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THE QUINOA HACK

A Critique

A FEW YEARS AGO the *New York Times* reported from Bolivia that quinoa, once a staple food of the Andean highlands, had become too expensive for local consumers, who were finding themselves priced out by the booming export market. Quinoa farmers may have benefited from growing demand in the US and Europe, but quinoa's popularity among health-conscious rich-world consumers was helping to push Bolivians towards cheaper, processed foods. Domestic consumption of the pearly grains declined by a third between 2005 and 2010, as the export price tripled. Malnutrition is up in quinoa-growing regions. Other reports described bitter battles over prime plots, with dozens injured when farmers fought with slings and sticks of dynamite over what was once abandoned land.¹

The *Times* has certainly done its share to spread the gospel of quinoa. In recent years the paper has published dozens of articles on preparing quinoa, with recipes ranging from an edamame and corn salad to a quick-cooking breakfast porridge, pancakes, a wholewheat-quinoa bread and 'chard cakes'. Early recipes emphasized substitutability, with quinoa taking the place of cracked wheat in summer salads and brown rice in pilafs. Later entries in the series have exploited quinoa's exceptional protein content, which lends moistness and structure to baked goods. The *Times's* resident quinoa evangelist, Martha Rose Shulman, has responded to the chenopod's newfound popularity by urging a return to basics (tabouli, roasted-beet pilaf), encouraging readers to buy Fair Trade Certified quinoa, and pushing the less widely available red and black varieties. Any doubt that the grain had been indigenized was dispelled in April 2011, when the *Times* reported consternation

in the North American Jewish community over whether quinoa was kosher for Passover.²

The quinoa conundrum seems to cry out for a response from food-justice activists, but what form this should take is a matter of contention. These days—and this is not intended as a trivialization—food justice is hot. In intensively developed markets such as New York, consumer awareness of the social and environmental factors involved in the availability, nutritional quality and long-term viability of food products is at a level that was unimaginable when Frances Moore Lappé published *Diet for a Small Planet* in 1971. A growing body of work has encouraged millions of rich-world eaters to revise their food-consumption habits, taking into account energy and water footprint, spoilage, the environmental costs of long-distance transport, the vitiation of plant and animal genetic diversity, the human misery of labour-intensive production, and the suffering of animals raised in confinement.³ There have been protests against the concentration of ownership in genetic resources for agriculture and the distortion of commodity prices wrought by speculation in agricultural derivatives.⁴ The latest wave of activism has both built on and inspired a new generation of food-centred geography and rural sociology, along with a new discipline: food studies. Critical works include Marion Nestle's *Food Politics* and Julie Guthman's *Agrarian Dreams* and, more recently, *Weighing In*.⁵

Farming 2.0

Part of what has made food justice attractive to such a broad audience is a new emphasis on pleasure. The distance between critical and enthusiast

¹ Simon Romero and Sara Shahriari, 'Quinoa's Global Success Creates Quandary at Home', *NYT*, 19 March 2011; Dan Collyns, 'Quinoa Brings Riches to the Andes', *Guardian*, 14 January 2013.

² Paul Vitello, 'For Passover, Quinoa Is Popular, but Kosher?', *NYT*, 17 April 2011.

³ See, among many others: Barbara Kingsolver, with Steven Hopp and Camille Kingsolver, *Animal, Vegetable, Miracle*, New York 2007; Jonathan Safran Foer, *Eating Animals*, Boston 2009; Carolyn Steel, *Hungry City*, London 2009; Raj Patel, *Stuffed and Starved*, London 2007; Michael Pollan, *In Defense of Food*, New York 2009.

⁴ Rachel Schurman and William Munro, *Fighting for the Future of Food: Activists versus Agribusiness in the Struggle over Biotechnology*, Minneapolis 2010.

⁵ Marion Nestle, *Food Politics: How the Food Industry Influences Nutrition and Health*, Berkeley 2002; Julie Guthman, *Agrarian Dreams: The Paradox of Organic Farming in California*, Berkeley 2004, and *Weighing In: Obesity, Food Justice and the Limits of Capitalism*, Berkeley 2011.

modes of food commentary has shrunk considerably in the past ten years. Indeed, it is often those whose love of food is most intense, most chthonic, who are held to be best positioned to comment on what is wrong with the food system and how it might be fixed. It is now common, in food-activist circles, for independent farmers to be consulted as authorities on how a tomato (or a peach, or a pork loin) should taste—and, by extension, how food could be grown so that the sensual pleasures of an earthy diet can be extended to all. This is a gratifying development, at least for speciality produce growers who live near major markets. But the apotheosis of sensual pleasure arrived hand in hand with a neoliberal turn in food-justice activism. Too often today, activists imagine the reform of the global food system as something that will grow organically out of a revolution in individual household choices. This perspective essentially addresses those who are not only passionately concerned with the environmental unsustainability and growing health disparities of the food system, but who also possess the discretionary time and wealth to develop a fondness for charismatic microproduce.

