



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



MILANO 2015

FEEDING THE PLANET
ENERGY FOR LIFE



(Photo by Benedetta Ciotto)

Scientific and Technical Profiles for the Common Areas of the COCOA AND CHOCOLATE CLUSTER EXPO MILANO 2015

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Foreword

by Pier Sandro Cocconcelli

Oscar Wilde said he could resist anything except temptation. And among the most pervasive temptations we cannot exclude chocolate. But chocolate is only the happy result of a true gem of a plant: cocoa. That the seeds of this plant are precious can be seen from its scientific name *Theobroma cacao* – the food of the Gods. But originating in Latin America cocoa is food for others than Olympian Gods. Grown for thousands of years by the ancient and fascinating cultures of the Mayas and the Aztecs, it has become widespread across the world mainly in the last two centuries. Today cocoa is a planetary business. Thirty developing countries are producers for a turnover amounting to almost 75 billion dollars. So it is an interesting story. And the pages which follow try to tell this story, from its links with the age of geographical discoveries, to the advent of modern science through to the related anthropological themes. Because the history of cocoa is essentially the history of “its” civilizations, their meetings and their conflicts; it is a story which involves us and our world, so different from pre-Columbian America, where tastes, knowledge and perfumes mingle into one.

The story of cocoa begins with a brief historical itinerary, divided into four periods starting from its American origins, through its trading of the early colonial period (16th century), the subsequent spread and consumption of chocolate in Europe and worldwide (17th-18th centuries), to an analysis of the effects of its consumption on our habits and society. Indeed, Chocolate becomes from a luxury for the lucky few to a staple in everyone’s diet (19th-20th centuries).

The journey proceeds through the origin, evolution and domestication of cocoa, the habitat of wild cocoa and the cocoa coming from plantations starting from the classic varieties of Criollo, Forastero and Trinitario to the decoding of the whole genome of *Theobroma*. The visitor is led from the tropical rainforest of Latin America to Africa and as far as the Pacific Islands, to the discovery of varieties originating from the domestication of cocoa. The sustainability of the plantation also depends on the contribution of biotechnology to preserve and best reap the benefits of biodiversity.

Next the technological aspects of chocolate manufacturing are explored, beginning in the country of origin, where the first processing take place – harvesting of the pods, fermentation and drying of the cocoa beans – and on to the importing country, where the beans are roasted, ground and the cocoa mass and butter are extracted. The story continues narrating how the blending of the various ingredients, through careful technological processes, results in the different types of chocolate. The visitor is therefore immersed in the rich sensory world of chocolate to understand and discover how the technology changes and enhances the peculiarities of each type of cocoa.

The visitor’s journey continues, to learn about the nutritional proprieties and components of chocolate, highlighting its effects for health, in particular for the cardiovascular system, the central nervous system, diabetes and obesity and the effects on the skin and teeth.

We then explore the economic dimension of the cocoa and chocolate industry: where and how the cocoa grown in the countries of origin enters the food chain in Italy, Europe and the rest of the world. The story covers the entire value chain from cultivation to the final consumption of the product, examines the technical and economic phases, the jobs and entrepreneurship that revolve around this product in different countries, in the various steps of the supply chain which involves millions of people creating an enormous volume of trade. Finally there is a brief analysis of the role of fair trade and sustainability in the cocoa and chocolate industry.

The journey through the discovery of chocolate from its origins to the present day ends with a collection of texts and images which describe the colonialization of the collective imagination. A fascinating story which, from the peoples of Central America to the Spanish conquistadors sees chocolate become a fashionable beverage with Europe’s aristocracy, the Italian courts and the clergy.

From the end of the 18th century until now, art and advertising become tools for a radical change that turns chocolate from a luxury for the elite to a product for the masses; from a breakfast treat for the pleasure-seeking aristocracy to a drink for the new hard working bourgeoisie, children included. Chocolate is at one and the same time a symbol of pleasure in the cinema and advertising and a object of consumption for children and families.

CHAPTER 1

Cocoa and chocolate. A brief history

by Emanuele Pagano

1.1 "Food of the Gods". The American origins of cocoa

When we taste a fine chocolate bar or drink a cup of delicious hot chocolate, few of us think of the vertiginous journey of nearly 4,000 years that this ancient luxury item has taken. And yet cocoa, the raw material of chocolate, was already known, cultivated and processed by Mesoamerican peoples many centuries before the Christian Era. Today we are almost sure that the Olmecs (1500-400 BC), who settled the coastal plain of the Gulf of Mexico, were one of the first cultures to grow cocoa. But perhaps the origins of human use of the plant are even older: the earliest image comes from Peru, a 2500-year-old vase decorated with elements in the shape of cocoa pods. For thousands of years the cocoa plant, sensitive to environmental conditions, was grown and consumed in Central America, in a vast area from Central Mexico to Guatemala, Belize, El Salvador and Western Honduras, inhabited by historically and socially stratified peoples, including the Olmecs, the Maya (1000 BC-900 AD), the Toltecs (900-1100 AD) and the Mexica (or Aztecs, 12th-16th centuries). For many pre-Columbian American cultures, the seeds and edible products of the plant performed a central role in many belief systems and religious rites as well as in social and economic affairs.

Cocoa was linked to a complex religious symbology. Cocoa and maize represented a fundamental pairing in Mesoamerican cosmology, both of them prepared with holy water in ritual drinks as food for the gods and the ancestors and to plead for fertility of the land. And we have evidence of its being buried with the dead to ease their journey to the underworld. Cocoa was also associated with blood and with the sacrifice of animals and prisoners of war. To possess cocoa was a sign of wealth and political power. Frothy drinks of cocoa are often represented on Maya and Mexica vessels at the base of the thrones of kings. Cocoa seeds and pods, associated with the tombs of the powerful and offerings to the gods, were also used as currency in domestic and international trade. Cocoa was the customary gift to cement alliances between political leaders or to repay loyal elites. The precious seeds, roasted, ground, mixed with water and flavoured with spices, chilli and other ingredients, made a bitter spicy drink, refreshing and stimulating, known to begin with as *cacahuatl*, probably in honour of the plumed Toltec-Aztec god Quetzalcòatl, and later as *xocolatl*, meaning "bitter water". This drink, at least in Mexica culture, was reserved for the ruling classes: the sovereign, the royal family, leading warriors and the wealthier merchants. Which explains why the Swedish naturalist Linnaeus in 1734 called the plant *Theobroma* ("food of the gods").

1.2 European colonial influence and "brown gold" (Spanish and Native Americans, 16th century)

When the Spanish arrived in 1519, emperor Motecuhzoma II believed he saw in captain Hernàn Cortès the image of the plumed serpent god Quetzalcòatl, who, according to legend was about to return to Earth, and welcomed him with honours and a gift of a cocoa plantation. The conquistador, who guessed the economic value, dubbed cocoa "brown gold". The conquered communities were obliged to provide labour and huge tributes in kind (including cocoa) to the new rulers. The Italian Girolamo Benzoni, a botanist travelling in America between 1541 and 1555, described in detail the preparation of the drink which, however, he thought "a beverage fit more for pigs than men." To make it more palatable to them, the Spanish settlers in Mexico added white sugar, cinnamon, aniseed, cloves, almonds and spices. Bernal Díaz del Castillo, eye witness to a banquet offered by the emperor Motecuhzoma II, alluded to the belief, later to become widespread in Europe, in the aphrodisiacal properties of the drink: "They brought him several cups of fine gold, with a drink made of cocoa, which they said would bring success with women."

Missionaries (Augustinians, Franciscans, Dominicans, Jesuits) received huge tributes in kind from the recently converted natives. In the local churches forms of religious syncretism took hold and cocoa, once the food of the Mayan gods, continued to play a part in festive ceremonies and popular worship. In certain Mesoamerican communities, offerings of food, incense, flowers and cocoa beans were placed on the altar before images of the saints, equated with the ancient idols. Testimony of this persisting custom is the *Señor del cacao* in Mexico City cathedral, where cocoa beans are placed at Christ's feet. Colonial trade in effect began a process of 'transculturation' which gave rise in Latin America to a new Mestizo-Creole culture. Maize, chilli and chocolate were integrated into colonial Mexican cuisine and eventually spread from Spain

to the rest of Europe. These foods were also absorbed into Christian religious culture. In monasteries and convents the preparation of chocolate became a sophisticated art. The drink was highly prized by the clergy who even used it to mitigate the frequent canonical fasts. But not everyone looked kindly on this new custom. Jurists and intransigent theologians opposed any easing of the fast, whose purpose was the mortification of the flesh and spiritual uplift.

They saw chocolate as a nutritious liquid meal which – even worse – was said to arouse the senses. While the Catholic polemic on fasting lasted for centuries, authoritative pronouncements established that drinking chocolate was permitted, such as that by Pope Pius V (1569) or Cardinal Francesco Maria Brancaccio, who in 1664 reasserted the principle that “liquidum non frangit jejunum” (one drink does not break the fast).

1.3 Europe discovers chocolate (17th-18th centuries)

At the start of the 17th century, the drinking of chocolate spread from the Catholic ecclesiastical milieu, the Court of Madrid and the houses of the Spanish aristocracy and upper classes to other European countries: Franche Comté, the Netherlands, Milan, Naples, Turin and Florence. In France chocolate was introduced in 1615 and gradually won over the aristocracy. Cardinal Alphonse de Richelieu (brother of the famous statesman) became a fervent supporter, though perhaps more as a medical remedy “to moderate the vapours of the spleen”. In Paris the first shop serving “chocolat à boire” opened in 1671. In England Chocolate Houses spread, competing with Coffee Houses. Naturally Spain tried to keep hold of the monopoly in the trade and sale of cocoa, but piracy and smuggling, as well as strong competition from the Dutch, diverted much American supply to the centre of Amsterdam, which had then become home to Jews from the Iberian diaspora who were expert chocolate makers.

In the 18th century Europe chocolate, also known as “Indian brew”, became an aristocratic fashion, imitated by the urban bourgeoisie. It was usually drunk at breakfast, at the table or, preferably, lounging in bed in a negligee or in the boudoir, environments which, according to the rich iconographic tradition, hinted at eroticism, but also at intellectual activity and creative contemplation.

At the end of century the first experiments with mechanized production began. The first hydraulic machine for beating cocoa paste appeared in France in 1778. In 1795 a steam-powered machine was used by Joseph Fry & Sons in Bristol.

1.4 From a luxury good for the few to a snack for everyone (industrialization and changing lifestyles, 19th-20th centuries)

In the first half of the 19th century the chocolate industry continued to expand, albeit more slowly than that for tea and coffee. France was the first country to see modern industrial development. A sizable group of companies (Lombard, Menier, Pelletier, Poncelet, Devink, Masson, Méliand) experimented with mechanization, with cleaning/breaking machines, grinders and mixers, and drum roasting. A decisive turning point came in 1828, when the Dutchman Casparus J. Van Houten developed a new method for extracting cocoa butter, with half the fat content of the beans and at the same time obtaining a substantially new product, cocoa powder, much more soluble, lightweight and digestible than traditional paste. With cocoa butter a totally new product was invented, solid chocolate. Ready to eat in any situation, it triggered a minor revolution in consumption habits, from 1849, when the British firm Fry & Sons introduced the first chocolate bars. The appearance of cocoa butter was the key prerequisite of dark chocolate, invented by the Swiss Rudolf Lindt, around 1879. Another Swiss, Daniel Peter, produced the first milk chocolate (1879), using the new milk powder invented in 1867 by the Swiss Henri Nestlé. Henceforth the Helvetic Confederation became the home of chocolate, the main exporter of solid chocolate, while the Netherlands specialized in exporting cocoa powder. Thus the eating habits of the elite and the masses met for the first time in the modern history of chocolate.

