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The Exploitation of Natural Rubber

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Introduction

There can be no one living in this modern world who is not familiar with rubber and its properties. But perhaps it is that very familiarity which has bred, if not contempt, at least an unthinking acceptance of the material and its position in society today. This natural material has been used for two thousand years that we know of. It may, even today, be used “raw” for crepe soles of high quality shoes, or mixed with chemicals in the latex state, prior to having formers dipped into it to produce such articles as baby bottle teats, condoms or surgeons’ gloves. The mixed (or compounded) latex may also be treated to produce latex thread suitable for the finest underwear whilst, at the other extreme, the dried rubber can be mixed with more chemicals, often including carbon black, to manufacture the strongest of engineering products such as base isolation units for buildings in earthquake zones, conveyer belts and, accounting for by far the greatest area of usage of elastomers, aircraft and car tires. If you doubt the remarkable properties of this material, remember the faith you put in those few square inches of tire which are all that holds you and your car to the road.

The history of the evolution of natural rubber, or NR as it is usually known, from a plaything over two thousand years ago to the founding member of one of the most important classes of materials today is a fascinating story. It is also a story confused in some important details, complex, and containing elements of greed and mayhem where, even today, the truth is sometimes obscure.

It is not the intention of this paper to discuss technological developments and innovations, except to indicate where they affect the demand for rubber, but even with these restrictions this historical summary must be heavily abridged.

The Very Early Days

One fact on which there is no disagreement is that the oldest rubber known was found in 1924, in Germany, fossilized in lignite deposits some 60 million years old. Apart from this, there seems to be only one other reference to natural rubber appearing in the “Old World” and this refers to the Ethiopians making play-balls and other rubber objects which then spread to ancient Egypt. Heroditus attributed their origins to the Lydians. With these exceptions, the early history of rubber is solely a story of the “New World”, centered round the equatorial regions of South America and Mexico.

The earliest records which refer to natural rubber in the Americas are Aztec picture writings dating from the 6th Century AD which show that rubber was used as a material for paying tributes and was also associated with devil worship. However, since the great civilizations of the Americas are now known to extend back many thousands of years, it is probable that rubber was in use well before that time. In the Mayan city of Chichén Itzá a great “wishing well” has been excavated which was found to contain many sacrificial items (including human remains), rubber figurines and torches with rubber cores which were burnt to generate thick black smoke, possibly to suggest rain clouds – homeopathic witchcraft!

There is no doubt that sport was a fundamental part of the pre-Columbian Americans and it seems that one game which spread through the whole region was an early version of handball or basketball, the idea being to hit a rubber ball through a hole set high in the stone wall of the T-shaped court with almost any part of the anatomy. Goals would appear to be the exception rather than the rule since the person who scored one was entitled to all the spectators' capes – although history does not relate how he collected them and what he then did with them subsequently! The same game was played in Mexico (tlachtli), by the Mayans (pok-ta-pok), by the natives of the Greater Antilles (Batey) and, in all, as far south as Paraguay and north into what is now Arizona.

Although the ball game appears to have covered a vast area, the same is not true for the artifacts manufactured by the natives of the Amazon or Peruvian regions, which did not spread in the same way, possibly because they had much more practical and/or religious values. One example is the use of rubber for the manufacture of shoes. The Amazonian native was concerned with protecting his feet and did this by a straight over-dipping process, with his feet as the mold, to produce a perfectly fitting pair of galoshes. In the more civilized (?) courts of Mexico the shoes were made in such a way that it was impossible to walk on them without tottering and falling over. They were used to shoe the dwarfs and hunchbacks who provided light relief for their lords and masters.

By the time that the white man arrived, the natives over a vast region of equatorial America had developed processes for manufacturing articles from rubber which were at the forefront of technological innovation and which it took the “developed world” a further 300 years or more to improve upon. The basis of many of these processes involved a controlled combination of drying and sterilizing the latex products by smoking them over fires fuelled with certain nuts.

The White Man Arrives

The pre-history of rubber took many years to deduce and resulted from archaeological excavations carried out right through to modern times. The earliest “western” references to rubber inevitably involve Christopher Columbus, but the honor for the first certain reference to rubber in print belongs to Pietro Martire d'Anghiera who talked of “*gummi optima*” and described how it was obtained as a white juice from certain trees which dried to a transparent material whose properties were improved by fumigation.

