THE COMMERCE IN RUBBER
THE FIRST 250 YEARS

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The juice which is found in the bark of the hevea tree, from which most of the world’s natural rubber comes, looks like milk. A diagonal incision in the bark of a mature tree is sufficient to cause the milk-like juice to flow very slowly out, and a cup of metal or coconut is tied to the tree at the lowest point of the incision to receive the flow.

Within hours of being extracted, the milk begins to darken toward a golden brown colour and thicken. At a certain stage, when it is no longer liquid yet still pliant, a piece of the substance can be stretched repeatedly to many times its length, and after each stretching return to about the same dimensions. Nothing else in nature possesses such elasticity.

The darkening and thickening continues, and after less than three days in a hot climate, the formerly milk-like juice has become dark grey-brown and solid. In this state it can be cut with a knife, and thin strips of it retain their elasticity; but pieces so cut cannot be re-united to form desired shapes. The substance can be moulded and shaped for useful purposes only when it is liquid and fresh from the tree.

This was the problem which rubber presented to men of science when they first encountered it, in Peru in the year 1736. It clearly possessed remarkable properties; but if it was to be applied to civilized man’s uses, it meant at that date that it must be brought to Europe; and before it was even out of the forest, and long before it reached a ship, it turned into hard, intractable lumps, of which the only virtue was that if a ball-shaped piece of it was dropped on the ground it bounced.

Rubber is produced by a fairly wide variety of trees and bushes of different genera, most of them growing in the world’s equatorial belt, whether in America, Africa or Asia, and between the latitudes of the tropics similarly, though only in regions of abundant rainfall and high humidity. It came to the cognizance of Europe through the discovery of the New World.

Michele de Cuneo, a traveller on Columbus’ second voyage to
America in 1493, wrote in a letter dated the following year: 'There are also trees that give milk when cut, of which they make a kind of wax, which we used."

The first published reference to it, and to its bounce, was in Peter Martyr's *De Orbe Novo*, which started publication in Alcalá in 1511, being issued thereafter in sections, terminating in 1530. On the subject of the games played by the Aztecs he wrote:

'... but the most popular game amongst them, as amongst the people of our own islands, is a game of tennis. Their balls are made of the juice of a vine that clammers over the trees, as hop vines clamber among the hedges. They cook the juice of these plants until it hardens in the fire, after which each one shapes the mass as he pleases, giving it the form he chooses. It is alleged that the roots of this herb when cooked give them their weight; at all events I do not understand how these heavy balls are so elastic that when they touch the ground, even though lightly thrown, they spring into the air with the most incredible leaps. The natives are most skilful players at this exercise, catching the ball on their shoulders, elbows, heads, rarely their hands, and sometimes their hips, if their opponents throw when their backs are turned. When playing tennis they strip, as do our wrestlers.'

Rubber was first seen in Europe in circumstances of considerable splendour, and at a surprisingly early date. The Spanish conquest of Mexico was accomplished in 1521. Three years later, in Seville in 1524, the Italian diplomat Andrea Navagiero, ambassador to the court of the Emperor Charles V, watched a tennis game played by a group of Aztecs brought from the New World by the friars to impress the Emperor with the Aztecs' intelligence and skills. Navagiero described the game in his *Viaggio fatto in Spagna*, published in Venice in 1563 (a thirty-year delay in publication was not unusual in those times). 'The ball', he wrote, 'was of some kind of very light wood and which bounced with extreme ease.' He was so interested that he repeated his description of the game in a letter to the geographer Ramusio.

The tennis ball used was obviously of solid rubber, and as can be judged from other sources, the games were tough. The players' bruises when hit by the ball were sometimes so severe they had to be bled. Bearing this in mind, Navagiero's conjecture that the ball was wooden is reasonable.

In general, though, it is not surprising that albeit rubber was seen in Europe, and by the greatest prince in Europe, nothing came of it.

As even the simplest actual description of rubber is sufficient to show, men of science were needed if the mysterious substance was ever to be tested and put to use; and descriptions such as the three just given—milk, wax, the juice of a vine, cooking roots, a very light wood—were
hardly enough to stimulate scientific interest, or even to indicate that all three descriptions referred to the same substance. In addition, there was the Censor to be reckoned with. Spain was the prime source of information concerning America, the printed word the greatest medium of transmission. Nothing could be printed in Spain without the Censor's approval. Such was the censorship's policy in relation to the New World that a number of descriptions which might have excited scientific interest were not published till four centuries after they were written, by which time they were mere curiosities.

Finally, Spain's years of eminence as a nation of pioneering and discovery were soon numbered. By the reign of Philip III (1598–1621), as is shown by the abandonment of the search for the 'Unknown Continent', apathy prevailed at the Spanish court over anything related to further discoveries, an attitude which reflected on the entire field of scientific inquiry.

Meanwhile Spaniards had settled down in Mexico and Peru, and were finding life agreeable. Lima, in Peru, in the seventeenth century, was quite as cultivated as some of the capitals of Europe, and more salubrious than any of them. This very quality of culture caused the current of ideas to flow the other way. Where once the Spanish court had waited eagerly for news of America, a century later the viceregal court at Lima waited eagerly for the mail from Spain.