Meanwhile science had begun to clarify the commodity-related and nutritional aspects of cocoa, identifying the significant contribution of carbohydrates and fats to the human diet.

Industrialization raised personal incomes and the relative price of cocoa fell. With broader consumption and new lifestyles the industry grew dramatically. By the end of the 19th century the traditional Latin American supply was no longer able to keep pace with the huge expansion in demand. Western capitalist investors turned to other parts of the Americas (Trinidad and Tobago, Jamaica, Cuba, Haiti, Dominican Republic) and countries in Africa, like Togo, Cameroon and, in particular, the Portuguese island of São Tomé. In the first decade of the 20th century, São Tomé became the world's second producer of cocoa (22,100 tons) after Ecuador (24,700 tons). Around the same period, at the end of the production chain, the United States and Germany became the two biggest producers by total volume of raw material transformed. Germans,

Americans, French and British were the main per capita consumers of cocoa at that time. The modern confectionary industry saw its most exemplary development with the large U.S. company of Milton S. Hershey (1857-1945), who introduced European technological innovations to mass production, with huge repercussions for labour, eating habits and society, comparable to Ford's assembly line. Between the 19th and the 20th century, therefore, a fundamental cultural shift took place in Western food habits, with the appearance of three separate products: cocoa powder, dark chocolate and milk chocolate. From an exotic item sought after by the privileged few, the ancient food of the gods, chocolate became the product of the modern confectionary industry, eaten by millions of people and specially recommended by medical science for certain groups such as children, the elderly, sports people and adventurers, as well as soldiers. Advertising stoked consumption further for specific social situations, leisure, parties and for gifts. In the second half of the 20th century chocolate also became a snack, associated with the pace of urban lifestyle, taking its rightful place among the items of mass consumption across the world (and not only in the West): from the penniless student to the astronaut in space.

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CHAPTER 2

Biodiversity and the cultivation of cocoa

by Raffaella Battaglia and Adriano Marocco

2.1 Origin, evolution and domestication of cocoa: from the Amazon rainforest to Africa and the Pacific islands

From the botanical standpoint, the cocoa plant (*Theobroma cacao* L., 1753) belongs to the Malvales order; the *Theobroma* genus comprises 22 species including *Theobroma cacao* L.

The cocoa plant is an evergreen tree which can reach 15m in height. The leaves are persistent, alternate, ovate, with a slightly undulate margin, glossy above and capable of turning to face the light.

The flowers are produced in clusters directly on the trunk or older branches, and can be of different colours, white, green or pink. The flowers are bisexual, containing both male and female reproductive organs. In some varieties, especially non-cultivated ones, genetic self-incompatibility prevents the growth of seeds following self-fertilization, a biological mechanism that serves to maintain a high degree of genetic variability. The cocoa has two half-year flowering cycles a year. After fertilization, the ovary differentiates into the fruit (pod) in the shape of an elongated lemon, yellowish-green in colour, which turns a reddish-brown during ripening. The pod has longitudinal grooves and contains around 25-40 seeds (cocoa beans) embedded in a white gelatinous pulp which is rich in sugars.

Today cocoa is cultivated in humid forests at latitudes between 10° N and 10° S but its origins are geographically more limited. Since cocoa was cultivated in very early times, probably by the Olmecs (1500-400 BC), intervention by man to select and breed the best cultivars makes it very difficult to identify the precise origins of the plant.

Various hypotheses have circulated since the early 20th century as to the true origins of wild cocoa.

According to some authors (Van Lobbe 1914; Cheesman 1944; Schuler 1984) the species evolved in the region of the Orinoco and Amazon, where it was first domesticated, before being spread by man to Central America. In 1964, in his book *Cacao and its allies: a taxonomic revision of the genus Theobroma*, Cuatrecasas suggests that the populations grown today in South and Central America evolved independently, separated by the Panama Canal and giving rise to two subspecies: *T. cacao* ssp. *cacao* and *T. cacao* ssp. *sphaerocarpum*. Only recently, molecular biology approaches allowed to discriminate between the main hypotheses.

Close analysis of the genome of the different varieties of cocoa suggests that the subspecies classification is mistaken and points to South America as the original birthplace of the plant, where it was domesticated and then moved by man (Motamayor et al. 2002). Besides the purely scientific question of taxonomy, knowing the origins and methods of domestication of such a commercially important species is a precious resource in designing breeding programs to improve the characteristics of commercial varieties.

Early domestication by man has produced the classic cultivars: Criollo, Forastero and Trinitario. Criollo probably developed from a few individuals selected in South America and taken to the regions of South-Central America where it is grown today. The pods are very thin skinned and the cocoa it produces is pale in colour and has a uniquely fine aroma which makes it the most prized. Unfortunately, the fine qualities of this cultivar are not matched by good yields or resistance to biotic stress. The Forastero variety has greater resistance to pathogens and a better yield than Criollo. The pods are thick skinned and have an intense aroma. The cocoa made from Forastero beans is often called "bulk" and produces chocolate with a characteristic strong and bitter aroma. Today Forastero has replaced Criollo in South America and it is cultivated all around the Equator. A cross between Criollo and Forastero has given rise to a cultivar known as Trinitario. This variety was selected on the island of Trinidad and combines better resistance to pathogens than Criollo with a good quality chocolate. The varieties originating from the domestication of cocoa, mainly Forastero, have crossed the ocean and are today grown in all equatorial regions: in Africa, in Asia and Latin America. It seems that seeds were presented to the future king of Spain, Philip II, in 1544 but cultivation had to wait until the 17th century, when the Spanish began to grow cocoa on Fernando Po island, now Bioko, in Equatorial Guinea off the coast of Africa. However, the biggest development of cocoa as a global product began around 1880, with the introduction of plantations in today's Ghana. The West African coast is today the world's largest producing area, but cocoa is also a profitable crop in Antilles and in areas of Asia such as Malaysia, Indonesia and the Philippines, where it represents an important component of the countries' economies. Cocoa is certainly a valuable currency of exchange for the developing countries, given that the biggest consumer countries are not the same as the ones that grow it.

2.2 Biodiversity: from the classic Criollo, Forastero and Trinitario to genetic clusters.

The contribution of biotechnology to the preservation and exploitation of biodiversity

The origins of wild cocoa and the movements of domesticated cultivars have been the subject of scientific debate for almost a century. What were once described as subspecies, *T. cacao* ssp. *cacao* and *T. cacao* ssp. *sphaerocarpum*, often used as synonymous for Criollo and Forastero, are today specified as traditional cultivars (Motamayor et al. 2008). In reality, in an attempt to describe the genetic structure of populations with greater precision, it has been found that cultivars like Forastero do not have a solid genetic basis. In 2008 Motamayor and colleagues (National Germplasm Repository, US Department of Agriculture, Agricultural Research Service, Subtropical Horticulture Research Station, Miami, Florida, United States of America) collected 1,241 samples of cocoa of different geographical origins and studied their genetic structure to describe the genetic relationships between the various populations. The results found 10 genetic clusters named according to the geographical location: Marañon, Curaray, Criollo, Iquitos, Nanay, Contamana, Amelonado, Purus, Nacional and Guiana. As we can see, while the definition Criollo remains (meaning that it does have a genetic basis and all Criollo individuals share the same genetic structure), the definition Forastero has disappeared. The explanation is simple: in reality Forastero includes various genetic clusters which can be broken down further.

Motamayor's results are interesting for a variety of reasons. On the one hand they provide valuable details for tracking the evolution of cocoa populations, but above all they describe the genetic variability within a given species. Knowing the genetic variability within a species is one of the most precious tools that breeders have. Long before the advent of molecular biology, F.J. Pound (1938) travelled through the Amazon region in search for cocoa germplasm that was resistant to witchbroom, which had devastated the plantations in Ecuador and Trinidad at the beginning of the century. What Pound was doing was looking for new genetic variability to introduce into the cultivated varieties through breeding programs. The analysis of the genetic structures of today's cocoa populations is certainly a lot more detailed and reliable than the methods that Pound used at the beginning of 20th century, and this is where breeders come to develop varieties combining quality with resistance to biotic stresses.

In just two years (Argout et al. 2011; Motamayor et al. 2013) the entire genome sequence of two varieties of cocoa – Criollo and Matina belonging to the genetic cluster known as Amelonado – have been published. The commercially most important cultivars were selected and analysis of their genome has identified the portions of DNA responsible for defence against pathogens or the production of terpenoids and flavonoids and other molecules that give cocoa its aroma. This information is vital to selecting the best individuals for breeding programs to create commercial varieties.

2.3 Cultivation: wild cocoa and plantation habitats. Sustainable cultivation

The natural habitat of cocoa is the lowest area of the equatorial forest in the understory beneath tall standing plants like bananas or palms. Rainfall is a critical factor for healthy growth, with annual rain level between 1500 and 2000 mm normally being necessary. Humidity should ideally be 100% during the day and 70-80% during the night. The best soil is rich in nutrients to a depth of around 1.5 m so that the roots have a chance to grow. At greater depth the soil should be permeable so that the heavy rainfall drains away. Soil pH should range between 5 and 7.5 as high acidity or alkalinity are harmful. The organic material should be concentrated in the top 15 cm.

Cocoa plants flower in the fourth year of life. While flowering is continuous and abundant, only about 2% of the flowers are pollinated by tiny flies in the *Forcipomyia* genus. As a result, only a small percentage of the flowers develop into fruit.

The cocoa plant is one of the most difficult trees to cultivate because it does not bear fruits outside the equatorial region. It is traditionally grown at the edges of the forest, in the shade of natural trees or trees of the legume family planted for the purpose, or together with other crops like rubber or coconut. Since there is a strong correlation between yield and sowing density, most producers use a density between 1000 and 1200 trees per hectare. Shade is particularly important for young plants. For this reason the greenhouses are covered with grills or mesh fabrics to partially block the sun's rays. Alternatively, fertilisers and hormones are used to accelerate growth and stimulate the development of a dense crown of leaves that can provide shade for the lower parts of the tree.

In its natural habitat, sexual reproduction is the most common form, but growers can choose to use asexual reproduction to produce specially vigorous varieties or clones.

The supply chain is very complex. Over 90% of the world's cocoa comes from around three million small family-run farms owned by peasants who depend on cocoa for their livelihood. While on the one hand this

can be a benefit, since it means cultivation cannot be removed from the developing countries, in another sense it poses serious problems of fair-trade and sustainable farming. Many associations, initiatives and chocolate producers are working to ensure that the cultivation of cocoa does not cause damage to the environment or local communities. Today efforts are focused on the elimination of child labour in the plantations and on scientific support to help farmers to grow a good quality crop that can earn international certification and guarantee fair trade in this precious product.

