Discovering Terroir in the World of Chocolate

Over the last several years I have noticed that chocolate bars are increasingly identified by the variety and origin of the cacao they contain. One company, Valrhona, even lists vintages on its “Estate Grown” chocolates. Coming from the world of wine, I wanted to learn whether chocolate, like wine, could carry me from an appreciation of its taste back to its origins. I wanted to discover whether terroir exists in the world of chocolate. So I contacted Robert Steinberg, who in 1996 joined forces with John Scharffenberger, a former California wine producer, to form a boutique chocolate company, Scharffen Berger.¹

I knew that terroir has many definitions, which is appropriate for anything magical. The way I wrestle it, terroir is the web that connects and unifies raw materials, their growing conditions, production processes, and the moment of product appreciation. “How can I understand terroir in chocolate?” I asked Steinberg. He began by warning me about the road ahead. Though he loved chocolate, particularly the blending of flavors to make a balanced product, he had lost faith in the business of chocolate. When he purchased cacao—the raw material—from merchants and even from individual farmers, he had no assurance of provenance or quality. The chocolate industry from bean to bar existed,
Europe and North America get their cacao through a market chain that reaches thousands of miles to peasant farmers working in tropical rainforests in the Third World. Distance, duration, and the multiple transfers of property complicate the cacao-to-chocolate chain and sometimes compromise quality. Cacao farmers see their harvest as a cash crop. They want copious, stable yields and waste little time and expense in presale processing. Processing involves splitting open the brightly colored cacao pods and removing the mass of sweet, white pulp and hard, bitter seeds inside. Processors amass the pulp and seeds of many pods in a container, after which fermentation ensues. At the end of fermentation, the pulp liquefies and drains away. Fermentation denatures the seeds and transforms their chemical compounds into ones that in smell and taste hint of the finished product. Some farmers skip the fermentation process (to the detriment of the final product) and go straight to the next step, drying the beans. This drying should be done gradually, before the and continues to exist, in a regulatory void. Steinberg cautioned me not to take on face value the claims of chocolate companies, who either stretched the truth or remained silent when public mistruths benefited them. He felt “let down” by “the very best journalists and authors” whose pens had chosen hype instead of substance. If I wanted to learn something real, he told me, I would have to understand the genetic realities that undercut varietal claims and how the impact of growing conditions and every detail of processing from bean to bar influences terroir. This article is the result of my effort.

The key circumstance that obstructs the expression of terroir in chocolate is the distance, both real and conceptual, between the farmer growing cacao and the factory that transforms the cacao into chocolate. In the wine industry, the roles of grape farmer, winemaker, and marketer can be filled by a single person, a family unit working together, or an association of collaborating technicians. Vineyards are usually situated in proximity to wineries, and wineries are usually close to markets. The short market chain from grape to wine is well defined and well regulated by both governmental and trade organizations. But chocolate factories in

Below: Workers shell roasted cacao pods at the Nova Moca factory on the island of São Tomé.

**Photograph by Claudio Corallo © 2009.**
cacao is bagged and delivered to a merchant. Farmers or initial processors, remote from the chocolate producers, are concerned only with satisfying minimum standards for sale. Furthermore, to get more money for their cacao farmers commonly exaggerate the “varietal” strain of their cacao.

**Chocolate “Varietals”**

I put the word “varietal” in quotation marks because the conventions for placing cacao plants into varietal categories such as Criollo, Forastero, and Trinitario sharply diverge from the genetic reality that should support these groupings. For wine, the observable traits shared by vines tend to mirror underlying genetic similarities. But the same cannot be said of cacao. Cacao pods sport a variety of colors and surface textures and take on a variety of shapes loosely resembling a child’s football. The pods contain sugary white mucilage; buried in this mucilage are a varying number of seeds. The seeds, too, vary in color from white to purple. A single tree of *Theobroma cacao* (the cacao tree’s botanical name in genus-species format) produces pods that reach maturity independently of one another. Not only do the pods not look alike, they contain seeds that can differ radically from pod to pod. This is because in typical plantings the pods are genetically different from each other. By contrast, every grape on every bunch of a *Vitis vinifera* vine variety is genetically identical to every other grape on that vine. (*Vitis vinifera* is the genus-species botanical name for the family of vine varieties that produce grapes for quality wine production, such as cabernet sauvignon, chardonnay, and pinot noir.)

*Vitis vinifera* varieties have hermaphroditic flowers. Each flower pollinates itself so easily that it maintains individual genetic identity over time, provided that neither mutation nor natural or induced cross-pollination occurs. Over the centuries grape farmers have selected plants that best serve their needs. They propagate them not by collecting seeds and planting them—as cacao farmers did and largely continue to do—but by burying vine canes (year-old shoots) or cuttings. Grape farmers could and can do this because vine canes can self-root. Cacao shoots and cuttings do not easily do so. Although vinegrowers throughout the centuries did not know it, they were using clonal propagation. This process further stabilized genetic strains, allowing for the gradual evolution of clear-cut varietal groupings. Moreover, for the past century grapevine farmers have increasingly planted vineyards dedicated to single varieties. This tendency further stabilized varietal groupings by making cross-pollination even more unlikely. The vinegrower therefore has won control over his vines’ genetic constitution—though at the cost of creating monocultures that lack genetic diversity and hence are very vulnerable to disease. Modern fungicides, herbicides, pesticides, and sophisticated viticultural techniques help sustain these fragile monocultures.