For a few years the literature flowed; in 1535 Captain Gonzalo Fernandez de Oviedo gave a detailed description of the ball games played in the Greater Antilles whilst Antonio de Herrera Tordesillas described how Cortez had watched such a game at the court of Montezuma. In 1615 Torquemada described the first applications other than play-balls. He reported how his soldiers were taught by natives to waterproof their clothing by dipping it in the milky juice from the rubber tree and he also described the making of footwear, bottles and a variety of hollow goods by the process of dipping over clay formers then breaking out the latter. The medicinal properties of oil distilled from rubber were documented, including its efficacy in stopping hemorrhages when taken internally. His description of the relationship between rubber and devil worship and other barbaric rites tied in closely with the Aztec picture writings mentioned earlier and he also included the first observations relating to the collection of the milky fluid. The (correct type of) tree had its trunk incised with an axe and from this the fluid flowed. It was usually collected in special vessels but, if none was available, the natives would cover their skin with it and, when it had dried, peel it off in sheets. Perhaps this is why the natives had relatively hairless bodies!

Neither the reports nor the rubber products which came out of the Americas stimulated more than a passing interest in Spain or Portugal. The latter were just regarded as curiosities and there was no appreciation of the commercial landslide which was shortly to come.

The French Connection

From 1615 to 1736 there appears a virtual literary void but from the latter date the start of the western rubber industry can be dated and this was due to the activities of two Frenchmen, Charles de la Condamine and Francois Fresneau. De la Condamine was an exceptional gentleman of the 18th Century. Born at the turn of the 17th and 18th Centuries, he was a soldier, social climber, dilettante and poet but he was also a friend of Voltaire's and had interests in chemistry, astronomy and botany. When the Paris Academy of Science organized two expeditions to determine the exact shape of the Earth, he seemed a reasonable choice to lead one which was sent to Ecuador (or Esmeraldas).

Soon after his arrival in Quito, in 1736, he sent a package of rubber to the Academy with a long memoir describing many aspects of its origins and production. These included the words "**Hévé**" as the name of the tree from which the milk or "**latex**" flowed and the name given to the material by the Maninas Indians: "**cahuchu**" or "**caoutchouc**". He also described the smoking procedure by which the natives made the rubber stable and the wide range of goods which were produced, including the following: "*They (the natives on the banks of the Amazon) make bottles of it in the shape of a pear, to the neck of which they attach a fluted piece of wood. By pressing them, the liquid they contain is made to flow out through the flutes and, by this means, they become real syringes.*" From this Portuguese called the tree "**pao de Xiringa**" (syringe wood) and the rubber tappers or harvesters "**Seringueiros**". De la Condamine described the tree from which the Amazonian rubber came as Seringa trees and confused them with the Castilla. It was Dr. Willdenow, of the Berlin Botanical Gardens, who distinguished between them in 1811.

What's In A Name?

So far I have only used the word "**rubber**" to describe this peculiar elastic material but now there is a need to consider what these new words mean and what complications can occur from their use. The present name for the tree which is universally accepted as producing the best rubber is "**Hevea Brasiliensis**" and this is the source of all modern plantation rubber. It was not, however, the tree which produced much of the rubber spoken of in pre-Columbian times – this was almost certainly the "**Castilloa elastica**" which is found north of the Amazon whilst the Hevea Brasiliensis is almost completely restricted to an area between the Equator and 15° south (the Amazon basin and the eastern half of Peru). "**Hevea Brasiliensis**" was originally called "**Hevea Guyahensis**" by Fuset-Aublet in 1775, became "**Siphonia Elastica**" in 1807 (Persoon) and finally, "**Hevea Brasiliensis**" some 60 years later.

"**Latex**", the word used by de la Condamine to describe the juice of the tree was derived from the Spanish word for milk and remains in use to this day.

The name I have used throughout this paper for the dried material – "**rubber**" – is the English word coined in 1770 by Joseph Priestly (the discoverer of oxygen) when he found some in a shop of

artists' materials, being sold to erase pencil marks by rubbing them out. A similar observation was made to the French Academy two years later by Magalhaens who reported that it was "better than breadcrumbs". The full name Priestly initially used was "*indiarubber*" to reflect the perceived source of the material but this soon became shortened.

De la Condamine's word "*caoutchouc*" is generally taken to be based on the Indian "*caa ochu*" – "the tree that weeps" but Lobo, writing in 1653, associates the Spanish word "*coucho*" with a word in the Kechua language which relates to magic and devil worship. It has also been related to a native word for blood, and this could complete the circle to the weeping (bleeding) tree. Bearing in mind the early history of rubber these seem to be the likely origins of the current German and French words, *kautschuk* and *caoutchouc*.