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CHAPTER 3

From cocoa to chocolate – processes and technology

by Milena Lambri and Dante Marco De Faveri

3.1 Cocoa processing in the places of origin: harvesting of the pods, fermentation and drying of the beans

3.1.1 Harvesting

The seeds contained in the fruit of the cocoa tree represent the raw material of chocolate manufacture. Still today the seeds are removed from the pods manually and separated from the surrounding pulp.

3.1.2 Fermentation

The cocoa seeds are bottom fermented in bins for 3-7 days. In Venezuela, and other countries in Latin America, fermentation takes just two days to obtain what is known as "porcelana cocoa" which is generally used to make "chocolate de taza": a bar of chocolate eaten dissolved in milk. In Mexico some types of cocoa are fermented by covering the seeds with a thick layer of earth (anaerobic fermentation). During fermentation the seeds shed the sugary pulp surrounding them and lose the ability to germinate. In addition, compounds known as "aroma precursors" are formed: they are very important for the chocolate flavour. Fermentation also produces volatile compounds which are not particularly pleasant and need to be removed by subsequent treatments (conching). Among these, there are acetic acid and other volatile compounds like aldehydes with different molecular weights.

3.1.3 Drying

After fermentation, the seeds are dried in the sun or in simple drying machines to block the fermentation at the desired level and to reduce the moisture content.

3.2 From cocoa beans to chocolate: roasting of the beans and extraction of cocoa mass and butter. The use and the blending of other ingredients to make the various types of chocolate

3.2.1 Roasting and preliminary operations

Normally the beans are sold and shipped in big-bags to the industries of consumer countries, where they are stored. The bags can be stored directly in cool, dry, well-ventilated rooms. However the modern trend – though not yet very widespread – is to store the beans loose in 10-12 meter silos at 14°C with relative humidity not over 70-75%. The raw fermented and dried cocoa beans from the farms often contain dust and sand as well as other items of varying sizes such as stones, bits of iron, wood, glass, etc. which must be removed before the next steps of production. During cleaning bean clusters (double or triple) are also broken up.

Sometimes, where the beans are intended to be roasted whole, they are sorted into two or three sizes (grading) using special sieves. The beans are subsequently roasted in hot air to remove any remaining moisture. Once the processed mass reaches the desired temperature, chemical and physical transformations take place that produce the specific flavour of the roasted beans and of the finished product. One of the important change which takes place is the condensation reaction between sugars and amino acids (Maillard reaction). If not controlled, this reaction results in a bitter acidic taste and a "burnt" flavour. When properly controlled, the reaction produces final products that have the bitter and astringent typical cocoa flavour. Together with this reaction, which is very common to food production, there are other specific reactions, involving chemical compounds such as polyhydrophenols and anthocyanins that produce new aromatic compounds and pigments which give the typical colour to the final product.

Physical reactions occur including the loss of moisture, the evaporation of certain volatile aromatic compounds and the breakdown of the fibrous structure of the cocoa to obtain a more easily grindable product facilitating the subsequent chipping process.

3.2.2 Extraction of the cocoa mass and butter

After roasting the beans are sent to a breaking mill where the shells are removed and the nibs are broken

into small chips.

Then, the nibs are ground into a fluid form known as cocoa mass or chocolate liquor. This breaks down the plant cells and releases the cocoa butter. Simultaneously, the heat produced by the huge forces of friction results in liquefaction. The resulting cocoa mass must be fine enough to allow the subsequent extraction of the cocoa butter. Cocoa butter is separated by pressure and always contains solid particles which give the butter a brown colour; these must be removed by sedimentation and filtration. The cocoa butter also has sensory proprieties such as a very strong odour and taste of cocoa which are often undesired, especially if it is used to make chocolate such as milk or white chocolate. Strong market demand has therefore developed for cocoa butter with a neutral flavour, achieved by high temperature vacuum steam distillation.

3.2.3 Ingredients

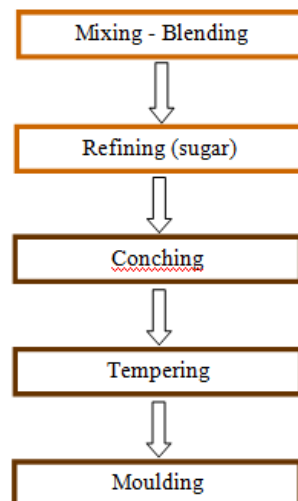
Cocoa mass and cocoa butter are the main ingredients in the production of all types of chocolate. The modern tendency is to use the cocoa mass after it has undergone a series of treatments: pasteurization, deacidification, aroma enhancement and alkalization. The latter is normally performed on the chips to obtain a product suitable for the production of cocoa powder. The others ingredients normally used to make chocolate or cream fillings are:

- sugar;
- milk powder derivatives;
- fats other than cocoa butter;
- emulsifiers;
- flavourings;
- nuts and/or other dried fruits.

3.2.4 Various types of chocolate

Broadly speaking, chocolate can be divided into in 2 main categories: milk and dark. White chocolate is classed as milk chocolate, and *gianduia*, most popular and best known in Italy, is in a class of its own because it can be either made with milk or dark chocolate. Whenever we speak about the processing of chocolate it is well to remember that there are two distinct stages: chocolate preparation and chocolate use. The preparation phase has a number of steps: dosing, blending, refining and conching (figure 1).

Figure 1: Sequence of operations in the making of any type of chocolate.



Refining requires powdered sugar (icing sugar) or crystalline sugar (caster sugar). The sugar is, after the cocoa, the most important ingredient of chocolate, since it represents at least 40-50 % of the composition. During refining the product changes to a flowing substance that looks like a powder in the end. To achieve fluidification, fat is added and the mass then undergoes conching, one of the more peculiar and critical processes in the production of chocolate. Here reactions occur which produce new aromatic compounds and the recipe is completed with the gradual addition of all the other ingredients.

Many companies buy chocolate to personalize its qualities and, in this case, the first process is tempering.

With a mass containing more than 10-12% cocoa butter, it is important to prevent fat blooming in the finished product, and ensure that the chocolate doesn't crumble or melt too easily. Cocoa butter contains a mix of parts that solidify at different temperatures.

The mass, stirred continuously, has to be brought very close to the average solidification temperature to ensure a perfectly uniform distribution of the parts of the butter throughout the mass. It is then cooled very gradually to the right temperature for shaping. Cocoa butter can solidify (crystallize) in different forms with different levels of stability, a phenomenon known as polymorphism. Form β gives the finished product the best characteristics of colour, hardness, gloss, handling and storage. It also confers the right contraction properties as the product solidifies, which is highly important to ensure that it doesn't stick to the moulds when making pralines or chocolates.

3.3 Technology in enhancing sensory properties

3.3.1 Sensory analysis of chocolate

Appearance, snap, texture, aroma and flavour are all sensory attributes of any chocolate product. The exact colour (hazelnut, caramel, brown, mahogany, etc.), glossiness and smoothness are visual properties (product appearance) that depend on the type and precision of the processing. Not all chocolates produce a sound when broken: the snap, produced as the internal structure of the chocolate breaks, is sharper and cleaner if the product is hard and crisp (dark chocolate), weaker and more muffled if the product is soft (milk chocolate and *gianduia*). The surface of a bar of chocolate or a praline can be smooth or uneven, soft or rough depending on the type of product and how it is made. The aroma can differ in type (descriptor), quantity of molecules present (intensity) number of different molecules (complexity), duration (persistence) and quality (fineness). Chewing reveals proprieties like hardness, cohesion, stickiness and elasticity, as well as tactile proprieties that depend on the shape and size of the particles present, the fat content in a solid state (fattiness) or fluid state (oiliness). Finally, how quickly the chocolate melts tell us about its solubility. When the product melts in the mouth we perceive the sweetness, acidity, bitterness, as well as the astringency (a dryness of the mouth). At this point we perceive other flavours released by the saliva, its enzymes, and the heat of the mouth.

3.3.2 Technology and sensory perceptions

The technological stages crucial to sense perception depend on factors linked to various phases of the production process. The uniformity of the blending of ingredients and the distribution of fats, as well as the size of the sugar particles are crucial factors in the blending, refining and conching processes. These all have an effect on the appearance of the product as well as its texture (size and shape of the particles present in the fluidified chocolate in the mouth). Tempering affects the glossiness and roughness of the surface of the finished product, but also determines the stability of the fat stage and prevents fat blooming, which alters the appearance and the structure, hardness, crispness and snap of the chocolate. This has no effect whatsoever on the nutritional properties or healthiness of the product, but does affect whether it is acceptable to the majority of consumers.

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CHAPTER 4

Cocoa and nutrition

by Alvaro Mordente

For over 3000 years chocolate has been one of the most popular foods enjoyed by people of all ages. "Nine out of ten people like chocolate. The tenth person always lies." states J.G. Tullius.

It is a common belief that the nicest, tastiest foods are also the most hazardous for our health. Chocolate, by virtue of its main ingredient, cocoa, is at least a partial exception to this rule. Cocoa and chocolate actually possess excellent nutritional properties which make them suited to a healthy balanced diet. They are also nutraceutical, foods that can have "beneficial effects on one or more bodily functions, improving one's state of health and well-being and/or reducing risk of illness."

4.1 Cocoa and chocolate in human nutrition

Cocoa and chocolate are complete foods, rich in essential nutrients (sugars, fats and proteins), with a high energy content, which makes them particularly suited to people who do sport or heavy work, but also for growing children or the elderly. Dark chocolate, in moderate quantities of course, can actually be included in diets for the diabetic in that it has a low glycemic index and raises blood sugar levels only slightly. Recently, dark chocolate was also used with good results in the treatment of chronic fatigue syndrome, a rare illness whose cause is unknown which provokes persistent tiredness and memory or concentration disorders. The Aztecs (1600 BC) already realized the nutritional and health benefits of chocolate and described it as a: "divine drink, which increases resistance and combats fatigue. A cup of this precious drink allows a man to walk for a whole day without food." Cocoa and dark chocolate contain no cholesterol or hydrogenated fats. The specific composition of fatty acids gives cocoa butter (the vegetable fat extracted from cocoa seeds contained in chocolate) unique nutritional properties and, in particular, a lower CSI (Cholesterol Saturated Fat Index) than animal fats. Cocoa butter contains a lower percentage of fatty acids, which tend to increase cholesterol levels in the blood.

Cocoa and chocolate also contain water- and fat-soluble vitamins, minerals (especially phosphorous, magnesium and iron), natural pharmacologically active alkaloids (theobromine, caffeine, theophylline) and many antioxidant compounds (flavonoids, which belong to the large family of polyphenols).

Cocoa is also particularly rich in soluble and non-soluble fibre which performs an important role in motility and bowel movement, helping to clean the walls of the intestine.

The major side-effects to excessive consumption of cocoa or dark chocolate (the recommended daily dose is around 20 grams) are weight gain and obesity. The presence of natural stimulant alkaloids (caffeine, theobromine and theophylline) also mean it is not advisable for children under three years of age, in pregnancy, during breast-feeding or in people with tachycardia, migraine and some diseases of the digestive system (hiatus hernia, gastro-oesophageal reflux and gastritis).