The consumer-choice vision—a product of what Guthman has referred to as the alternative foods movement—offers no way to talk about how food systems reproduce social dynamics that are not just about what we eat. Activists may recognize the systemic failures of capitalist food production—the overproduction of commodity crops, maize in particular, is seen as a driving factor in what they take to be the debasement of American eating habits over the past generation.⁶ But they pull back from inferring from this a need to remake the system itself. Since the 1980s, the turn towards personal responsibility has served to delaminate the alternative foods movement from farmers' rights and food-sovereignty appeals, on the one hand, and from campaigns to regulate the health hazards of industrial agriculture on the other.⁷

It is perhaps no surprise that the alternative foods movement would come to overlap with the tech-startup world. Lately there has been a lot of buzz in alternative-food circles around concepts like 'Farming 2.0', open-source agriculture and hacking the food system.⁸ The gist of

⁶ Guthman, *Weighing In*, pp. 6, 49.

⁷ On food sovereignty, see William Schanbacher, *The Politics of Food*, Santa Barbara, CA 2010. On environmental toxins, Linda Nash, *Inescapable Ecologies*, Berkeley 2007.

⁸ See the websites of Food+Tech Connect, 'Hacking the Food System Round Up', 8 October 2011, and the Grace Communications Foundation, 'Hack//Meat: Reimagining the Future of Meat', 12 December 2012.

much of this commentary is that the problem with past efforts to infuse agriculture with technology was that the tech has been *biotech* and the interventions were focused primarily on making plants do things they were not evolved to do: grow twice as big, twice as fast, absorbing twice the fixed nitrogen and phosphorus. The Green Revolution, the Farming 2.0 arguments go, did not increase yields so much as compress them into a shorter time window, while leaving farmers more vulnerable than ever to anomalies in the climate and business cycles. The way to ensure a reliable food supply for all was not by telling farmers that they didn't understand the science of selecting and growing crops, but by using information technology to match producers with consumers and eliminate inefficiencies in the supply chain, while allowing farmers to protect themselves by growing a wider range of crops. Connecting independent food producers directly to the public: this is the hack.

Crop scientists, on the other hand, have been calling for a different kind of technological intervention: a globally coordinated project of sustainable intensification, short on the kind of social-networking ventures popular among alternative food activists and long on science-driven programmes of breeding and genetic modification to equip food crops with drought, flood, pest and rust resistance, as well as desirable micronutrient profiles. These proposals do acknowledge environmental limits to yield intensification and point to the need to reduce post-harvest losses by improving storage, transport and market access. But those calling for sustainable intensification do not talk about their proposals as hacking the food system.⁹

The quinoa paradox—rising malnutrition and declining production for the domestic market, alongside an export boom—illustrates both the problems that food-justice activists have been most concerned about and those that drive proponents of intensification. On the one hand, relatively well-off consumers in New York, even those, no doubt a strong faction in the quinoa demographic, who are most concerned with eating local, reconnecting with farmers and so on, find themselves complicit in the erosion of food security in a faraway place. On the other hand, the problems that beset nutrition in Bolivia *could* be construed as issues of

⁹ Charles Godfray et al., 'Food Security: The Challenge of Feeding 9 Billion People', *Science*, vol. 327, no. 5967, 12 February 2010, pp. 812–8; Royal Society, *Reaping the Benefits: Science and the Sustainable Intensification of Agriculture*, RS Policy Document 11/09, London 2009.

domestic yields and a want of value-added food-processing technology. What's interesting about the quinoa case is that the story of how the grain became so popular outside its home region involves both kinds of technical interventions, agronomic and informational, and both visions of the future of food—local, slow and human, or global, intensive, post-human. Looking at how quinoa became a global food can help us better understand the possible consequences of different strategies of intervening in the food system—and the different kinds of value that arise from the production and trade of agricultural commodities.

