Another oddity that calls into question Potter's attention to detail is the following: "Born on August 13, 1717, into a family with Burgundian roots … Louis-François studied philosophy and the arts, having a particular fondness for Mozart" (p. 38). The good prince was clearly ahead of his time as the composer was born in 1756.

If I was given to pause at the beginning, the conclusion of the final chapter was partially redeeming. Potter admitted to having his first taste of Burgundy while covering the story of the crime for *Vanity Fair* in 2010. Until then, he wrote, "when I found myself reading a bit of a wine review, it struck me as pretentious to the point of being worthless" (p. 269). He went on to cite a review of "1987 Romanée-Conti by Allen Meadows, the self-appointed Burghound" concluding that "for connoisseurs, this sort of review might be useful. It didn't seem especially helpful for me" (p. 269). Paradoxically, in the acknowledgments, the author thanked Meadows who "answered many of my elementary questions" (p. 278). He also wrote, "I am deeply indebted to the work of many authors but these books were invaluable source material … *The Pearl of the Cote* by the ultimate Burghound, Allen Meadows" (p. 279). Perhaps one can attribute this change of heart to the epiphany Potter experienced when he tasted the 2008 La Tâche: "It is like divine, liquefied Pop Rocks that make me feel lightheaded – the kind of happiness that I felt after I first kissed my wife" (p. 272).

Like the author, the intended reader is not required to be an oenophile. As an unabashed one myself who has visited Burgundy and Champagne, where the crime and its resolution took place, I did not expect to add to my knowledge of wine, though I did learn a bit about DRC. However, I found Conti's story more intriguing than de Villaine's. The crime and its aftermath, which Potter describes as "unbelievable because it was all so remarkably unremarkable" (p. 240), left me more sad than satisfied. Nevertheless, despite its somewhat uneven writing style and the specter of inaccuracy, the book, which according to Potter's LinkedIn page is now in development for a movie, made for an agreeable diversion.

Neal D. Hulkower
McMinnville, OR
nhulkower@yahoo.com
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MARA P. SQUICCIARINI AND JOHAN SWINNEN (eds.): *The Economics of Chocolate*. Oxford University Press, Oxford, 2016, 496 pp., ISBN 978-0198726449, $45.00.

The Economics of Chocolate is—like an upmarket chocolate bar—rich, dense, and satisfying. Its editors, Mara Squicciarini and Johan Swinnen, are both at the University of Leuven in Belgium, a country that has deep and historic connections to chocolate and a country where "the idea of producing a book on the economics of

chocolate comes naturally," the editors write. The work was also "inspired by the rapidly growing field of the economics of wine, another luxury product, and the economics of beer, another Belgium specialty with sometimes surprisingly similar economic characteristics as chocolate."

The book is about economics in its widest sense; its 22 chapters by various authors cover "history and economic development, demand and supply, trade and investment, geography and scale economies, psychology and politics, technology and innovation, health and nutrition," (p. v) and so forth, the editors explain. There is even a chapter on how to encourage people to eat less chocolate.

Given my job as chief agricultural officer at Mars Incorporated, a company that turns a lot of cacao (as the crop that becomes cocoa is known) into chocolate, I have strong views about this commodity, views that will surface in this review. I also coedited an almost 1,000-page book on the history, culture, and heritage of chocolate, a fact I mention only so that I can add the confession that "economics of" does not appear in its index, demonstrating the timely necessity of *The Economics of Chocolate*. It is timely and necessary because of the watershed on which the commodity sits.

Many cacao growers in Africa, the main producing region, Latin America, and Asia live in deep poverty. They do not have enough land to grow enough cacao to escape that poverty. Thus, many are moving into cities or into other crops, such as rubber and palm oil.

As emerging markets appear, their appetite for chocolate is growing rapidly. Demand is likely to double over the next 20 years, yet the current production capacity is crumbling. Cacao is an underdeveloped crop, still in the early stages of domestication, threatened by pests and viral and fungal diseases that have serious effects on production. Political and economic instability in areas where it is grown is another threat. So the chocolate industry is predicting a shortage of 1 million metric tons of cacao by 2020. That is a big shortfall in a little time.