4.2 Cocoa and chocolate for health and beauty

Cocoa and dark chocolate – not milk or white chocolate – are recognized as foods with beneficial effects on various parts of the body. The European Food Safety Authority (EFSA) recently announced that cocoa is a precious source of substances with distinct antioxidant properties (flavanols) and a daily intake of cocoa powder (2.5 g) or dark chocolate (10 g) can help protect the walls of the arteries, stimulate blood circulation, regulate blood pressure and safeguard the heart.

Flavanols are a group of plant chemicals belonging to the flavonoid family. They have no nutritional value on their own, but they do have a powerful antioxidant and anti-inflammatory effect. Cocoa has the highest flavonoid content and the greatest antioxidant capability of any food. The concentration of flavonoids is directly proportional to the cocoa concentration in the chocolate. On average, 100 grams of dark chocolate contain 50-60 mg of flavonoids, while in the same quantity of milk chocolate we find only 10 mg. Flavonoids are practically absent in white chocolate.

Actually, adding cocoa or dark chocolate to one's diet is an effective way of increasing one's intake of antioxidants and a pleasant way to acquire flavonoids, whose bitterness is not to everybody's liking.

The flavonoids contained in cocoa or dark chocolate have **beneficial effects on the cardiovascular system** by reducing the main risk factors for heart disease: they improve endothelium function and blood flow,

inhibit platelet aggregation, lower blood pressure, increase sensitivity to insulin, lower the levels of low-density lipoprotein cholesterol in the blood (LDL cholesterol or "bad cholesterol"), and increase the levels of high-density lipoprotein cholesterol (HDL cholesterol or "good cholesterol"). Altogether, these effects afford a significant reduction in the risk of heart disease (angina, heart attack, stroke) almost comparable to those of the drugs prescribed for this type of prevention.

There are also beneficial **effects for the central nervous system** and, in particular, on the neurotrophic and neurostimulant action of certain natural alkaloids (theobromine, caffeine and anandamide) and vasoactive effects on cerebral microcirculation of flavonoids. Cocoa and dark chocolate increase the number and strength of the connections between the neurons and reduce the mortality of nerve cells, improve cognitive functions (learning and memory), and slow brain deterioration due to age or neurodegenerative diseases like Alzheimer's and Parkinson's.

On the linkage between cognitive functions and cocoa consumption, a recent study published in the New England Journal of Medicine found a close correlation between per capita chocolate consumption and the number of Nobel prize-winners per 10 million inhabitants in 23 countries. One possible explanation for this striking and interesting result is that cocoa, besides improving the cognitive functions of sufferers of dementia, can also reinforce cognitive capacity across the general population, thus increasing the chances of producing Nobel prize-winners.

There are also **effects on the skin**. The antioxidant properties of cocoa and dark chocolate help protect the skin from harmful UV rays and free radicals, helping to keep the skin smooth and moist and prevent the wrinkles and blotches typical of old age. Dark chocolate is also used in the cosmetics industry to make anti-cellulite creams and beauty masks for the face and body in a treatment known as "chocolate therapy".

For many years chocolate was considered an enemy of the **teeth**. Instead, thanks to the antibacterial agents in cocoa, it actually helps to prevent the formation of dental plaque and therefore combats caries.

In conclusion, it is interesting to see how scientific understanding of the beneficial proprieties of cocoa have radically altered the relationship of chocolate to human health, turning it from a delicious vice into an alternative medicine. "Gluttony is going to become a solution rather than a sin. But lovers of sweet chocolate need to acquire a taste for bitter dark chocolate, which, unlike white chocolate, is rich in nutritional properties." (Valentina Bonfanti, *La Stampa*, 10 October 2013).

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CHAPTER 5

The economics of world cocoa production

by Fabio Antoldi

Every time a child somewhere in the world bites into a chocolate bar or takes a drink of cocoa-flavoured milk ("cocoa" is the anglicised form of the word "cacao". The two terms are generally interchangeable), they are the final link in a chain of production that began much earlier and probably thousands of miles away, in a forest in the tropics.

This production chain actively involved millions of people in different countries, and benefitted from the input of energy, creativity and inventiveness of a myriad actors whose labour and technology have gone into producing the value of the final food (and non-food) product. It is a chain of production which: creates and distributes added value among numerous players in different regions of the planet; involves huge investments of capital and knowledge; stimulates innovation and technological research; fosters communication between peoples; generates wealth and potentially creates well-being and development; satisfies the need or simply the desire of the modern consumer for a taste that encompasses centuries of history.

The numbers that follow give a rough idea of the economic size of the production and commercial activities involved in turning cocoa into a consumer good, primarily for the food industry, across the globe.

5.1 Cocoa production and trade worldwide

According to the ICCO (International Cocoa Association) Report "The cocoa Market Situation" (the latest available), the cocoa production in 2012/2013 reached a record of 3.9 million tons. Africa is the biggest producer region, with nearly 70% of world production. Latin America remains stable with around 16% as well as Asia and Oceania that together account for 12%.

It should be said, though, that these figures can change dramatically from year to year as production is affected by weather conditions or the introduction in many countries of policies to develop new cultivation techniques. Production is also highly sensitive to local political circumstances since crises can impact harvests and commerce heavily, and instability is rife in several producing countries. For instance, ICCO estimates for production in 2012/13 and the 2013/14 forecasts suggest an increase in African production (especially in Ivory Coast) against that of American and Asia.

The leading country in cocoa production (2012/2013) is the Ivory Coast, which alone produces 1.5 million tonnes of cocoa (almost 40% of global production). It is followed by Ghana (835,500 tonnes), Indonesia (410,000 tonnes), Nigeria (225,000 tonnes), Ecuador (191,500 tonnes) and Brazil (185,300 tonnes), Peru (69,400 tonnes), Dominican Republic (68,000 tonnes).

The data change from year to year, because cocoa production is very exposed both to variations in climatic conditions and to the introduction, in various countries, of policies to develop cultivation techniques. It is also influenced by the local political situation, because in times of crisis the harvesting and trade of the product suffer substantially. These fluctuations, even if they occur over a period of three months, have a huge impact on the price of cocoa on international markets. The price, negotiated above all on the London and New York stock markets, also depends on the rising of production surplus with regard to real demand, which has, over the past few years, created huge stocks of processed product.

Generally, cocoa beans are dried in their countries of origin. But, in many cases, their journey to the factories to be transformed from raw material follows immediately. At this point cocoa really becomes a global product, which can give work to people all over the world.

5.2 The importance of cocoa for the economy of producing countries

According to the World Cocoa Foundation, around 50 million people depend on the crop for their livelihood, in the North, but above all in the South of the globe. According to Eurostat data, in Europe alone in 2009, the cocoa, chocolate and confectionary industry employed around 190,000 people in 5,500 companies, with a turnover of 42.3 billion euros and a value added of more than 10.9 billion euros.

Meanwhile in the U.S. in 2010, the industry employed around 69,000 (Source: World Cocoa Foundation, Cocoa Market Update, March 2012, Economic Profile of the E.U. Chocolate Industry, November 2011 and Economic Profile of the U.S. Chocolate Industry, November 2011).

These numbers refer exclusively to manufacturers and retailers of chocolate products. But the figures are

much more impressive if we look at the countries of origin, especially the two main producers of cocoa beans, Ivory Coast and Ghana, which alone produce more than 60% of the total world supply. In the Ivory Coast, out of a total population of 16 million, 3-4 million people work in the supply chain (Source: Global Witness, *Chocolat chaud: Comment le cacao a alimenté le conflit en Côte d'Ivoire*, Un rapport de Global Witness, June 2007, based on figures provided by the Treasury of the Ivory Coast), while in Ghana it is estimated that at least 6 million people (25-30% of the population) depend on the industry (Source: Anthonio, D. C. and E. D. Aikins [2009], "Reforming Ghana's cocoa sector - an evaluation of private participation in marketing").

In these two countries, the industry is fundamental not just in terms of jobs, but also as regards the wealth produced. In the Ivory Coast, cocoa is the country's number one economic resource and represents an average 35% of total exports, or around 1.4 billion USD (SOURCE: Global Witness, *Chocolat chaud: Comment le cacao a alimenté le conflit en Côte d'Ivoire*, Un rapport de Global Witness, June 2007). In Ghana, cocoa is the biggest item in the country's economy and the second source of income in its trade balance, representing around 30% of total exports (Sources: USDA Foreign Agricultural Service, Ghana – Cocoa Annual Report, March 2012; FAO, MAFAP SPAAA; Draft April 2013; Ghana Statistical Service, 2010; GAIN, 2012; and Ghana Export Promotion Council <http://www.gepcghana.com/economy.php>).

Sustained by growing world demand for cocoa-based consumer products, the cultivation of this plant in Ghana is proving to be a powerful weapon in the struggle against poverty. In the majority of families working in the industry, cocoa accounts for more than 67% of household income (Kolavalli and Vigneri, 2011).

Research has shown a significant reduction in poverty among farmers. Studies conducted in 1991, 1999 and 2005 indicate that poverty among farmers has fallen dramatically: from 60.1% in the nineties to 23.9% in 2005, while the average percentage of the population living in poverty has fallen over the same period from 51.7% to just 28.5%.

This sudden drop in poverty among farmers has coincided with a particularly favourable period for cocoa prices and productivity. But this clear correlation between international cocoa prices and the reduction of poverty among farmers also points to the vulnerability of the producers to price shocks (Coulombe and Wodon 2007). It is worth remembering that in Ghana – as in all the producing countries – 90% of the crop is produced by smallholders with no contractual power or control over prices (COCOBOD, 2012).

The contractual weakness of the farmers in the countries of origin means that the value added in the cocoa-chocolate supply chain is concentrated primarily in the hands of the players operating downstream of bean production (Fig.1).

The share of the final price of the product ending up with the farmers is only around 6% today, far less than the 16% of thirty years ago. This situation has made it even more urgent to offer guarantees to the farmers through fair-trade policies across the industry.

It is easy to see why the value added is concentrated in the final stages of manufacturing: on the one hand, bringing the product to the consumer requires interaction between numerous entities, many of whom make a vital contribution in terms of research, safety, quality and control, thus multiplying the final value over that of the raw material; on the other, these organizations are very big and physically a lot closer to the end consumer, making it much easier for them to capture the value of their contributions on the market (Fig.2).

Directly downstream from the harvesting and drying, there are three large international companies – Cargill, ADM and Barry Callebaut – which grind 40% of the world's total production of cocoa, to which we can add a fourth global player, Olam, based in Singapore (Traoré, 2009).

Even though cocoa is a growing market, there is no shortage of worries about its future development, both for growing supplies accumulated over the past few years and for the very structure of the distribution chain, which shows different points of weakness.