Discoveries

Estimates of quinoa's date of domestication range from 3,000 to 5,000 years ago, with the possibility of multiple independent domestication events spanning a swathe of the Andean *cordillera*, from the southern Altiplano up to the equator.¹⁰ Archaeological evidence in the form of storage residues points to quinoa's use as a cultivated food crop in the central Andes prior to 600 AD. Despite the transformative influence of the Incan period, in which ruling caste and priesthood collaborated to incorporate agricultural corvée into the apparatus of rule, it seems likely that Andean foodways may have persisted largely unchanged. In his study of Aymara terms, the Jesuit linguist Juan Ludovico Bertonio (1555–1628) cited a dish called *ñacchaya* as 'quinoa cooked almost without moisture', *acu thaa*, 'a tortilla of quinoa cooked in the frost (tostada al hielo)'; *huccha thaa*, 'a tortilla of quinoa or maize dried in the cold' and *huaykaya haccu*, 'a very white flour of quinoa, first moistened, and then toasted and ground'.¹¹ Quinoa seeds were dispatched to Spain in 1590, eighteen years after the sack of Vilcabamba and execution of Túpac Amaru had sealed the conquest of the Tahuatinsuyu; they could not be made to grow, however, perhaps because they had been scrubbed and rinsed, ready for cooking—quinoa stripped of its saponin seed-coat

¹⁰ Quinoa may initially have been introduced into human encampments by domesticated camelids, as proposed by the anthropologist Lawrence Kuznar: 'Animals [ex. llamas, alpacas, and today goats] aggressively seek and eat this plant whenever it can be found . . . The animals carry the seeds back to the corral in their fur and faeces, and deposit the seeds at the pastoral site. A mutualism appears to exist between herd animals and *Chenopodium*': Kuznar, 'Mutualism between *Chenopodium*, Herd Animals and Herders in the South Central Andes', *Mountain Research and Development*, vol. 13, no. 3, August 1993, pp. 257–65.

¹¹ Juan Ludovico Bertonio, *Vocabulario de la lengua aymara*, facsimile edn, ed. Julio Platzmann, Leipzig 1879.

will not germinate. The French naturalist Louis Econches Feuillée collected quinoa on his 1709–11 tour of the Andes and identified it as a chenopod in his 1725 *Journal des Observations physiques, mathématiques et botaniques*; it was granted a Linnean binomial in 1797.¹² For Alexander von Humboldt, who encountered it on his journey from Quito to Lima in 1802, quinoa was to the region what ‘wine was to the Greeks, wheat to the Romans, cotton to the Arabs’.¹³

A century later Hiram Bingham would merely remark, in his account of his 1911 expedition to Machu Picchu, that ‘the white-seeded variety, after being boiled, may be fairly compared to oatmeal’.¹⁴ Outside the Andes, quinoa remained an object of economic botany only in an academic sense. Indeed, geographers and ethnologists travelling in the region took remarkably little interest in what local inhabitants were doing with it. The plant was universally acknowledged as an important food source, capable of being grown at altitudes where maize could not, but descriptions of its preparation and consumption habits are scarce. The German ethnologist Carl Martin, describing his observations in the southernmost part of the quinoa-growing area in the 1870s, noted that the Chiloeans treated quinoa, as other foods, with smoking: ‘Over the hearth lie a number of rods hardly or but partly roofed over with boards. To these rods now everything destined for curing or preservation in smoke is affixed: bacon, ham, a type of sausage, bunches of quinoa (*Chenopodium quinoa*), the original cereal of the Indians.’¹⁵

Northern interest

The start of the Cold War would prove a turning point. In 1948 the newly formed Food and Agriculture Organization resolved to investigate quinoa’s potential as a solution to malnutrition among the ‘Upland Indians’ of Latin America: ‘scientific cultivation’—seed selection, row planting, irrigation, industrial fertilizer—offered the prospect of doubling yields.

¹² Joseph Ewan, ‘Plant Resources in Colonial America’, *Environmental Review*, vol. 1, no. 2, 1976, p. 54, fn. 10.

¹³ Cited in National Research Council, *Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation*, Washington, DC 1989.

¹⁴ Hiram Bingham, *Inca Land: Explorations in the Highlands of Peru*, Cambridge, MA 1922, p. 124.

¹⁵ Carl Martin, ‘Ueber die Eingeborenen von Chiloe’ (part 2), *Zeitschrift für Ethnologie* vol. 9, no. 3, 1877, p. 326.