The reason for such chaotic genetic diversity in *Theobroma cacao* is that most of the strains, particularly those originating in the Upper Amazon region and loosely called Forastero, are self-incompatible. This means that the pollen of a given flower cannot fertilize the stamen of the same flower or that of another flower on that cacao plant. The pollen has to come from another plant. This situation results in substantial genetic diversity. Thus cacao pods on the same plant may not only look very different from each other but may also have different genetic makeups. Some cacao strains, such as the subtly flavored Criollo cultivated by ancient Central American civilizations and favored today by many chocolate connoisseurs, are self-compatible, which makes these strains less genetically diverse and hence more susceptible to disease. Because genetic diversity favors greater plant vigor and yield and more resistance to disease, farmers and scientists advocate intermarriage of strains.

Even though the rainforest environment fosters greater disease and insect pressure, the patchwork of small, isolated farms of genetically diverse cacao plants, along with minimal use of systemic chemical sprays, allows many small cacao farms to be easily deemed “organic.” By contrast, to grow vines organically vinegrowers need a combination of favorable growing conditions and sophisticated viticultural techniques. These different conditions mean that the word *organic* is more often seen on gourmet chocolate bar wrappers than on the labels of quality wines.

In 2008 genetic researcher Juan C. Motamayor and colleagues proposed a classification of cacao plants into groups they called “clusters” based on their degree of genetic similarity. The ten “genetic clusters” proposed—Marañon, Curaray, Criollo, Iquitos, Nanay, Contamana, Amelonado, Purús, Nacional, and Guiana—could be adopted as the basis for a varietal scheme for labeling cacao. Equating these clusters with varietals would not negate the identification of a subgroup such as Porcelana within the Criollo grouping or variety. However, whether these “clusters” should become synonymous with “varietals” is a determination that scientists must make. In all likelihood, it will take decades to accurately organize cacao plants into varieties and subgroups, since any such categorization will require the concerted collaboration of scientists, farmers, merchants, chocolate factories, and governmental organizations. Nevertheless, a scientific basis for the use of varietal labeling in chocolate is badly needed.
The present situation remains murky. If chocolate producers were to adhere to restrictions regarding the use of varietal groups until such classifications were proven scientifically valid, they would sacrifice the value of all the varietal marketing they have done so far and risk losing the (false) confidence of consumers. An analogous situation exists in the world of wine regarding the use of screw caps and corks. Cork has been the traditional closure of choice for quality wine. However, cork seals can alter the flavor of wine and sometimes impart musty, flavor-destroying smells. Producers around the world, particularly in Europe where consumers are more conservative, have resisted the move to screw caps, even though they are the all-around better closure. However, in 2000 producers in the Clare Valley of South Australia banded together to bottle all their Rieslings in screw caps, and in 2001 New Zealand wine producers adopted the New Zealand Screw-Cap Initiative. Now, 90 to 95 percent of New Zealand wines are under screw caps, and screw-cap use is spreading rapidly throughout the world. Though changing from corks to screw caps is a simple mechanical change compared to the varietal chocolate revolution that I am suggesting, this example shows that traditional marketing messages can be changed relatively quickly, even on an international scale, and even in the very traditional world of wine.

Labeling Cacao

The labeling of raw-material origin is much more accurate and advanced for grapes and wine than it is for cacao and chocolate. Because of the vineyard discrimination that developed in Burgundy during the Middle Ages and early Renaissance, place labeling in wine can be as precise as the delineation of a tiny vineyard. For example, Romanée-Conti, one of the celebrated crus of Burgundy, is a mere 4.445 acres in size. Wine labeling around the world largely honors this tradition. Although there were periods, such as the late nineteenth century, when the Phylloxera louse infestation caused unscrupulous wine producers to print phony place names on labels, twentieth-century wine laws throughout Europe enshrine location of production as a fundamental principle. Working out of younger traditions, wine industries in the United States, Chile, Argentina, New Zealand, Australia, and South Africa have established their own regulations regarding place names. At least in terms of accurate geographic labeling—the fundamental information of terroir—the wine industry is a model of responsible marketing.

Cacao is different. It has always been sold to merchants according to port of departure, region of production, and (more rarely) plantation of origin. Because chocolatiers believed that blends of various cacao origins made more balanced chocolate, and because there was no demand for origin-labeled chocolates, “single origin” chocolates did not appear until 1984. In that year the French chocolatiers Raymond and Nicole Bonnat issued Mapemonde (Map of the World), a special box containing seven pure-origin chocolates from Puerto Cabello, Chuao, Maragnan, Trinidad, Madagascar, Ceylon, and Ivory Coast. This selection reveals the confusion over how to label chocolates according to origin: Puerto Cabello is a Venezuelan port-of-origin chocolate, while Chuao, also from Venezuela, is a plantation chocolate. The Bonnats’ son Stephane believes that Maragnan was once a small, isolated plantation in Brazil, but today it is loosely considered a “varietal” chocolate. Trinidad, Madagascar, Ceylon, and Ivory Coast are country-of-origin chocolates.