Fig. 1 - Main producers of cocoa beans from 2009/10 to 2012/13 (estimates) and forecast 2013/2014

Production of cocoa beans by country										
Country	2009/10	2010/11	2011/12	2012/13 Estimates	2013/14 Forecasts	2009/10	2010/11	2011/12	2012/13	2013/14
						Year-on-year change				
AFRICA										
Benin	0.1	-	-	-	-	-	-0.1	-	-	-
Cameroon	208.5	228.5	206.5	225.0	205.0	-15.1	+20.0	-22.0	+18.5	-20.0
Congo	1.0	1.5	2.8	5.0	5.0	-0.2	+0.5	+1.3	+2.2	-
Congo, Dem. Rep. of	1.1	0.9	0.8	3.0	2.0	-0.5	-0.2	-0.1	+2.2	-1.0
Côte d'Ivoire	1242.3	1511.3	1485.9	1449.0	1750.0	+19.1	+269.0	-25.4	-36.9	+301.0
Equatorial Guinea	0.9	0.9	0.7	0.7	0.6	-0.2	-	-0.2	-	-0.1
Gabon	0.1	0.1	0.6	0.1	0.2	-0.1	-0.0	+0.5	-0.4	+0.1
Ghana	632.0	1024.6	879.3	835.5	920.0	-30.3	+392.5	-145.2	-43.9	+84.5
Guinea	4.1	15.0	12.0	5.5	4.0	-0.6	+10.9	-3.0	-6.5	-1.5
Liberia	6.3	11.7	12.0	8.4	8.5	+1.7	+5.4	+0.3	-3.7	+0.2
Madagascar	10.0	6.5	8.0	9.0	9.0	+2.0	-3.5	+1.5	+1.0	-
Nigeria	235.0	240.0	235.0	225.0	230.0	-15.0	+5.0	-5.0	-10.0	+5.0
Sao Tome and Principe	2.6	1.6	2.8	2.2	2.5	+0.1	-1.0	+1.2	-0.6	+0.3
Sierra Leone	14.0	10.5	12.5	10.7	11.0	+4.0	-3.5	+2.0	-1.8	+0.4
Tanzania, United Rep. of	8.0	9.5	9.0	6.0	7.0	+1.8	+1.5	-0.5	-3.0	+1.0
Togo	101.5	142.5	34.5	15.0	13.0	-3.5	+41.0	-108.0	-19.5	-2.0
Uganda	17.0	18.0	16.0	22.0	20.0	+6.0	+1.0	-2.0	+6.0	-2.0
Other Africa	1.2	1.2	1.0	1.0	1.0	-	-	-0.2	-	-
Total Africa	2485.7	3224.2	2919.4	2823.0	3188.8	-30.7	+738.5	-304.8	-96.4	+365.8
AMERICA										
Belize	0.1	0.1	0.1	0.1	0.1	-	-	-	-	-
Bolivia	2.4	2.5	2.0	2.0	2.0	-	+0.1	-0.5	-	-
Brazil	161.2	199.8	220.0	185.3	210.0	+4.2	+38.6	+20.2	-34.7	+24.7
Colombia	40.0	35.2	42.6	48.4	47.0	+4.1	-4.8	+7.4	+5.7	-1.4
Costa Rica	0.7	0.6	0.5	0.5	0.5	+0.0	-0.1	-0.1	+0.0	-0.0
Cuba	1.7	1.5	1.5	1.5	1.5	+0.4	-0.2	-	-	-
Dominica	0.8	0.3	0.2	-	0.1	+0.7	-0.5	-0.1	-0.2	+0.1
Dominican Republic	58.3	54.3	72.2	68.0	70.0	+3.3	-4.1	+17.9	-4.2	+2.0
Ecuador	149.8	160.5	198.0	191.5	200.0	+14.8	+10.7	+37.5	-6.5	+8.5
Grenada	0.5	0.7	0.8	0.9	0.9	-0.0	+0.2	+0.2	+0.0	+0.0
Guatemala	1.1	1.1	1.0	1.0	1.0	-	-	-0.1	-	-
Haiti	5.5	3.5	4.5	2.0	3.0	+1.5	-2.0	+1.0	-2.5	+1.0
Honduras	0.6	0.5	0.5	0.7	1.0	-	-0.1	-	+0.2	+0.3
Jamaica	0.6	0.3	0.4	0.4	0.5	-	-0.3	+0.1	+0.1	+0.1
Mexico	27.0	21.4	27.6	27.9	30.0	+4.0	-5.6	+6.2	+0.3	+2.1
Nicaragua	2.8	3.4	3.2	4.0	4.0	+0.6	+0.6	-0.2	+0.8	-0.0
Panama	0.6	0.7	0.8	0.8	0.8	-0.1	+0.1	+0.1	+0.1	-
Peru	42.9	54.4	60.6	69.4	75.0	+6.7	+11.5	+6.2	+8.8	+5.6
Saint Lucia	0.1	0.1	0.1	0.1	0.1	-0.0	-	-	-	-
Trinidad and Tobago	0.7	0.4	0.5	0.5	0.5	+0.1	-0.3	+0.1	-	-
Venezuela, Bolivarian Rep. of	18.0	17.1	18.0	17.0	18.0	-2.5	-0.9	+0.9	-1.0	+1.0
Other Americas	0.1	0.1	0.1	0.1	0.1	-	-	-	-	-
Total Americas	515.5	558.4	655.2	622.1	666.1	+37.9	+42.9	+96.8	-33.1	+44.0
ASIA AND OCEANIA										
Fiji	0.1	0.1	0.1	0.1	0.1	-	-	-	-	-
India	13.0	14.5	13.0	15.0	14.0	+1.2	+1.5	-1.5	+2.0	-1.0
Indonesia	550.0	440.0	440.0	410.0	425.0	+60.0	-110.0	-	-30.0	+15.0
Malaysia	15.1	7.5	4.0	3.0	4.0	-7.3	-7.6	-3.5	-1.0	+1.0
Papua New Guinea	39.4	47.6	38.7	37.4	40.0	-20.0	+8.2	-8.9	-1.4	+2.7
Philippines	5.0	4.9	4.8	4.8	5.0	-0.1	-0.2	-0.0	+0.0	+0.2
Solomon Islands	5.0	6.3	4.6	4.7	5.0	+0.2	+1.3	-1.7	+0.1	+0.3
Sri Lanka	0.5	0.5	0.5	0.5	0.6	-0.1	+0.0	-0.0	+0.0	+0.1
Thailand	0.4	0.4	0.4	0.4	0.4	-	-	-	-	-
Vanuatu	1.5	1.7	1.2	2.0	2.0	-	+0.2	-0.5	+0.8	-
Vietnam	2.0	2.0	2.5	4.0	6.0	+1.5	-	+0.5	+1.5	+2.0
Other Asia and Oceania	1.0	1.0	1.0	1.0	1.0	-	-	-	-	-
Total Asia and Oceania	633.1	526.4	510.9	482.9	503.1	+35.4	-106.7	-15.6	-27.9	+20.2
World total	3634.3	4309.0	4085.4	3928.0	4358.0	+42.6	+674.7	-223.6	-157.5	+430.0
Total for members	3264.6	3905.5	3657.6	3523.5	3922.2	+38.0	+640.8	-247.9	-134.1	+398.7
Share of members	89.8%	90.6%	89.5%	89.7%	90.0%					

Note: R Revised

(data in thousands of tonnes. Source: ICCO World Cocoa Economy 2014).

Fig. 2 - Main countries for the grinding of cocoa beans in 2009/10 to 2012/13 (estimates) and forecast for 2013/14

TABLE 2

Grindings of cocoa beans by country

Table 5		2009/10	2010/11	2011/12	2012/13	2013/14	2009/10	2010/11	2011/12	2012/13	2013/14
Country					Estimates	Forecasts	Year-on-year change				
(thousand tonnes)											
EUROPE											
European Union:											
Austria	m	13.7	13.8	10.1	11.0	12.0	- 2.9	+0.1	- 3.7	+0.9	+1.0
Belgium	m	70.0	75.0	70.0	75.0	75.0	+12.5	+5.0	- 5.0	+5.0	-
Croatia	m	2.2	1.8	1.8	1.9	2.0	-	- 0.4	-	+0.1	+0.1
Denmark	m	3.4	3.5	3.2	3.6	3.5	+0.3	+0.1	- 0.3	+0.4	-0.1
Estonia	m	0.8	0.8	0.8	0.8	0.8	-	-	-	-	-
France	m	145.0	150.0	128.0	130.0	135.0	- 9.0	+5.0	- 22.0	+2.0	+5.0
Germany	m	361.1	438.5	407.0	402.0	415.0	+19.4	+77.4	- 31.5	- 5.0	+13.0
Greece	m	3.6	3.9	3.7	2.6	2.5	- 0.5	+0.3	- 0.2	- 1.1	-0.1
Ireland	m	5.0	4.8	3.5	4.0	3.0	- 3.2	- 0.2	- 1.3	+0.5	- 1.0
Italy	m	63.2	66.5	66.6	70.6	72.0	+4.9	+3.3	+0.1	+4.1	+1.4
Latvia	m	1.2	1.2	0.9	2.0	2.0	- 0.2	-	- 0.3	+1.1	-
Netherlands	m	525.0	540.0	500.0	535.0	540.0	+35.0	+15.0	- 40.0	+35.0	+5.0
Poland	m	10.2	9.7	10.6	11.4	11.5	- 1.5	- 0.5	+0.9	+0.8	+0.1
Portugal	m	-	0.1	0.1	0.1	0.1	-	+0.1	-	+0.1	-
Slovak Republic	m	8.5	9.0	8.2	8.0	7.5	+2.1	+0.5	- 0.8	- 0.2	- 0.5
Slovenia	m	0.1	0.1	0.1	-	0.1	-	-	- 0.1	- 0.1	+0.1
Spain	m	86.0	86.0	90.5	95.0	95.0	- 4.9	-	+4.5	+4.5	-
United Kingdom	m	110.0	87.0	78.0	90.0	90.0	-	- 23.0	- 9.0	+12.0	-
Total European Union		1409.1	1491.7	1383.0	1443.0	1467.0	+52.0	+82.6	- 108.7	+60.1	+24.0
Switzerland	m	40.2	41.5	42.0	39.5	42.0	+1.5	+1.3	+0.5	- 2.5	+2.5
Former USSR:											
Belarus		6.2	5.7	7.4	7.1	7.5	- 0.3	- 0.5	+1.7	- 0.3	+0.4
Kazakhstan		6.4	5.8	6.2	5.7	5.0	+0.1	- 0.6	+0.4	- 0.5	- 0.7
Republic of Moldova		0.1	0.1	0.1	0.1	0.1	-	-	-	-	-
Russian Federation	m	51.9	60.9	63.0	65.0	67.0	- 2.1	+9.0	+2.1	+2.0	+2.0
Ukraine		14.0	16.8	17.3	18.0	18.0	- 2.1	+2.8	+0.5	+0.7	-
Former Yugoslavia:											
Serbia		2.4	2.0	2.2	3.3	3.5	-	- 0.4	+0.2	+1.1	+0.2
Total Europe		1530.3	1624.5	1521.2	1581.7	1610.1	+49.1	+94.2	- 103.3	+60.6	+28.4
AFRICA											
Algeria		3.4	2.9	5.5	6.0	6.5	- 0.6	- 0.5	+2.6	+0.5	+0.5
Cameroon	m	26.9	28.0	32.6	32.0	32.5	+2.9	+1.1	+4.6	- 0.6	+0.5
Côte d'Ivoire	m	411.4	360.9	430.7	471.1	535.0	- 7.1	- 50.6	+69.9	+40.4	+63.9
Ghana	m	212.2	229.5	211.7	225.1	228.0	+79.2	+17.3	- 17.8	+13.4	+2.9
Nigeria	m	25.0	32.0	30.0	40.0	45.0	- 9.0	+7.0	- 2.0	+10.0	+5.0
South Africa		-	-	-	-	-	- 0.1	-	-	-	-
Tunisia		4.5	3.2	5.0	4.5	4.0	- 2.0	- 1.3	+1.8	- 0.5	- 0.5
Other Africa		1.0	1.0	1.0	1.0	1.0	- 0.5	-	-	-	-
Total Africa		684.5	657.5	716.5	779.6	852.0	+62.8	- 27.0	+59.0	+63.1	+72.4

Table 2: Grindings of cocoa beans by country (contd.)