The use by the Portuguese of words derived from the native syringe was extensive. Not only are the labourers called "*seringueiros*" but the village which is the centre of his daily toil is called a "*seringal*". The emphasis on one particular instrument which the Indians manufactured is possibly due to the uses to which the syringes were put. De la Condamine said that at any banquet or meal with the Omuguan natives it would be impolite not to offer each guest a syringe filled with hot water to be used before sitting at table. He does not go into details but the sentence is part of a section on medical practices. Fordyce Jones swallows his scruples and mentions enema syringes as being produced by the Amazonian Indians and at least one author has queried as to whether coming into contact with these practices might have been the origin of "The Great American Sense of Humour".

One final observation about the confusion of words: the reader of older books about rubber production in Amazonia will see rubber described as "*fine Pará*" or the like. He should realize that this is named after the port of Pará, close to the mouth of the Amazon river. However, the whole state, a substantial part of Brazil, is also called Pará and the town itself is also known as Belém.

The French Connection II

It was the connection between de la Condamine and Francois Fresneau which gave birth to the rubber industry of today. It took de la Condamine seven years to carry out his work relating to the measurement of the earth's size and shape and during that time he heard tell of an earlier explorer, Francisco de Orellana, who had traversed South America from Quito to Pará and arrived at the eastern seaboard with tales of his adventures and battles against a tribe of female warriors – the Amazons from which the river's name comes. De la Condamine, always a ladies' man, decided to follow this route and, although he did not find the ladies, he did make use of his trained scientific mind to observe and report on both rubber and the cinchona tree, another white man's miracle tree which was later "transplanted" to the east as the source of quinine.

Before returning to France, de la Condamine met Francois Fresneau who, himself, was a trained engineer and amateur botanist and the two became firm friends. Fresneau became infected with de la Condamine's enthusiasm for rubber and was the first western person to consider it as a potential industrial material. Whilst de la Condamine returned to France to pick up his social life and write six books about his experiences in the Amazon, Fresneau remained in Guiana until 1749, detailing all aspects of rubber production, treatment and usage and forwarding reports to his friend for publication. These can truly be called the first scientific papers on rubber.

Fresneau deserves one further mention. On returning to France in 1749 he continued to devote his life to research into rubber and, according to his biographer and descendant, the Comte de Chasseloup Laubat, he eventually concluded that turpentine was the ideal solvent from which to prepare rubber solutions which could be used to emulate latex in the manufacture of articles in the west, the latex itself being too unstable to ship to Europe. Although he reported this to Minister Bertin, it seems possible that the information was “leaked” as, soon after, two French scientists, Herrissant and Macquer announced the same “discovery”.

Rubber had become an industrial material and Fresneau, the father of the rubber industry.

The Industrial Innovative Years

There is no place in this discussion for the industrial developments related to natural rubber which took place during the 19th Century, since this is the history of the raw material and just the stories of Hancock or Goodyear would easily fill this space twice over. They must, however, be mentioned to put in context the rapid growth in demand for the raw material.

For fifty years after the works of Fresneau, progress was slow but then, between 1820 and 1839, there was a tremendous growth of interest as, in the UK, Hancock invented his machine to convert lumps of solid rubber into usable homogenous gum, a process he called “pickling” to confuse his competitors. Macintosh developed his three layer waterproof fabric and, in North America, Chaffee invented his mill and calender, the designs of which are basically the same as those in use today. He also founded the first American rubber company. In the year of 1839 Goodyear discovered, by accident, that heating a mix of rubber, white lead and sulphur resulted in a highly elastic material which was rubber “cured” of its problems. It no longer went brittle in the cold and soft in the heat – nor did it seem to putrefy so easily. Thus the process of heating rubber with sulphur became known as the “curing” process. In the UK, Hancock got hold of some of Goodyear’s cured rubber and, identifying sulphur as the “magic” ingredient, developed a curing process which he patented ten weeks before Goodyear. The name “vulcanization” was coined by a friend of Hancock’s – a Mr. Brockedon – and fell into popular use. Whatever the pros and cons of the Goodyear -vs- Hancock argument, and the argument over who discovered sulphur vulcanization did range for many years, the British word “vulcanization” is probably more manageable than Goodyear’s “Metallic gum-elastic”!

In 1857 Thomas Hancock published his classic guide to the UK rubber industry and his illustrations gave some idea of the breadth of uses to which rubber was being put. Not many are missing from a list of today since they include air-proof products, hoses and tires, nautical, domestic and travel equipment as well as a range of seals and washers.