In the same year, the American anthropologist Weston La Barre offered a more detailed account of foodways around the Lake Titicaca basin. Quinoa, he noted, occupied a role in the Aymara diet second only to that of potatoes: the spiky pannicles gave the remarkable yield of 2,000 seeds to one; it was easy to grow, 'exempt from diseases and pests, hardy and requires no care in cultivation'. Drawing on Bertonio's account, La Barre went on to describe various forms of preparation: *pitu*, 'made by washing and winnowing quinoa, and then toasting the flour'; *p'esque*, 'boiled with salt in an olla [a ceramic vessel], sometimes with the addition of cheese broken up into small pieces', or—La Barre's preference—*p'esque k'ak'uta*, 'stirred with a *wisla*, or large wooden spoon, to break the grains'; and *pisara*, toasted quinoa cooked and mixed with honey. The leaves of the quinoa plant 'are boiled when young like spinach'.¹⁶

In 1955, a team of nutritional scientists at the Harvard School of Public Health conducted an investigation into quinoa's nutritional profile: more energy-dense than wheat, yellow maize or polished rice, with higher proportions of protein, fat and mineral micronutrients, double the phosphorus and four times the calcium of improved wheat. The Harvard scientists reported that young rats had thrived on a diet of whole quinoa supplemented with cod-liver oil, gaining more weight than rats raised on Nestlé's skimmed-milk powder at an equivalent protein concentration. Amino-acid composition assays showed quinoa to have two and a half times the lysine of wholewheat.¹⁷ The US Department of Agriculture was soon involved in efforts to introduce it into the United States, although the growing season in the Rockies proved too short to allow the plants to mature before the first killing frost.¹⁸ Before long, experimental stands

¹⁶ Weston La Barre, *The Aymara Indians of the Lake Titicaca Plateau, Bolivia*, *Memoirs of the American Anthropological Association*, no. 68, in *American Anthropologist*, vol. 50, no. 1, Part 2, 1948, pp. 84, 63. La Barre offers a firsthand account of communal feasting: 'All eat a spoonful of meat from a common bowl which is passed around by a man; this symbolizes *ayllu* [community] unity . . . The "table" consists of a series of heavy woolen textiles laid in the shape of an L, and in the centre are two lines of cooked maize grains placed directly on the cloth, and between these two lines lies a heap of cooked potatoes . . . The natives eat with their hands, and from small individual bowls, and use no eating utensils otherwise': pp. 64–5.

¹⁷ Philip White et al., 'Nutrient Content and Protein Quality of Quinoa and Cañihua, Edible Seed Products of the Andes Mountains', *Agricultural and Food Chemistry*, vol. 3, no. 6, June 1955, pp. 531–4.

¹⁸ Elizabeth Eiselen, 'Quinoa, a Potentially Important Food Crop of the Andes', *Journal of Geography*, vol. 55, no.7, October 1956, pp. 330–3.

of quinoa were pushing up in the tropical-plant laboratories of the Wageningen Agricultural University in the Netherlands and at the John Innes Institute in England. Economic botanists took a renewed interest in the plant's habits and uses on the Bolivian Altiplano.

Mystical entrepreneurs

Yet quinoa's commercial debut in the United States depended not on international-development agronomics alone, but rather on its conjunction—its cross-pollination—with the trickle-down Eastern mysticism that found an eager audience in the developed world in the wake of the Vietnam War, the 1973 energy crisis and the first rumblings of post-Fordist capitalism: the strategies of supply-chain disaggregation, flexible accumulation and financialization that today we call globalization. Books like E. F. Schumacher's *Small Is Beautiful* (1973) and Masanobu Fukuoka's *The One-Straw Revolution* (1978) offered a philosophical context in which eating choices could seem revolutionary.

In 1970 a mystic from La Paz, Oscar Ichazo, was contacted by American fellow-thinkers from the Esalen Institute and elsewhere. Ichazo soon set up shop in the US himself, opening institutes in California and New York. He endorsed quinoa as good food for shamanic work—sustaining, grounding, etc. In 1978 one of his US disciples, a psychologist named Steve Gorad, visited Bolivia and returned with a fifty-pound bag. Friends were enthusiastic about quinoa's taste and texture; the problem was an absence of infrastructure for supply aggregation. A few years later a fellow Ichazo follower, Don McKinley, a small entrepreneur and graphic designer then based in Boulder, suggested that Colorado could be perfect quinoa-growing country. A local agronomist, David Cusack, was the third member of the trio that would found the Quinoa Corporation in 1982. Cusack had a PhD in international development and was running an agricultural consultancy in Boulder, while putting together an edited volume on the use of computer technology to support Third World farming. He persuaded a local grower to plant trial crops of quinoa in the high desert soil of the San Luis Valley, using seed flown in by Gorad.