Table 5	2009/10	2010/11	2011/12	2012/13	2013/14	2009/10	2010/11	2011/12	2012/13	2013/14	
Country				Estimates	Forecasts				Year-on-year change		
AMERICA											
Argentina	0.4	0.4	0.4	0.4	0.4	-	-	-	-	-0.1	
Bolivia	2.0	2.0	2.0	2.0	2.0	-0.3	-	-	-	-	
Brazil	226.1	239.1	242.5	241.2	245.0	+10.0	+13.0	+3.4	-1.3	+3.8	
Canada	59.2	62.3	60.0	64.2	65.0	+3.8	+3.1	-2.3	+4.2	+0.8	
Colombia	39.5	44.0	40.5	42.3	42.5	-2.2	+4.6	-3.5	+1.7	+0.2	
Costa Rica	0.2	0.4	0.3	0.3	0.3	-0.2	+0.2	-0.0	-0.0	-	
Cuba	0.5	0.5	0.5	0.5	0.5	+0.0	-	-	-	-	
Dominican Republic	m	6.2	4.4	4.9	3.8	4.5	+0.7	-1.8	+0.5	-1.1	+0.7
Ecuador	m	21.6	23.2	27.5	25.9	27.5	-1.1	+1.7	+4.2	-1.6	+1.6
Guatemala	0.8	0.8	0.5	0.6	0.6	-	-	-0.3	+0.1	-	
Honduras	0.1	0.1	0.1	0.1	0.1	-	-	-	-	-	
Jamaica	0.2	0.2	0.2	0.2	0.2	-	-	-	-	-	
Mexico	37.2	39.2	37.7	40.4	42.0	+4.1	+2.0	-1.4	+2.6	+1.6	
Nicaragua	m	1.1	1.2	1.2	1.2	+0.0	+0.0	+0.0	+0.0	+0.0	
Panama	0.5	0.5	0.5	0.5	0.5	-	-	-	-	-	
Peru	m	28.4	31.2	29.8	37.1	40.0	+1.5	+2.8	-1.5	+7.3	+3.0
Trinidad and Tobago	m	0.1	0.1	0.1	0.1	0.1	-	-	-	-	-
United States	381.9	401.3	386.9	413.2	418.0	+21.2	+19.5	-14.4	+26.3	+4.8	
Venezuela, Bolivarian Rep. of	7.8	10.0	9.4	8.5	9.0	-2.6	+2.2	-0.6	-0.9	+0.5	
Other Americas	0.5	0.5	0.5	0.5	0.5	-	-	-	-	-	
Total Americas	814.2	861.5	845.5	882.9	900.0	+34.8	+47.2	-16.0	+37.4	+17.0	
ASIA AND OCEANIA											
China	22.0	35.0	39.5	45.0	45.0	+0.6	+13.0	+4.5	+5.5	-	
India	22.0	25.0	28.0	30.0	32.0	+3.5	+3.0	+3.0	+2.0	+2.0	
Indonesia	m	130.0	190.0	270.0	255.0	310.0	+10.0	+60.0	+80.0	-15.0	+55.0
Iran	8.0	8.0	6.0	3.5	5.0	+3.0	-	-2.0	-2.5	+1.5	
Israel	1.5	1.3	1.0	0.8	0.8	+0.2	-0.2	-0.3	-0.2	-	
Japan	42.2	40.3	40.0	39.7	39.0	+1.3	-1.9	-0.3	-0.2	-0.7	
Korea, Republic of	3.6	4.2	3.3	4.3	4.5	+0.6	+0.6	-0.9	+1.0	+0.2	
Malaysia	m	298.1	305.2	296.8	292.6	270.0	+19.9	+7.1	-8.4	-4.3	-22.6
New Zealand	1.3	1.3	1.1	1.9	2.0	+0.4	-	-0.2	+0.8	+0.1	
Philippines	5.0	5.0	5.0	5.0	5.0	-	-	-	-	-	
Singapore	83.0	83.0	83.0	78.0	80.0	+3.5	-	-	-5.0	+2.0	
Sri Lanka	2.5	5.0	3.5	2.0	2.0	+0.5	+2.5	-1.5	-1.5	-	
Thailand	19.8	20.5	20.5	18.0	17.0	-1.2	+0.7	-	-2.5	-1.0	
Turkey	68.0	70.0	75.0	75.0	77.0	+11.0	+2.0	+5.0	-	+2.0	
Other Asia and Oceania	0.8	0.8	0.8	0.8	0.8	-	-	-	-	-	
Total Asia and Oceania	707.7	794.6	873.5	851.6	890.1	+53.2	+86.8	+78.9	-21.9	+38.5	
World total	3736.8	3938.1	3956.7	4095.9	4252.2	+200.0	+201.3	+18.6	+139.2	+156.3	
Total for members	2662.3	2799.9	2823.2	2931.3	3069.9	+148.4	+137.6	+23.4	+108.0	+138.6	
Share of members	71.2%	71.1%	71.4%	71.6%	72.2%						
Origin grindings	1526.4	1599.2	1727.7	1776.5	1893.8	+108.3	+72.8	+128.5	+48.8	+117.3	
Share of origins	40.8%	40.6%	43.7%	43.4%	44.5%						

Notes:

R Revised

Data for individual countries shown in bold have been provided by official or trade sources.

Data for individual countries shown in italics are ICCO secretariat estimates based on trade in cocoa.

Totals may differ from sum of constituents due to rounding.

(data in thousands of tonnes, Source ICCO World Cocoa Economy 2012).

5.3 The international cocoa-chocolate supply chain

The global dimension of the transformation of cocoa beans can be clearly noticed in the Countries where the four million tons of cocoa beans harvested in 2012/13 were processed.

While production of the beans is clearly localized in Africa, Latin America, Asia and Oceania, grinding – the first stage in the manufacturing process – takes place mainly in other countries, above all in Europe (38.6%) and the U.S. (10.1%), while only 40.7% occurs in the countries of origin.

Once again, it is worth looking at the Ivory Coast. Of the more than 1.5 million tons produced, only 471,100 were ground inside the country (32.5%), while the remaining 67.5% of the harvest was shipped to importing countries and transformed through a complex system of intermediation, purchasing and deliveries. Ghana shows an even lower situation (26.9%). With other producers, like Indonesia, a much higher percentage of its production is transformed locally (62.2%), while Brazil, which is itself a producer of cocoa beans, processes more than it produces, importing from other parts of Latin America.

The obvious reason is the presence in the transforming countries of strong local demand for chocolate products, as well as a specialization in chocolate manufacturing, as in the case of the Netherlands, the world's biggest importer of cocoa beans.

While the volumes indicate that cocoa is a growth market, there are concerns about the future, due to the growing stockpiles of beans accumulated over recent years, and the structure of the supply chain, which reveals various weaknesses.

A 2012 study by Credit Suisse analysts describes the market thus: "Driven primarily by growth in world population, the rapid development of emerging markets and rising incomes, demand for cocoa is set to increase steadily. [...] Over the last decade world demand has shown an average annual increase of around 2.5 per cent."

The supplier of cocoa and chocolate products Barry Callebaut believes this spiral is destined to exceed supply by a million tons by 2020. Joe Prendergast of Credit Suisse adds: "Against current levels of demand, the reserves of cocoa are still sizable. However, the ratio of stocks to grinding show a downwards trend indicating a fall in supply."

The shortage of supply affects the whole supply chain right through to the chocolate manufacturers and retailers, but the source of the problem lies with the first link: the plantations. Among the biggest difficulties are structural problems such as the aging of the trees, increasingly elderly farmers, the scarcity of investment, infrastructure shortfalls and the abandonment of harvests. "Plantations are also constantly under threat from diseases and political instability," explains Prendergast.

At the first Chocovision conference, where the world's major stakeholders gathered to discuss the industry's most basic problems, Sir Bob Geldof – known for his activism in the struggle against poverty in Africa – added that a further serious threat is represented by global warming: "If climate change continues at the current pace, by 2050 half the land used to grow cocoa will disappear."

While environmental problems remain a tough nut to crack, the solution in large part lies in raising the productivity and income of the farmers. This will require enormous investments in innovative farming methods, education for farmers and agricultural infrastructure, as well as increased prices to the growers. A series of government programs to support investment and growth of supply by Ghana and Indonesia have massively expanded production activities, but we are still a long way from meeting future demand.

In March, Barry Callebaut, organiser of Chocovision, launched a global initiative worth 40 million Swiss Francs to improve harvests, quality and sources of aid in the main producing countries, lending support to the health service and education for farmers. Prendergast explains: "This form of closer engagement by the chocolate supply chain is mainly attributable to the growing awareness of consumers, but it is also in the interest of the producers to ensure long term cocoa supplies. As global investors become increasingly sensitive to environmental, social and governance issues, it is inevitable and to be hoped that they take further steps forward towards sustainable production and a real increase in the income of the farmers." Over recent years, several giants of the industry have signed up to ethical schemes such as Fairtrade, UTZ or Rainforest Alliance for their mass market chocolate. Besides favouring the sustainable cultivation of the commodity, these initiatives allow consumers – especially chocolate lovers – to make an informed choice about the final products.

The volatility of supply prices represents another huge barrier in the chain. Prendergast comments: "Thanks to the good harvest in 2011 prices have remained at modest levels, but the downward trend in stocks and increased grinding is bound to lead to volatility. It takes several years for a plant to bear its first fruit and many more to reach full yield: I can't see supply reacting rapidly.

Rather, it will only take one or two bad harvests to cause a profound shock. Right now there is a direct

correlation with the need for a more sustainable supply model." Given the current dynamics of the cocoa market, Credit Suisse predicts that prices will flatten out – above USD 2,000 a ton – for most of the 2011/2012 season and rise thereafter. In the longer term, cocoa prices should present high levels of volatility associated with a gradually rising trend (Source: Credit Suisse, Sectors and Companies, Are We on the Brink of a Chocolate Supply Crisis?, by Cushla Sherlock, Corporate Communications, 19/06/2012).

5.4 Cocoa consumption worldwide

The apparent domestic cocoa consumption for the world's biggest countries, provides a geography of market demand. The figures – in thousands of tons – are calculated per country as grindings of cocoa beans plus imports of cocoa products (butter and paste), chocolate and other chocolate products expressed as bean-equivalents using special conversion factors.

As we can see, worldwide consumption has grown steadily in recent years. The biggest consumers are the U.S. (763,500 tons), Germany (323,000), the U.K. (229,000), France (228,000), Russia (200,000), Brazil (178,000), Japan (155,000) and Spain (105,000).

After grinding to produce paste or butter, the cocoa is ready as a raw material for three possible manufacturing processes: a) production of chocolate; b) as an ingredient in other food products; c) for the cosmetics/pharmaceuticals industry (creams, soaps, sticks).