Bonnat’s use of the word origin was elastic, as was the word’s overall definition at the time. Clients and chocolate professionals advised Bonnat that single-origin bars would have no future. But in late 1994 Venezuelan chocolate company El Rey began producing a line of bars called Carenero Superior, after a type of cacao sourced from the mountains east of Caracas (Carenero also refers to the port from which the chocolate was shipped). In 1998 Valrhona introduced a single-origin and vintage-dated bar, Gran Couva, its first “Estate Grown” or “Domaine” chocolate labeled with a precise location and harvest year. Gran Couva is a plantation in Trinidad in its fourth generation of family ownership. Valrhona used domaine to describe it, a term from the wine industry referring to an estate that bottles wine from grapes produced on its own property. Because the company headquarters lie at the foot of the famous wine cru Hermitage, Valrhona’s intimate connection to the world of wine makes its choice of terminology natural.

But what do all these terms mean to the consumer? When purchasing a single-origin chocolate, it is important to read the wrapper closely or consult the producer’s Web site to decipher the meanings of such labels as Single Origin, Single Bean Origin, Origin, Cru, Grand Cru, Grand Cru de Terroir, Estate Grown, Plantation, 1er Cru, Single Plantation, and Cru Hacienda. There is no official or industry definition of these terms. Thus some chocolate producers ascribe terms like cru and origin to areas as large as a country. This kind of labeling is misleading and could be easily avoided, since cacao sources are typically concentrated in particular areas. For instance, nearly all the cacao from the island of Madagascar comes from the Sambirano Valley. However, Venezuela presents a problem, since there are many regions
where cacao is grown. Although researchers have identified similar flavors in the cacao liquor and country-of-origin chocolates arising from controlled sources in Ecuador, Papua New Guinea, Trinidad, and Venezuela, country-of-origin labeling would have more meaning if the indications of origin and the terms used were more precisely defined.

**Preserving Terroir in Chocolate**

Location is the starting point for terroir. The smaller and more precisely delimited a chocolate’s origin is, the more opportunity there is for a producer to express its identity. As in wine production, man’s interaction with the raw material, in this case cacao, also shapes the final product: through the choice of when to harvest, the selection of the best cacao pods and seeds, the controlled fermentation of the sweet mucilage surrounding the seeds, and conching until the chocolate’s aroma and texture reach the desired point. Here is where cacao processors practice their art. The chemical changes that occur in chocolate during the conching process are still not entirely understood, although the process and sensorial effect appear to mirror the maturation process for red wines, when the bitter, coarse, astringent flavors associated with phenolic compounds change into softer ones. A similar change seems to occur during the conching of chocolate.

The more control man has over the entire chain of production from plant to product, the better man can preserve terroir. In wine there is a long tradition of the vigneron, who oversees every aspect of wine production from tending the vines, to making the wine, to selling it to merchants or consumers. Something analogous is now taking place in the world of chocolate, where producers are gradually moving closer to the cacao plant, shifting quality control closer to the farmer to gain better control of the raw material. Some companies, such as Pralus and Valrhona, have purchased cacao plantations or groves in the tropics. Others, like the Grenada Chocolate Company and Kallari, are farmers’ cooperatives. Grenada Chocolate owns and operates its own chocolate factory, completing the link between farming and production. The company that best approximates the role of a vigneron is Claudio Corallo, a family-owned, plant-to-bar producer on the two-island country of São Tomé and Príncipe off the coast of West Africa. The excitement and energy such small-scale, artisanal producers bring to the chocolate industry will likely showcase terroir even more.

Wine can make itself. If you pick several bunches of grapes and put them in a pail, in two or three days you will have wine. But to make high-quality wine, a wine producer must start out with excellent grapes and move the natural process toward a stable endpoint. If the harvest originates from a particular place, the only way to preserve the sense of that place in the finished wine is for man to intervene as little as possible in the processing. Winemakers have understood this for centuries—if not on paper, then in their hearts and in their wine. Although putting some cacao pods in a barrel will not naturally yield bars of chocolate, starting out with site-specific, quality cacao will yield a bar imbued with terroir if the processing is minimal and sensitive. If the chocolate industry were to engage in some individual and collective introspection and discover real varietal and place distinctions, then tasting terroir in chocolate could become a reality. Anyone for a blind chocolate tasting?  

**Notes**

I wish to express special thanks to Robert Steinberg for putting me on the road to understanding terroir in chocolate. Robert passed away on September 17, 2008. He was generous with his wide knowledge to the end.

1. A physician turned chocolate maker, Steinberg enjoyed a reputation for scientific rigor and forthrightness.
3. See D.A. Sukha and D.R. Butler, “Trends in Flavour Profiles of the Common Clones for the CYGOCNIAP Flavour Project,” *Annual Report 2005* (St Augustine, Trinidad and Tobago: Cocoa Research Unit (cru), University of the West Indies, 2005), 55-61.