David Cusack is the pivot, the figure who joins the two scenes instrumental in bringing about quinoa's take-off in North America: the

human potential movement, with its characteristic fusion of mysticism, vagabondage and entrepreneurialism, and the development agronomy establishment. You look for the David Cusacks and follow them to see what unlikely alliances enter into the phenomenon that he defined, without naming it—commodity globalization. Cusack also offered perhaps the first proposal for a computer hack to ‘restore an equilibrium between man and nature’, while still producing more food, through the delivery of ‘good information’. His 1982 edited volume, *Agroclimate Information for Development*, was illustrated by an ink-wash depiction of a god-like figure in a Peruvian cap emerging above the Altiplano landscape, a 1970s computer cradled in his hands, beams of light streaming from one eye. Cusack argued that the Green Revolution had foundered on the limitations of bio-engineered high-yield seeds, its signature innovation, which tended to underperform local varieties if the weather deviated from the highly specific climatic conditions for which they had been programmed; they also demanded high-grade inputs in terms of fertilizers and mechanization, limiting adoption to wealthier farmers, or those better connected to credit sources. To revive the Green Revolution, Cusack suggested a food-system hack *avant la lettre*: coordinating computer-based simulations of climate and other factors with real-time delivery of data, ‘to support small-farmer decision-making and system management’.¹⁹

In a 1984 *Ecologist* article, ‘Quinoa: Grain of the Incas’, Cusack took the logic of the food-system hack a step further. In a world of ‘instant communications and mass media’ it was consumer demand, rather than processing and production technology, that should be transferred from the developed to the developing world.²⁰ The key to fostering quinoa cultivation by small farmers in the Andes was not the export of technical information but of tastes: American consumers would stimulate native demand for crops more in tune with local environmental conditions, which had been spurned in favour of processed foods by modernizing local elites. The \$2.4 billion US healthfood market (as it then was) had a key role to play in quinoa’s future. The following year Cusack took part in a seminar convened by the National Research Council, which launched a full-scale international survey on the ‘Lost Crops of the Incas’—quinoa, cañihua and amaranth. The NRC report, ‘intended as a tool for economic

¹⁹ David Cusack, ed., *Agroclimate Information for Development: Reviving the Green Revolution*, Boulder, CO 1982, pp. xiii–xv.

²⁰ David Cusack, ‘Quinoa: Grain of the Incas’, *Ecologist*, vol. 14, no. 1, 1984, p. 31.

development', would stress the growing need to adapt the world's food supply to unprecedented climatic and pedological uncertainty.²¹

When you look at the hype surrounding Andean superfoods, gluten-free products, heirloom crops and other niches used to push quinoa and its congeners to a broader demographic, it does seem to be largely about marketing. Cusack was right: consumer interest would be the key input; no doubt he knew what he was doing when he promoted quinoa as the 'lost grain of the Incas', rather than the staple fare of Bolivian *campesinos*. In June 1984 Don McKinley, Cusack's Quinoa Corporation colleague, staged a market test at Alfalfa's, a new natural-foods store in Boulder, offering steamed quinoa along with a quinoa pudding and quinoa cookies. Within a year, Alfalfa's was turning over 700 pounds a month.²² By 1988, annual US retail sales came to 750 tonnes. Cultivation in Colorado never really took off, but the Quinoa Corporation became a booming import, wholesale and retail business. Cusack's role, however, was cut short. In the same week that quinoa made its debut at Alfalfa's, he was murdered outside La Paz.

On the Altiplano

Bolivia is the world's largest supplier of quinoa, responsible for around 46 per cent of global production, compared to 42 per cent for Peru and 6 per cent for the US.²³ Nearly two-thirds of Bolivian quinoa, including the prized 'royal' variety, *quinoa real*, comes from the departments of Oruro and Potosí in the southern Altiplano, the vast plateau, 3,000 to 4,000 metres above sea-level, suspended between the Western and Eastern *cordilleras*. Traditional cultivation methods, under the auspices of the *ayllus*, followed a system of communal land management known as *aynuqa*,

²¹ NRC, *Lost Crops of the Incas*, p. 4. In 1993 a NASA Technical Paper would enthuse about the possibilities of hydroponically raised quinoa as part of a 'Controlled Ecological Life Support System' for long-term space missions, where the crew would grow their own food. It was quinoa's versatility—it 'can be eaten like a hot breakfast cereal, as a side dish in a dinner meal, or put in soups, salads, pilafs and desserts'—that interested NASA, as much as its high lysine and fatty-acid content. See Greg Schlick and David Bubenheim, *Quinoa: An Emerging 'New' Crop with Potential for CELSS*, NASA Technical Paper 3422, Moffett Field, CA 1993, p. 3.