It is estimated that more than 2/3 of processed cocoa (paste or butter) is used to make chocolate and chocolate products: chocolate bars, sweets and snacks, chocolates. The powder is used as an ingredient for drinks, desserts, ice-cream, sauces, sweets and biscuits. Around half the global confectionery market is controlled by five large international groups: Kraft (14.9%), Mars (14.5%), Nestlé (7.9%), Hershey's (4.6%) and Ferrero (4.5%). More than 90% of the cocoa consumed goes to make standard chocolate, where the question of quality is less important. Only 10% of the consumer market is sensitive to the quality of the product, using only selected raw materials beginning with the plants. This is the premium chocolate segment, where it is easier for social and environmental sustainability issues to get a foothold (Source: CBI, Market channels and segments cocoa, 2012 www.cbi.eu/marketintel_platform/Coffee-Tea-and-Cocoa-/177417/channelsandsegments).

5.5 Chocolate consumption worldwide

If we consider that 75-80% of processed cocoa (butter and mass) goes to make chocolate, it is clear that to examine the cocoa market we have to look at chocolate as well, a secondary market which nevertheless largely determines demand for the raw material.

In 2010, the biggest markets were the USA (1640 million tons), followed by Germany (946,000 tons), the United Kingdom (605,000 tons), Brazil (562,000 tons), France (410,000 tons), Japan (268,000 tons) with Italy seventh (227,000 tons). The figures refer to aggregated consumption per country.

In certain respects it is more interesting instead to look at annual per capita consumption, i.e. the average kgs of chocolate eaten each year by each person in these countries. In 2011, the biggest chocolate eaters in the world are the Germans (11.60 kg/year), followed by the Swiss (10.55 kg), the British (9.77 kg), Norwegians (9.24 kg), Estonians (8.78 kg), Austrians (8.65kg) and Danish (8.18 kg). The Italians are 13th with an annual per capita consumption of 4.06 kg.

Fig. 3 - Average per capita chocolate consumption in main countries

CONSUMPTION PER CAPITA - Kg/Head p.a.								
ALL CHOCOLATE PRODUCTS								
TOTALS DETAILED BY COUNTRIES/REGIONS								
2006 - 2011								
COUNTRIES	2006	2007	2008	2009	2010	2011	2011/10	2011/06
EU								
AUSTRIA	8,19	8,22	7,90	7,71	8,16	8,65	6,0%	5,5%
BELGIUM	8,60	9,05	6,80	5,00	4,81	5,73	19,1%	-33,3%
BULGARIA	2,84	2,99	2,99	2,89	1,71	1,35	-20,7%	
CZECH REPUBLIC	2,66	2,37	2,17	2,08	2,04	2,51	23,1%	-5,7%
CYPRUS								
GERMANY	11,16	11,42	11,38	11,34	11,56	11,60	0,3%	3,9%
DENMARK	7,65	8,07	8,57	7,43	8,49	8,18	-3,7%	6,9%
ESTONIA	2,69	8,07	7,47	5,68	6,33	7,68	21,2%	185,4%
SPAIN	3,30	3,27	3,30	3,06	3,60	3,24	-9,9%	-1,7%
FINLAND	6,92	7,56	6,97	6,87	7,26	6,81	-6,2%	-1,6%
FRANCE	6,50	7,00	7,02	6,41	6,34	6,64	4,8%	2,1%
GREECE	3,27	3,29	4,50	3,65	3,51	2,41	-31,4%	-26,5%
HUNGARY	3,11	3,72	3,47	3,58	3,60	3,30	-8,3%	6,3%
ITALY*	3,87	3,37	3,38	3,49	3,77	4,06	7,8%	5,1%
IRELAND**	7,64	12,38	3,09	2,82	2,75	2,55	-7,3%	-66,6%
LATVIA								
LITHUANIA	5,70	6,34	6,08	5,39	5,58	5,80	4,1%	1,8%
LUXEMBOURG								
MALTA								
NETHERLANDS**								
POLAND	3,79	3,62	4,52	4,34	3,02	2,69	-10,8%	-29,0%
PORTUGAL	1,18	1,31	3,14	2,95	2,72	2,57	-5,2%	118,0%
ROMANIA	2,08	2,19	2,25	2,81	2,36	2,55	8,2%	
SLOVENIA	5,23	5,56	5,47	6,12	6,49	6,56	1,0%	25,5%
SLOVAKIA	3,28	4,63	4,20	3,00	1,94	3,77	94,6%	14,8%
SWEDEN	6,39	6,74	6,58	6,43	6,51	6,22	-4,4%	-2,6%
UNITED KINGDOM*	10,29	10,40	10,22	9,01	9,72	9,77	0,5%	-5,1%
TOTAL EU	6,13	6,28	6,25	5,89	5,96	6,02	1,0%	-1,8%
EFTA								
SWITZERLAND	10,05	10,47	10,77	10,35	10,51	10,55	0,4%	5,0%
NORWAY	8,83	9,44	9,65	9,45	9,44	9,24	-2,0%	4,7%
TOTAL EFTA	9,59	10,08	10,34	10,01	10,09	10,05	-0,5%	4,8%
TURKEY								
					0,00			
ICA								
AUSTRALIA	5,72	5,81	5,96	4,17	0,00			
BRAZIL	2,16	2,47	2,57	2,58	3,27	3,53	8,1%	63,4%
JAPAN	2,23	2,18	2,15	2,13	2,09	2,16	3,1%	-3,3%
USA	5,46	5,18	5,14	5,28	0,00			
TOTAL ICA	3,85	3,81	3,82	3,82	1,37	1,46	6,7%	-61,9%
GRAND TOTAL	4,90	4,95	5,10	4,95	3,44	3,50	1,8%	-28,4%
* Figures provided by National Associations								
** Figures provided by National Associations until 2007 (2008 Prodcorn figure)								

(Kg per head, Source COABISCO Statistical bulletin 2013).

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CHAPTER 6

Chocolate in the collective imagination

The Journey of Chocolate in the collective imagination of the West from its origins to the present day - class, literature and art.

by Fausto Colombo and Silvano Rubino

6.1 A breakfast pleasure

A noblewoman reclines on soft cushions and lace sheets in the company of two gentlemen at the side of bed, including the family priest. Standing alongside is a "footman", one of the servants "who several times a day runs backwards and forwards with pots and cutlery serving hot drinks which are the height of fashion and a regular feature of the aristocrats' day,"¹ holding a silver pot ready to serve the chocolate, which they drink with cakes. The painting is by Pietro Longhi from 1775².

This classic image of daily life of the Venetian aristocracy painted on commission provides unmistakable proof that the hot drink made of water and cocoa powder was all the rage among the European elite of the 18th century. Following the political and economic colonialization of the new world by the Spanish in the 16th century, came a colonialization of the imagination by one of symbols of that conquest – cocoa. This is a conquest in reverse, beginning with the native peoples of Central America who discovered its use³, through the Spanish conquistadors who brought the drink to Spain in 1500, and its rapid spread among the European aristocracies of France, the United Kingdom, the Italian courts and even the clergy⁴. Thus it became a fashionable drink. In other words it entered the collective imagination, "a place of exchange and transition between the day-to-day reality of a social context and the culture which develops it"⁵. Thus it becomes an element that is capable of describing, through its cultural representations, the social class which expresses it. In the cultural products of that social class (literature, theatre, painting), cocoa reflects a very aristocratic taste for leisure, that *dolce far niente* that begins first thing in the morning with a cup of hot chocolate, completely at odds with what will happen later on with coffee, the preferred drink of the middle classes: "Breakfast chocolate had little in common with the bourgeoisie's breakfast coffee. It was quite the opposite... If coffee virtually shook drinkers awake for the workday that lay ahead, chocolate was meant to create an intermediate state between lying down and sitting up. Illustrations of the period nicely portray this ideal of an idle class's morning-long awakening to the rigors of studied leisure."⁶

The representation this class has of itself reveals a world marked by ritual, pleasant conversation, the pursuit of aesthetic and other pleasures: "18th-century paintings illustrate how these rituals break up the day and document the use of silver and porcelain artefacts in their homes, and their use in intimate or official spheres: gardens or salons, bedrooms and boudoirs, were all settings suited to drinking chocolate, whose use and consumption was essential to an elegance at the height of its exoticism and exquisite gentility."⁷

Pour the delectable liquor / bit by bit into the cup / mixing as you go / Then drink it, / and they will ask you to sit / and engage, as you do, / in delightful gossip".⁸

Sitting, engaged in amusing and idle gossip, taking tiny occasional sips: this is how Abbot Metastasio at the end of the 1700s advises Fille – a country girl little used to the pleasures of high society – to drink Chocolate.

¹ T. Lucchetti, P. Mengarelli "Storia e storie del cioccolato", Confartigianato Marche, 2011, p. 32

² Image 01, Pietro Longhi La cioccolata del mattino (1775-80). Ca' Rezzonico, Museum of 18th Century Venice, Venice

³ Image 02, An Aztec woman preparing chocolate. Watercolour from the Codex Tudela (late 16th century) from Sophie D. Coe, Michael D. Coe, The True History of Chocolate, Milan, Archinto, 1997 <http://www.worldstandards.eu/chocolate%20-%20history.html>

⁴ The drink made from cocoa could be used in periods of ecclesiastical fasting. Image 04, see Sophie D. Coe, Michael D. Coe The True History of Chocolate, Milano, Archinto, 1997

⁵ F. Colombo Il paese leggero. Gli italiani e i media tra contestazione e riflusso (1967-1994), Bari, Laterza, 2012

⁶ W. Schivelbusch Tastes of Paradise: A Social History of Spices, Stimulants and Intoxicants, Vintage Books, 1993, p. 91

⁷ Andreina d'Agliano "La bevanda alla moda: cambiamenti nel costume e sulle tavole documentati attraverso la pittura e le arti decorative tra il XVII e il XIX secolo" in Il cioccolato dai Maya al XX secolo, Cinisello Balsamo (Mi), Silvana Editoriale, 2008

⁸ *In tazza allora/ mesci a sorsi interrotti / dal replicato flagellare alterno,/ il soave liquor. Bevilo alfine,/ ma siedi, ti diranno;/ e favella fra tanto, e dolcemente/ mormora della gente*, P. Metastasio "La cioccolata a Fille" in Selected Works, edited by F. Gavazzoni, Turin, Utet, 1971, pp. 971-973

Whereas Giuseppe Parini's young lord in "The Day" is fully acquainted with such a world: *"But the well-groomed waiter / now comes forward and humbly asks / which of the products from the Indies / you would like in your cup / Choose what you prefer / if you want something hot / that aids in digestion / choose the hot chocolate / a gift from the inhabitants / of Guatemala and the Caribbean / with their heads wreathed / in exotic bird feathers."*⁹ With his ironic tone Parini paints a picture of a society in crisis, shortly to be overturned by the French Revolution and the social and economic changes which would also alter the place of cocoa in the collective imagination.