However, this book is largely the product of a conference attended mainly by economists and social scientists, rather than agriculturalists. So this stark reality is not captured strongly enough among chapters with titles such as "From Pralines to Multinationals" and "Chocolate Brands and Preferences of Chinese Consumers."

Christopher Gilbert, looking at the "Dynamics of the World Cocoa Price," heroically constructs a chart of U.S. dollar cocoa prices back to 1850, concluding that "the effects of demand-side shocks are more persistent than those of supply-side shocks (p. 307)." Writing in late 2014, he predicts that the International Cocoa Organization's cocoa price average, $2,439 per ton in 2013, would rise steadily toward $5,000 by the end of the decade, but higher prices would cause more cacao plantings and "prices will drift back toward current levels in the following decade." Given the pressure on cacao, the major chocolate companies are not nearly as calm as Gilbert.

William Clarence-Smith begins his chapter on chocolate consumption from the sixteenth century until the early twentieth century by claiming chocolate is "slightly addictive" (p. 43) and ends by noting that "debate still rages over whether chocolate is physiologically addictive (p. 62)." However, between these statements he offers a fascinating account of cocoa consumption around the world and its competition with the likes of tea and coffee (and the fact that for long periods cocoa beans were used as currency in parts of Latin America, keeping demand high).

Cocoa was consumed as a liquid for much of its social history, but in the late nineteenth and early twentieth centuries, a perfect storm of events coalesced to create the "great chocolate boom." The invention of milk powder and ways to get the fat out of the solids led to smooth chocolate bars, and other new technologies created the possibility of great product diversification. Even new techniques in advertising played a role in the boom.

However, lest chocolate consumption rise too high, Sabrina Bruyneel and Siegfried Dewitte offer a chapter entitled "Health Nudges: How Behavioural Engineering Can Reduce Chocolate Consumption." They were moved to do this work based on the "observation that chocolate not only provides immediate utility but also contributes to the rise of obesity and, in its wake, a host of preventable diseases (p. 167)." They define *nudges* as "subtle rearrangements in the decision environment that support consumers in adapting welfare-enhancing behaviours, like choosing healthy food options (p. 158)." For example, bowls of chocolate were placed within "close proximity" (20 cm) of test subjects and "within reach" (70 cm). Results showed that the "probability of consumption and the number of chocolates consumed decreased significantly when the distance to the chocolates increased from 20 to 70 cm." (Now if I can just get someone to move that bowl of chocolates "within reach" …)

Heike Alberts and Julie Cidell offer a look at chocolate consumption, manufacturing, and quality in Europe and North America. American mass-market chocolates tend to have more sugar and less cocoa than their European cousins. American chocolates are not rolled ("conched") as much, if at all, so they tend to be grittier. Chocolate manufacturers in the United Kingdom have always substituted palm oil, coconut oil, and so forth for cocoa butter, whereas Americans have resisted this. As for "quality," well, it is subjective. The authors describe taste tests in which "chocolates sold in discount grocery stores performed very well, and among milk and dark chocolate received better marks than more expensive brands, many of which customers believed to be of particularly good quality (p. 131)."

Other chapters look at consumption in emerging markets. The traditional Chinese diet contains few sweet items, according to Fan Li and Di Mo, but the growth rate of China's chocolate market has accelerated between 2004 and 2010 by 10% to 15% per year, more than five times the growth rate of the global chocolate market. (This growth rate is spurred by what the chocolate industry likes to call "emerging chocolate lovers"!)

Russia is "one of the most promising emerging chocolate markets in the world," (p. 400) according to Saule Burkitbayeva and Koen Deconinck. Russians are

consuming more chocolate and "are increasingly switching to more expensive chocolates, causing the market to grow even more strongly in value terms. Observers expect growth to come from new product development such as healthy snack alternatives or the introduction of new flavours and shapes (p. 416)."

Not to be outdone, India is the fastest-growing market for chocolates in the world. Africa, the world's major supplier of cacao beans, has not been a consuming region because few people there have been able to afford such luxuries and because most imported chocolate brands, especially in the tropical regions, "do melt at local 'room temperature.'" Despite these issues, "the growth rate of chocolate consumption in both North Africa and SSA [sub-Saharan Africa] is comparable with that of China and India, and is even higher per capita wise than the latter two countries (p. 453)."