²² Rebecca Wood, 'Tale of a Food Survivor: Quinoa', *East West Journal*, April 1985.

²³ Wilfredo Rojas, José Luis Soto and Enrique Carrasco, *Study on the Social, Environmental and Economic Impacts of Quinoa Promotion in Bolivia*, PROINPA Foundation, La Paz 2004, p. 7.

in which quinoa took its place alongside potato-growing and llama husbandry, for wool and meat.²⁴ Potatoes and quinoa would be planted in rotation on the hillsides, where the damper soil was more fertile than on the sandy flatland; the crop would be followed by a long fallow period of at least four years. Quinoa was sown in September, the start of the austral spring; seed holes were dug some six inches deep, down to where the soil retained its moisture, then topped with llama manure. After the April harvest, the dried seed heads would be heaped on a cloth and hammered with a mallet to release the grain, which was then stored in woollen sacks. Before cooking, the quinoa would be subject to a lengthy de-husking process—in some communities, the women would tread the part-baked seeds in a stone basin in the yard, before scouring and rinsing them—to get rid of the bitter seed-coats.²⁵

The development of the region's tin mines, nationalized after the 1952 revolution, helped to create a cash market for quinoa, on sale at the weekly *feria* in small Andean towns. The MNR government tried to encourage its use in commercially produced bread, but the bitter seed-coat remained an obstacle to industrial processing. In the late sixties, Bolivian crop researchers began developing a *dulce*—soft-coated—quinoa, successfully cultivated at lower altitudes from 1970; but its nutritional value would be significantly poorer than the hard-coated highland strains.²⁶ The main export destination at this stage was Peru, a market three times the size of Bolivia's. In his *Manual de plantas económicas de Bolivia*, the botanical scientist Martín Cárdenas would note the appearance of Bolivian quinoa in Peruvian supermarkets, along with “Peruvita”, a mixture of quinoa flour and fish meal, [taken] with sugar for breakfast and with salt for soups'. Cárdenas was sceptical about its future: 'Even if quinoa is richer in protein than the general run of cereals, the conditions for planning large-scale production do not hold, nor is its flavour at all agreeable, the taste being an acquired one.'²⁷

²⁴ Andrew Ofstehage, 'The Gift of the Middleman: An Ethnography of Quinoa Trading Networks in Los Lipéz of Bolivia', Master's Thesis, Wageningen University, 2010, p. 21.

²⁵ Laura López, Aylene Capparelli and Axel Emil Nielsen, 'Traditional Post-Harvest Processing to Make Quinoa Grains Apt for Consumption in Northern Lipéz', *Journal of Archaeological and Anthropological Science*, vol. 3, no. 1, March 2011.

²⁶ Rojas et al., *Impacts of Quinoa Promotion*, pp. 6–7.

²⁷ Martín Cárdenas, *Manual de plantas económicas de Bolivia*, 2nd edn, La Paz 1989, p. 86.

The entry of Cusack, Gorad and McKinley's Quinoa Corporation came at a time of widespread social upheaval in Bolivia. The late 1970s saw an eruption of protests against the Banzer dictatorship, signalling the end of the military–*campesino* alliance and the beginnings of an indigenous armed struggle on the Altiplano, along with highway blockades and general strikes in the towns. In the early 80s, falling oil and mineral prices decimated Bolivia's export earnings; devaluations fed soaring inflation and cuts in real wages. In 1985 the newly elected government under the septuagenarian Víctor Paz Estenssoro imposed one of the most ferocious shock-therapy programmes Latin America has known: food and fuel subsidies were abolished, wages frozen and operations at the state-owned mines suspended, prior to privatization.²⁸ Hunger in the countryside was widespread. In 1985, 65 per cent of the population was rural; by 2013 that figure had dropped to 33 per cent, as Altiplano peasants and miners swelled the informal sector in the slums of El Alto and Cochabamba, headed for the coca-growing valleys of Chapare and agro-industrial complexes of the Santa Cruz lowlands, or sought casual work in Chile and Argentina.