Meanwhile millions of people, like the maid Despina in Mozart's *Così fan tutti* (performed for the first time in 1790), are waiting impatiently at the edge of the picture to finally get their chance to enjoy the delights of chocolate: *"What a wretched life / A lady's maid leads! / From morning till night working, / Sweating and toiling, and after all / One's done there's nothing for oneself! / I've been beating this for half an hour, / And now the chocolate's ready; yet though my tongue's / Hanging out, must I just stand and smell it? / Aren't my tastes just like yours? / O dearest ladies, / You have the substance / And I only the smell! / Damn it, I'm going to try it. / Delicious!"*¹⁰

6.2 An active family

A group of exponents of the wealthy Turin bourgeoisie crowd around a window. A gentleman with a cloak and a dog on a leash, lots of children, a few women and mothers, two more gentlemen, an elderly lady. All have the amazed and cheerful expression of people who are about to savour a new pleasure: the "Cioccolato floreale" by the firm Beata & Perrone, in the window of a middle class chocolate house in the Piedmontese capital.

The advertising poster, in unmistakable art nouveau style, is from the early years of the 1900s is signed by è firmato da Alphonse Mucha¹¹ Compared with the idle lady of the end of the 18th century, it sums up the stark change that chocolate had undergone in the collective imagination of the West. From a symbol of the elite to a consumer good, from a ritual breakfast drink for the pleasure-seeking aristocracy it becomes a food for the new hard working middle classes, children included.

What had happened in 100 years? On the one hand there was clearly the decline of the aristocracy as the dominant class. But on the other hand chocolate – like many other products – had been engulfed in a process typical of advancing industrialization. Technological progress meant increased production and lower costs. In 1828 the hydraulic press patented by the Dutchman Casparus Johannes van Houten¹², finally rendered the original Central American grinders redundant, in 1847 the British firm J. S. Fry and Sons¹³ developed a process to produce bars of chocolate by re-using cocoa butter, and in 1875 the partnership between chemist Henry Nestlé and the Alsace confectioner Daniel Peter gave birth to milk chocolate.¹⁴ The greater quantities of product were met by a much broader demand, that of a middle class with disposable income and – increasingly as the years passed – a willingness to spend their money on the "superfluous".¹⁵ Meanwhile big businesses competed to win over the public with marketing techniques, and the story of cocoa becomes one of persuasion. The collective imagination is colonized by a series of stereotypes designed to be even more persuasive. In 1868 one of leading British companies, Cadbury, announced the first "box of chocolates" in a new type of packaging: the box lid carried a picture of Richard Cadbury's little daughter, Jessica, with a cat in her arms.¹⁶ It was a massive success, and a huge blow to their direct competitors, the Frys. From then on children would be a permanent target. Children featured strongly in the

⁹ *Ma il damigel ben pettinato i crini/ ecco s'innoltra, e con sommessi accenti / chiede qual più de le bevande usate / sorbir ti piaccia in preziosa tazza. / Indiche merci son tazza e bevande;/ scegli qual più desii. S'oggi ti giova / porger dolci allo stomaco fomenti, / onde con legge il natural calore/ v'arda temprato, e al digerir ti vaglia,/ tu il cioccolatte eleggi, onde tributo / ti diè il guatimalese, o il caribèo/ che di barbare penne avvolto ha il crine,* G. Parini, "Il Giorno, Il Mattino", verses 93-125, in G. Parini *Il giorno, Le Odi, Dialogo sopra la nobiltà*, Milano, Rizzoli, 1978

¹⁰ W.A.Mozart *Così fan tutte*, K 588, libretto by L. Da Ponte

¹¹ Alphonse Mucha, *Chocolat Idéal*, 1897

¹² Image 08, Van Houten advertising from the second half of the 19th century,

<http://www.worldstandards.eu/chocolate%20-%20history.html>

¹³ Image 09, Fry's advertising from the second half of the 19th century, <http://www.worldstandards.eu/chocolate%20-%20history.html>

¹⁴ F. Lanza, "Chocolate to drink and eat in Europe before and after the industrial revolution" in *Il cioccolato dai Maya al XX secolo*, cit. p. 258

¹⁵ The greatly increased demand for cocoa led to the export of plantations far from the native Americas, giving birth to large new production centres in Africa (Ghana, Ivory Coast etc) and in Asia. On this see F. Chiapparino *L'industria del cioccolato in Italia, Germania e Svizzera*, Bologna, ed. il Mulino, 1997.

¹⁶ Sophie D.Coe, Michael D.Coe *The True History of Chocolate*, cit., p. 224

posters, adverts and wrappers of the leading manufacturers of chocolate "for everyone" in the late 19th and early 20th centuries, many of them Swiss, like Suchard, Nestlé, Lindt and Caillers. In the collective imagination of the bourgeoisie of the industrial age, constructed partly through the clever use of persuasive marketing by the big food companies, chocolate became a product for the whole family, a symbol of an energetic class more committed to self-affirmation than to the pursuit of pleasure. And the children were not excluded, as mass education drove consumption of nutritious and energy-giving foods. "Superfluous" chocolate helped to form the image that the bourgeoisie had of itself, a class strongly rooted in the family, striving for success (economic and social) through restless activity.

This narrative, at least until the arrival of the television, was told through the images on advertising posters, packaging, newspaper and magazine ads. A form of activism firmly embodied in the spread of sporting activity, which is combined with energy-giving cocoa in a poster for the British company Cadbury's from 1888, which shows a group of amateur rugby players with a slogan stressing the stimulating virtues of chocolate, "strength and staying power."¹⁷ This is the narrative that dominates the iconographic and audio-visual output at least until the 1980s, when television, especially U.S. commercial TV with its advertising becomes the principal vehicle for the message.¹⁸

Interlude

The chocolate of peace

Symbol of the superfluous and middle class commitment typical of peacetime, chocolate acquired other meanings in a brief moment of stasis. Included in the rations of American soldiers (on the initiative of Milton Hershey, the American chocolate magnate), it was handed out to the peoples liberated from German occupation. The return of chocolate ushered in a return to prosperity after years of suffering and malnutrition, to become a symbol of peace restored.

6.3 The return to pleasure

*The children spy through a crack in the window at Vianne, newly arrived in a small French village to open a chocolaterie. They watch her as she prepares her chocolate wares anxiously with a sense of the forbidden. The whole village senses a spark of sensuality with the arrival of this young and beautiful artisan. Later she becomes a teacher to a woman who takes refuge in her shop from a violent husband. Causing eroticism and sensual pleasure to explode in a closed and backward community of the 1950s, Vianne, "is thus a revolutionary and scandalous figure."*¹⁹

Chocolat by Lasse Hallström was a blockbuster film of 2000 which irretrievably marked the return of a category which seemed to have disappeared from the collective imagination of chocolate: pleasure. Like an underground river, the aphrodisiacal virtues attributed to chocolate since its origins, appropriated by the hedonist 18th-century aristocracy, return to restore its slightly sinful charm.

The post-industrial middle classes, which no longer have to worry about self-affirmation, won over by the individualist hedonism of the 1980s, have once again turned chocolate into a pleasurable habit, a sensual moment in the busy day. Here again the seductive mechanisms of marketing have played a crucial role, ably introducing greater and greater doses of eroticism into the advertising language: "advertising and marketing experts have turned the simple act of eating a chocolate into an experience on the edge of decency.

Creating spectacular ads around the advertising of chocolate products on television and in the pages of the newspapers, using beautiful and famous actresses as testimonials in glossy and highly sexualized images."²⁰

The rhetoric of desire which features so strongly in the film *Chocolat* has come to dominate the advertising on television, in the newspapers and posters, leaving children and families with a soluble drink and snacks.

From little Jessica with a cat in her arms to the sexy female model in the rain in a well-known ad for Flake chocolate²¹, this food has come a long way in the collective imagination of the West. Yet the author in both cases is the same: the British firm Cadbury, undisputed king of chocolate in this part of the world.

¹⁷ Cecil Aldin, *Cadbury's Cocoa*, from www.cadbury.co.uk

¹⁸ Video 21: spot pubblicitario della Nestlé del 1959 <http://www.youtube.com/watch?v=gl87ABzUQM0>

Video 22: collage di spot della Nestlé <http://www.youtube.com/watch?v=Ufd6nB-s0cs>

Video 23: spot degli anni 80 della Hershey <http://www.youtube.com/watch?v=Hr03VpcVDsE>

¹⁹ *Chocolat* (Lasse Hallström, USA, 2000, based on the 1999 novel on the same name by Joanne Harris), quoted by Fausto Colombo and Adriano D'Aloia in *Gastronomia medievale. Riti e retoriche del cibo nel cinema, nella televisione e nella Rete.....* Video 26

²⁰ R. Malacart "Cioccolato bollente", *Lettera 43*, 14 February 2012, www.lettera43.it

²¹ Cadbury ad, <http://youtu.be/NSgKvc5odoA> video 30

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Images

Chapter 1

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4. Title page of the treatise by Leòn Pielo, Madrid, 1636, on the question of chocolate and clerical fasting in Sophie D. Coe, Michael D. Coe op.cit.
5. Chocolatada ("chocolate party"), tile decoration, Valencia, Spain, early 18th century
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6. Giuseppe Zucchi, "La mattina" (1754), Florence, Museo dell'Opificio delle pietre dure, in *Il cioccolato dai Maya al XX secolo*, cit.
7. Achille-Jean-Baptiste Leboucher, "La tasse de chocolat" (1836), Paris, Banque de France from *Il cioccolato dai Maya al XX secolo*, cit.

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8. Van Houten advertising from the second half of the 19th century,
<http://www.worldstandards.eu/chocolate%20-%20history.html>
9. and 10., Fry's advertising from the second half of the 19th century,
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11. An advertising poster for "Chocolat Ideal" from the early 20th century by the Czech painter Alphonse Mucha, <http://www.worldstandards.eu/chocolate%20-%20history.html>
12. A wrapper for a Cadbury's bar of chocolate from the late 19th century, <http://www.cadbury.co.uk>
13. A Suchard advert from 1898, <http://www.worldstandards.eu/chocolate%20-%20history.html>
14. Cecil Aldin, Cadbury's Cocoa, from www.cadbury.co.uk
15. Cadbury's advert inspired by Alice in Wonderland from www.cadbury.co.uk
16. Advertising for the firm Beata & Perrone of Turin, Milan, Stabilimento Cromo-Tipo-Litografico G.B. Virtuani & C., 1900 ca, Treviso, Museo Civico L. Bailo, from *Il cioccolato dai Maya al XX secolo*, cit. p. 258
17. Franz Laskoff, Suchard Chocolate, Grand Prix Paris 1900, around 1900 from *Il cioccolato dai Maya al XX secolo*, cit. p. 261
18. Suchard chocolate wrapper (early 20th century) in F. Chiapparino R. Romano (ed.) *Il cioccolato. Industria, mercato e società in Italia e Svizzera (XVIII-XX sec.)*, Franco Angeli, 2007, Milan
19. Caille advertising poster (early 20th century) in F. Chiapparino R. Romano op. cit
20. Nestlé chocolate wrapper (early 20th century) in F. Chiapparino R. Romano op. cit

21. Video: Nestlé ad from 1959, <http://www.youtube.com/watch?v=gl87ABzUQM0>
22. Video: collage of Nestlé ads, <http://www.youtube.com/watch?v=Ufd6nB-s0cs>
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24. A 4-ounce 600-calorie chocolate ration provided to American soldiers.
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26. Film excerpt from *Chocolat* by Lasse Hallstrom, <http://www.youtube.com/watch?v=FF0R3csIFSE>
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