The Days That Changed The World

If there was ever a short period of time when it can be said that the Gods conspired in the development of today’s lifestyle, then the period 1786 – 1878 must be the one against which all others are judged. During this time five completely separate events in four continents occurred:

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- 1876 Otto invented the 4 stroke internal combustion engine
- 1878 Clark invented the 2 stroke engine
- 1876 – 1877 Hevea seeds/plants “migrated” from America to Asia
- 1878 There was a severe drought in the Ceara region of South America, just to the east of Pará
- 1877 HM Stanley (of “*Dr. Livingstone I presume*” fame) completed the east-west crossing of Africa, from Zanzibar to the mouth of the Congo

The significance of the first is obvious, leading to the motor car and pneumatic tires. The demand for rubber skyrocketed. The other three events played their part in satisfying that demand.

The Seed Migration To Asia

As early as 1791 the seed of transplanting the American rubber tree to more convenient (and politically more acceptable) locations was planted by James Anderson. The idea was nurtured by Hancock who offered Sir William Hooker, director of the Royal Botanical Gardens at Kew, his support if he cared to try it but it was only in the 1870's that Hooker's son, Sir Joseph Dalton Hooker, brought the concept to maturity. Around 1870 Sir Clements Markham was feeling very pleased with his new knighthood, bestowed on him by Queen Victoria for having “re-located” the cinchona (quinine) tree to India, and was looking for new ideas. The idea of repeating the process with the Hevea (rubber) tree seemed appealing. At this time he was working in the India Office and, through his contacts with the Cabinet, the consul in Pará was asked to obtain some Hevea seeds. Although it has been reported that Brazil was averse to having the seeds exported, there seems no evidence of this – indeed there is one story that the restrictions were on the urucuri nuts used to smoke the drying latex as it was this which had the special powers to give the best and strongest rubber. In 1873 the first (2000) seeds came to England but only 12 germinated and these died either at Kew or in India. Hooker then suggested that a planter he knew in Santarem, a town some 500 miles up the Amazon from the near-coastal port of Pará, be commissioned to collect some seeds. Thus Henry Wickham arrived on the scene, to be rescued just in time by Hooker from the poverty he was subsiding into due to the failure of his plantation.

The story of how Henry Wickham brought those famous Hevea seeds out of South America to Kew Gardens and thence to Ceylon (Sri Lanka) and on to Malay(si)a has been told many times – mostly by Wickham himself with more and more added refinements until his death in 1928. It was only in the final versions that “*the seeds had been loaded aboard the Amazonas under the nose of a gunboat which would have blown us out of the water if the commander had suspected what we were doing*” but even the earlier versions seem to owe more to poetic license than fact if one judges by his wife's diaries and other contemporaneous reports. Because of the importance of this “seed snatch” to the world today it is worth dwelling on it a little. The tale can best be told in two columns, the “accepted” Wickham version in the left and comments to the right.

The **Amazonas** was making the inaugural voyage of a new Liverpool-Amazon line, with Captain Murray at the helm. Two officers disembarked with the cargo which they sold and vanished with the proceeds. The Captain was left with no funds to purchase a return cargo. Wickham chartered the ship on behalf of the Government of India and fixed a date for it to arrive at Santarem. On March 6, 1876, he wrote to Hooker saying that he was collecting the seeds and packing them in openwork baskets interlayered with banana leaves.

He says that he was working against time to collect them as, although they would fall *“for another month or so it would be inexpedient to risk the vitality of some thousands I had succeeded in securing”*.

The **Amazonas** arrived and the baskets were loaded into “the roomy empty forehold” as also were Wickham and his family, although presumably into more spacious quarters.

The tension built as the ship journeyed to Pará since any delay would have ruined the seeds and the ship would have to stop for clearance. If the authorities guessed what was on board the cargo would be confiscated or, at best, held up for some period of time.

Wickham and a friend, the local Consul (Green) went to the chief of customs, only identified as Baron de S- - -, where they bluffed their way through, claiming that the ship was laden with *“exceedingly delicate botanical specimens specially designated for delivery to Her Britannic Majesty’s own royal gardens at Kew”*. The ship continued to Le Havre where Wickham disembarked and rushed to Kew to arrange for a train to meet the **Amazonas** when she docked in Liverpool.

The **SS Amazonas** (built 1874) did belong to the Liverpool and Amazon Royal Mail Steam Ship Co. but the inaugural voyage was in 1875. Her captain was J. L. Beesley.

There were regular ships sailing from Santarem to England and even more regular ones from Santarem to Pará and from Pará to England, the last on a weekly basis.

There is no India Office record of the charter - neither bills nor payments although they do record payment for the seeds (740 pounds indicating a claim for 74,000 seeds).