Against this turbulent backdrop, the new US market for quinoa offered highland *campesinos* a potential cash source; but it also speeded the erosion of the *aynuqa* system, which had served as a brake both on intensification of cultivation beyond the soil's capacity to regenerate and on fragmentation of responsibility for land, allowing *ayllus* to organize community labour across a broader set of landholdings. The ballooning export market—Quinoa Corporation purchases soared from 108 to 1,500 tonnes between 1986 and 1997, with the EU importing another 1,300 tonnes—drove the increasing mechanization of quinoa cultivation and its expansion onto the sandy flatlands, where tractors and rotary ploughs could operate, while monoculture increased the risks of disease and pest infestation. Even on the hillsides, the long fallow periods of the *aynuqa* were now curtailed and llama husbandry, a vital element of the traditional economy, was left to the old women.²⁹

Quinoa growers were to some extent protected by the Bolivian tradition of producer-owned cooperatives, which helped set prices. ANAPQUI, the

²⁸ See James Dunkerley and Rolando Morales, 'The Crisis in Bolivia', NLR 1/155, Jan–Feb 1986.

²⁹ Rojas et al., *Impacts of Quinoa Promotion*, pp. 43–4; López et al., 'Traditional Post-Harvest Processing'.

National Association of Quinoa Producers, was established in 1984 to unite a clutch of local co-ops that had arisen from the *campesino* mobilizations at the turn of the 1980s, and which aimed at cutting out exploitative middlemen. But ANAPQUI in turn was soon transmitting the conditions imposed by US importers: purchasing only *primera* quinoa, of the large, white-seeded variety, in quantities that favoured larger landholders; and, from around 1992, insisting on organic certification. For small producers, the costs of certification could be greater than the value of the crop, while the intrusive organic inspection regimes were resented by the highland farmers. The cooperatives' deferred-payment system—settling with the growers only after the crop had been sold on—was another source of complaint. Private intermediaries touring the quinoa-growing regions still played a role, though they offered lower rates: a 10lb bag of quinoa might be traded for cooking oil, soap, fruit, noodles or cash.³⁰ By the early 2000s, a Bolivian report noted that expanded quinoa production was 'having devastating effects' on the environment of the southern Altiplano, due to the over-exploitation of soil that was too fragile for mechanical rotation.³¹ Production was stagnating, the problems exacerbated by pests and droughts. Quinoa now accounts for over 55 per cent of household income in parts of Oruro and Potosí, yet the poverty level on the Altiplano stands at 90 per cent, infant mortality is still sky-high, and three in four households lack electricity. Researchers suggest that, contrary to Western media reports, quinoa growers still consume a good portion of the crop that they produce, as a lunchtime soup, or mixed with sugar and water to make a nourishing breakfast drink.³² But in the supermarkets of La Paz or El Alto, quinoa is many times more expensive than a packet of rice.

Techno fix?

As Cusack's career showed, food-system hacking emerged from the same conjuncture—and, in fact, the same social networks—as the back-to-the-land and human-potential movements.³³ It's possible to imagine various hacks to the quinoa value chain, which would represent not so much a contribution to farmers' technical expertise as an attempt

³⁰ Ofstehage, 'Gift of the Middleman', p. 46.

³¹ Rojas et al., *Impacts of Quinoa Promotion*, p. 61.

³² Ofstehage, 'Gift of the Middleman', p. 81.

³³ Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism*, Chicago 2006.

to change how consumers relate to producers. For example: quinoa farmers in Bolivia, Peru and Ecuador would register with a service that allowed them to enter vital statistics about their family and farm—where they're located, what they grow, how old their kids are—and to keep a Twitter-style microblog of daily observations over the course of the growing season. These could be tagged with local weather data. The bags in which they send quinoa to market would be outfitted with RFIDs or QR codes, allowing aggregators to track which farms supplied a particular lot and to share this data seamlessly with importers.³⁴ The lot number printed on the packaging would allow consumers to pull up profiles of the farmers whose quinoa they are eating, to write them comments, or follow them online. Eventually, smart packaging would communicate directly with the tracking service to display a rotating farmer profile in e-ink directly on the box or retail bulk bin.³⁵

Would this help close the social distance between consumers and producers, compelling North Americans to take steps to undo their complicity in the erosion of nutrition security in the quinoa-producing regions? Maybe. But it might simply turn the farmer persona into an element of the brand, something already happening with the smiling *campesino* holding out his coffee beans to the consumer in Alter-Eco's packaging. Solidarity, as Adam Smith recognized at the dawn of the era of long-distance commodity trade, is a gradient phenomenon: the thicker the social ties, the more solidarity there will be. But farmers might not want to subject themselves to what would amount to a kind of surveillance. Besides, since quinoa requires little cultivation between planting and harvest, many farmers migrate to the cities in search of casual work during the growing period; e-tracking is likely to find them sweeping streets in Santiago de Chile or cleaning offices in Buenos Aires. In some respects, the quinoa conundrum has parallels with the 'resource curse' often held to afflict poor communities who live atop unexploited stocks of fossil fuels or strategic minerals. It might also be compared to

³⁴ Compare the Relationship Information Tracking System for Producers, a pilot project conducted by the coffee importer Sustainable Harvest: see 'Mobile Technology Project', 2011, available on the company's website.