In these unpromising circumstances rubber grew wild, as it always had, in the lower-lying parts of the country much further north, closer to the equator. No one knew much about it except for some of the natives, and they hardly mattered.

In 1735 the Académie Royale des Sciences in Paris sent an expedition to measure a degree of the meridian on the equator. Next year a similar expedition was sent to do the same on the Arctic Circle. The purpose of the two related expeditions was to determine the shape of the globe. Recent French scientific observations had questioned the prevalent assumption that the earth was circular by suggesting that it might in fact be spherical. Controversy had generated in Europe, and the intention of Louis XV, in ordering the expeditions, was to settle it by establishing the truth.

It was decided that the equatorial party should make their measurements in the neighbourhood of the mountain city of Quito, the present-day capital of Ecuador. In those times, Quito was the capital of an extensive part of the Spanish Peruvian empire with a government of its own, its chief executive nominally subordinate to the Viceroy at Lima, though for geographical reasons in effect independent of him, corresponding directly with Madrid.
The expedition sailed from France in April 1735, and arrived off the coast of Peru, at the mouth of the Rio Esmeraldas, just over a year later. Three scientists were aboard—Louis Godin, with whom this relation is not concerned, Pierre Bouguer and La Condamine—all of them typifying French learning of the time in holding a comprehensive view of science, being specialists with none of the narrowness that word can sometimes suggest.

Charles Marie de la Condamine (1701–74) was thirty-five when he reached Peru. Born in Paris, he was trained for the Army, but did not pursue it, his real interest being natural science. His military knowledge of maps led to his becoming a specialist in geodesics as well, an unusual combination for which the world has much to be thankful. Pierre Bouguer (1698–1758) was three years older, an astronomer, mathematician and hydrographer. In terms of knowledge it would be difficult to think of two men better chosen to undertake the exceedingly important task assigned to them.

They were held up at their place of disembarkation in Peru for eleven days, for want of guides and mounts to bring them up to Quito, a journey of three weeks to a month. It was a remote place in the woods, evidently country-style. Bouguer and La Condamine were intrigued by the lighting provided in their rooms after dark. In each room was set a torch about two inches in diameter and two feet long, wrapped in a double banana-leaf whenever the torch was liquid and alight. It had no wick, and it did not run, as a candle does, once it was put in place. It gave out a slight smell, which neither of the Frenchmen found in the least unpleasant, and its light was very strong. On investigation they found that half a torch of that size would burn for twelve hours.

Despite anything that may have gone before, this was the discovery of rubber.

On the twelfth day they set forth on horseback with guides up the valley of the Esmeraldas, and at each stop at day’s end, torches of the same kind were provided to lighten their nights. Along the way they learned some more, and procured several rolls of the substance—they looked like oversized rugby footballs—which La Condamine described as ‘blackish and resinous’. On 24 June 1736, shortly after their safe arrival at Quito, they despatched these to the Académie in Paris with a covering note from La Condamine, he being the naturalist among them:3

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sun, whereupon it hardens and turns brown, first outside, and then inside. Since my arrival at Quito I have learned that the tree which discharges this substance grows also along the banks of the Amazon river, and that the Maínas Indians call it Cauotchouc; moulds of earth in the shape of a bottle are covered with it; they break the mould when the resin has hardened; these bottles are lighter than if they were of glass, and are in nowise subject to breakage.

The Maínas Indians lived on the far (eastern) side of the cordillera of the Andes, among the sources of the Amazon; and their name for the resin—actually for the tree, rather than the resin—was the one most generally used in the Amazon region. Cauotchouc (in Spanish caucho) means ‘weeping wood’—‘caa’, wood, ‘o-chu’, to weep.

During the long time the scientists spent in Quito province, La Condamine came to realize that caoutchouc was used for many purposes other than making bottles. Cloth was varnished with it to make entirely waterproof cloaks with hoods, and they were not in the least heavy to wear. He himself had a large piece of canvas coated with it and erected as a covering for his measuring instruments, which could then be left set up on their stands, sheltered from rain and snow. He also heard how at the Maínas missions—missionaries were the only Spaniards to be found in that remote region—they made waterproof boots of caoutchouc, which after they were smoked looked just like leather.

All went fairly smoothly for the scientists until, nearing the completion of their task, two stone pyramids were erected to fix in perpetuity the terminal points which were the fundamental base of all their measurements, La Condamine being in charge of these works. Each pyramid naturally bore an inscription, stating what it was and the circumstances in which it had been erected.

The inscriptions were denounced by two Spanish lieutenants of marine as injurious to His Spanish Catholic Majesty and the Spanish nation; passions were inflamed, there was uproar in the Quito parliament, and a minor riot ensued. Worse still, a legal suit was brought against La Condamine in person, and the case went on for two years. He won in the end, over the opposition of the parliament, but by this time it was 1742 and the final proof of the measurements had not yet been made.

This involved taking the angle of the same star from two different points at the same moment, and at this juncture the heavens opened. It rained for six and seven hours a day for weeks on end, while Bouguer and La Condamine waited at their respective and far-separated positions. Six months passed before, at the end of March 1743, there was a clear night sky, the star was visible to perfection, and the arc of the meridian was finally measured.