There is much on the sustainability of the industry: both environmental sustainability (cacao growing is a great cause of deforestation and the loss of biodiversity) and social sustainability (issues of poverty and child labor). However, the picture is a bit too rosy, with emphasis on what companies are doing rather than what the industry is not doing. This rosiness is best captured in one chapter title: "From Small Chocolatiers to Multinationals to Sustainable Sourcing."

There is also perhaps too much optimism that a few Western NGOs such as Fair Trade, Rainforest Alliance, and UTZ can lead remote farmers into sustainability through certification systems that set farming and employment standards. Certification is certainly a part of the solution (and Mars will by 2020 use only "certified sustainable" cacao), but companies and governments need to do much more.

I began by saying the book is "satisfying," and it is. This old chocolatier reviewer found insights on every page. However, it is only the beginning of a dialogue that must move rapidly forward so that it can be part of the saving transformation of this threatened industry. I have some suggestions for the second edition.

Let us take a harder look at the future, as many chocolate companies are moving toward intense production on irrigated cacao plantations, a move that would drive many present farmers out of cacao and would certainly change the economics of chocolate, not to mention the agricultural economies of countries such as Ivory Coast, Ghana, and Indonesia.

Let us also take a harder look at the past. The history passages of *The Economics of Chocolate* start with cacao in what is now Central America. In fact, cacao originated in the Morona, Nangaritza, and Zamora River valleys in what is now Ecuador. It must have developed some economic value there, or its seeds and/or seedlings would not have been transported so far north and east.

Let us stop confusing cacao and the chemicals it contains with "chocolate," which is a combination of cacao with things not particularly good for one in large

concentrations, such as sugars and fats. This confusion leads the authors of the chapter on chocolate's nutritional and health effects—Stefania Moramarco and Loreto Nemi—to write that "we focus on 'unadulterated' chocolate, that is, dark chocolate with at least 70% cocoa solids (p. 134)." Something that its 30% "other" is hardly "unadulterated."

This confusion leads the same authors to refer to "the beneficial effects of chocolate on CVD" (cardiovascular diseases) when speaking of the Kuna Indians' habit of drinking "three 10oz servings of homemade cocoa beverages per day" (p. 140) and suffering little or no CVD. However, these drinks were almost pure cacao, with no added sugar or fat. They were not *chocolate*.

I feel strongly about this because over the past 20 years, Mars scientists have produced some 150 peer-reviewed studies in scientific journals on the health benefits of some of the ingredients of *cacao* without ever claiming that *chocolate* is good for you. Whiskey contains a great deal of water, but one would be ill-advised to source one's hydration needs from whiskey.

The book also makes the standard error of claiming that cocoa flavanols have an antioxidant effect. Some of the work by Mars has shown that they do in the test tube but have little antioxidant effect once they get into the human body.

However, the slowly emerging, but astonishing, health benefits of cocoa flavanols may have a huge effect on the economic future of cacao, if not chocolate. An article on the front page of the *New York Times* in 2014—too late to be included in this book—reported: "In a small study in the journal *Nature Neuroscience*, healthy people, ages 50 to 69, who drank a mixture high in antioxidants called cocoa flavanols for three months performed better on a memory test than people who drank a low-flavanol mixture." It quoted the study's senior author, Dr. Scott Small of Columbia University, as saying that on average the improvement of high-flavanol drinkers meant they performed like people two to three decades younger on the study's memory task, and about 25% better than the low-flavanol group. It quoted another researcher as saying, "An exciting result. Look, it's chocolate. Who's going to complain about chocolate?" Note that even the *New York Times* thinks that flavanols are antioxidants, and a leading researcher thinks that "it's chocolate." No, it is not chocolate; it is flavanols.

Much more work must be done to set the economics of cacao and chocolate straight. However, Squicciarini and Swinnen have made a valiant start. Let the research, reporting, and dialogue now accelerate.

Howard-Yana Shapiro
Mars Incorporated and University of California, Davis
howard.shapiro@effem.com
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