³⁵ Labelling with verification, as in the case of Fair Trade, represents an alternative to directly connecting consumers to producers. But as Daniel Jaffee has shown, labelling can actually serve to keep value chains opaque to consumers. In the case of fair-trade coffee, large integrators managed to capture the standards-setting process, diluting the redistributive effect of verification without consumers' becoming aware: Daniel Jaffee, 'Weak Coffee: Certification and Co-Optation in the Fair Trade Movement', *Social Problems*, vol. 59, no. 1, February 2012, pp. 94–116.

those national products that are treasured for non-economic reasons, their value represented by the vast subsidies supplied to US steelmakers and cotton-growers, by French and British governments' cossetting of their arms industries, or the cheaper-than-water gasoline available in oil-producing countries like Iraq and Venezuela. In Bolivia, the population has repeatedly mobilized over the past decades in attempts to rescue the country's natural resources from super-exploitation by foreign multinationals: BP–Amoco and Repsol in the gasfields, Edison and Bechtel running water and sewage systems, American corporations mining silver, zinc and tin, Japanese lithium extractors on the Potosí saltflats. Rural and urban organizations—*ayllus*, city neighbourhood groups, market-vendors associations, *cocalero* and miners' unions—came together in the water and gas wars of 2000–03, and in the popular mobilizations of March–June 2005. Campaigns that included highway blockades, mass strikes and demonstrations succeeded in bringing down three presidents in a row.³⁶ Yet so far, at least, Bolivians have not rallied to defend quinoa as they have water or gas. For all its cachet, quinoa occupies a diminutive position in the Bolivian economy: agriculture makes up just 17 per cent of GDP, of which quinoa constitutes only a fraction.

The 2005 election of former *cocalero* organizer Evo Morales marked a rejection of outside efforts to determine the fate of Bolivian resources, as well as a proud assertion of indigenous identity. Earlier governments had been criticized for their failure to support quinoa.³⁷ The Morales administration has campaigned on its behalf at the UN General Assembly, with the result that the Food and Agriculture Organization duly named 2013 the International Year of the Quinoa [sic]. Its objective is to 'focus world attention' on the role that quinoa's biodiversity and nutritional value can play in advancing food security and in the eradication of poverty, as well as 'recognizing the Andean indigenous peoples, who have maintained, controlled, protected and preserved quinoa as food for present and future generations, thanks to their traditional knowledge and practices of living well in harmony with Mother Earth and nature.'³⁸ However, it will take

³⁶ Forrest Hylton and Sinclair Thomson, 'The Chequered Rainbow', *NLR* 35, Sept–Oct 2005; Amber Wutich, 'The Moral Economy of Water Reexamined: Reciprocity, Water Insecurity and Urban Survival in Cochabamba, Bolivia', *Journal of Anthropological Research*, vol. 67, no. 1, 2011, pp. 5–26.

³⁷ Rojas et al., *Impacts of Quinoa Promotion*, p. 22.

³⁸ Food and Agriculture Organization website, 'International Year of the Quinoa: 1YQ–2013'.

more than discursive courtesy to address the problems that global commodification has created.

This returns us to the central point: food justice is hobbled at best, doomed at worst, when it focuses on the intrinsic eudaimonic potential of particular foods, to the exclusion of the manner in which they are produced and shared. The value of quinoa has something to do with its lipid and protein content, its conservation in landraces instead of cultivars, and its role as an emblem of the endurance of indigenous ways of being. It has a great deal more to do with how it is used to enact social relations. A strategy that aims to reform the food system by reordering market incentives so that it is not worthwhile for independent farmers to grow anything but de-commodified charismatic produce serves only to create a world in which those who do not already have an entitlement to these kinds of foods are even more vulnerable to systemic volatility—say, when the global market for their leading export crop collapses; not a world in which everyone enjoys the benefits of crop genetic diversity, but one in which some people live in a controlled, ecological life-support system, while others serve as its cogs. Those who produce the world's food are owed more by its privileged eaters than just an upvote.