be turned into powder that was easy to transport and use. "The Western method of making man-made meat essence is proper for industrial production," stated the report, but Chinese scientists had found a simple method

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<sup>109</sup> "Zhongguo kexueyuan dangzu guanyu daban liangshi dai yong pin de jianyi" [Suggestions by the Chinese Academy of Sciences Party Group concerning producing food substitutes], 9 November 1960, *Database of Chinese Great Leap Forward*.

<sup>110</sup> *Ibid.*, 9 November 1960, in *Database*.

that could be employed in the communal kitchens attached to communes, schools, and other organs. “There are diverse edible resources in nature,” claimed the report. “We are sure that after extraction, purification and fermentation, inedible and unpalatable wild plants, subsidiary agricultural and forestry products, and aquatic organisms can be turned into edible and tasty food.”<sup>111</sup> Drawing on the Academy of Sciences report, on 14 November the Central Committee issued “Emergency instructions on immediately developing a large-scale campaign for the gathering and manufacturing of food substitutes.” This document, which was drafted by Zhou Enlai, gave rise to a nationwide Food Substitutes Campaign in late 1960 and 1961.<sup>112</sup> In December 1960 and May 1961, respectively, the *Neibu Cankao* published two special issues, each 16 pages in length, on the Food Substitute Campaign. These reports, complete with photographs, included detailed and scientific-sounding discussions of the production of man-made meat essence, chlorella, artificial milk and starches, and other food substitutes in different parts of the country.<sup>113</sup>

When communal kitchens, schools, factories, and other units throughout the country were ordered to collect and produce food substitutes, however, a rash of poisonings quickly ensued. An emergency directive circulated to all provinces, autonomous regions and municipalities on 23 December 1960, only a month into the campaign, reported that food poisoning incidents had occurred in several locales. In Fujian alone, it continued, 6,591 persons had been poisoned by late November, and 294 of them had died. Most of the poisonings had occurred when people ate cassava, but others had been poisoned due to eating starch made from the hemp flower, and still others had died due to eating starch made by stalks that had been sprayed with pesticide. The State Council ordered all local governments to refrain from relaxing the Food Substitutes Campaign, but to avoid such accidents by enhancing the oversight and testing of substitute foods.<sup>114</sup> In spite of the directive, the food poisoning problem continued. During a two-day period in January 1961, for instance, 463 people suffered nitrate poisoning after eating in three different communal kitchens in Henan’s

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<sup>111</sup> Ibid., 9 November 1960, in *Database*.

<sup>112</sup> Gao Hua, “Food Augmentation,” 183-84.

<sup>113</sup> *Neibu Cankao*, “Special Issues on Food Substitutes,” 27 December 1960; 10 May 1961.

<sup>114</sup> “Guowuyuan guanyu zai caiji he zhizao daishipin yundong zhong yanfang zhong du shigu de jinji tongbao” [Emergency directive of the State Council on preventing poisoning accidents during the campaign to collect and produce food substitutes], 23 December 1960, in *Database of Chinese Great Leap Forward*. See also Gao Hua, “Food Augmentation,” 188-190.

Nanyang Prefecture. Sixty-six of the cases were severe, and another twenty-four were relatively serious.<sup>115</sup>

## CONCLUSION

During the Great Leap Famine many Chinese villagers followed their late-Qing predecessors by seeking to survive the disaster by consuming grass roots, tree bark, wild herbs, or even Bodhisattva earth. The Maoist state's headlong rush to replace requisitioned grain with "scientific" food substitutes during the Great Leap disaster, on the other hand, demonstrates that Chinese Communist leaders shared with both their Nationalist predecessors and many mid-twentieth-century Western researchers an "extravagant faith in technologies that appeared to transcend known boundaries."<sup>116</sup> Unfortunately for those involved, the CCP proved to be even more "unscientifically optimistic" than its counterparts when evaluating how quickly and to what degree scientific solutions could solve China's problems, and it was both more willing and more able than the Nationalists had been to use coercive state power to bring about sweeping change.<sup>117</sup> In sum, the Mao-era Food Substitutes Campaign can be understood as not only a sharp departure from Qing China's grain-centered famine relief policies and a radical extension of rhetoric and priorities laid out in the Nationalist period, but also as a classic case of "'high modernism' gone wild."<sup>118</sup>

By the end of 1960 Bodhisattva earth, which some villagers believed to be "rice sent from the immortals," had been largely replaced by man-made food substitutes produced and disseminated by organs of the Chinese state. Ironically, consuming the supposedly "pure" and "scientific" food substitutes recommended by the Chinese Academy of Sciences may in the end have proved more dangerous than eating time-tested Bodhisattva earth.

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<sup>115</sup>Zhonggong Nanyang diwei, "Guanyu gonggong shitang buduan fasheng yaxiaosuan yan zhongdu shijian de tongbao" (Notification concerning ongoing nitrite poisonings in communal kitchens), January 27, 1961, File 1-1-508, Nanyang City Archives.

<sup>116</sup> Belasco, 609, 621.

<sup>117</sup> James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998), 4-5.

<sup>118</sup> Peter C. Perdue, "Ecologies of Empire: From Qing Cosmopolitanism to Modern Nationalism," *Cross-Currents: East Asian History and Culture Review E-Journal* No. 8 (September 2013), 22.