The source of the seeds is confused. Wickham claims to have used natives to collect them just south of Santarem, but his wife’s diaries indicate that he had one Indian boy and bought all he could get. In essence, they had no provenance.

There was no justification for the belief that there could be problems at Pará. One report claims that he succeeded *“thanks to assistance from the Brazilian Government”* but it has also been suggested that this could be subsequent face-saving.

Consul Green’s files show no record of this meeting and the chief of Customs in Pará at that time was a Mr. Ulrich. The only Baron de S- - - in the area was in Wickham’s “home town” - the Baron de Santarem.

If the ship had no other cargo why did it sail to the usual first port of call in Europe - Le Havre - rather than straight to Liverpool? There is an unsupported reference to the cargo being 141 cases of rubber which were shipped at Manaus, 500 miles further upstream than Santarem (and the ship’s original destination) but with no mention of the seeds. They certainly were on the ship so did some of the cases hide the split cane baskets?

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It has been suggested that, whatever the truth about the earlier part of the story, it seems possible that Wickham persuaded Murray/Beesley to take himself, his seeds and his family to Europe in return for the promise of reimbursement (cash or otherwise) when Kew paid for the seeds.

From this point on Wickham leaves the story. He continued to regard himself as the “fount of all knowledge on rubber” and, whilst the rubber industry in Asia grew and prospered by ignoring his suggestions, he continued to fail in most activities. He did, however, succeed in publicizing the skill and duplicity he professed to have used in shipping the Hevea nuts out of Brazil and, as with so many high-profile failures, he was eventually knighted (1926) and died (1928).

Interestingly, whilst Brazil continues to revile the name of Wickham for carrying out an “exploit hardly defensible in international law”, the country glorifies the names of Francisco Inocencio de Souza Coutinho, who smuggled seeds of many spices from Cayenne to Pará in 1797, and Francisco de Melo Palheta who had been able to charm the wife of the French governor into providing him with seeds of the then forbidden fruit – coffee – in 1727.

If the story of the seed grab seems convoluted, the fate of the seeds is equally complex since, although detailed records were kept by most of those involved, small holes result in gaping gaps today.

There is no doubt that some 70,000 seeds arrived from Brazil as a result of Wickham's exploits and that just 2,397 germinated, not the 7,000 that he claimed. In August 1876, 1,919 of these were sent to Ceylon and 90% survived the journey to Colombo, arriving in September of that year. It was then discovered that no one had arranged for the freight charges to be paid. After furious correspondence without the benefit of the “fax” the matter was finally settled but history does not relate how many survived. It does relate that 100 were also sent to Singapore, again with no arrangement for freight charges to be paid and that these all died.

The importance of tracing these seeds and seedlings is that in 1876 Markham also arranged for Robert Cross, to travel to Brazil and “back up” Wickham by shipping further Hevea stock to England. These were shipped mainly as seedlings and in the Spring of 1887 it was recorded that only 26 had survived. By the end of 1877, Kew had distributed over 3,000 seedlings, much more than their primary stock, so there must have been considerable propagation from cuttings and within this set a further 100 were sent to Ceylon – of which 22 were forwarded to Singapore. The planters noted that these were quite different from other Heveas they had seen and this led Henry Ridley, the Director of the Singapore Botanical Gardens and the man who, more than any other, could claim to have got the Malaysian rubber industry off the ground, to suggest that these were “Cross” plants and that *“it was from these 22 plants....that three quarters of the cultivated plants of Hevea Brasilensis have sprung”*.

The question remains: Who is the “father of the plantation rubber industry”?

Plantation Rubber

From this point on, the plantations prospered, slowly at first as land was cleared and mature stock suitable for tapping developed but the following table gives some idea of the pattern which

was to follow. As demand grew in the first decade of the 20th Century, mainly because of the development of the motor car, the wild rubber producers tried every trick to increase production but to no significant avail. In the 1910–20 period the plantations took over and have seen a steady growth to today’s figure of about 5 million tons per year. Although the synthetic rubber industry plays no part in this story, it is worth noting that its current production level is around 10 million tons.

Regional Exports of Natural Rubber (Long Tons)

Source	1900	1910	1920
The Far East	821	11084	304993
The Americas	27784	62861	30486
Africa	15526	20132	6391
Total	44131	94077	341870

1878 The Ceara Drought

As the demand built up for rubber, two opposing factors became important. Demand meant higher prices and more profit, thus more scope for the entrepreneurs, but shortage of labour limited production. Ceara was a region just to the east of the Amazon and, when the drought struck in 1877-8, it became a dust-bowl. This caused a mass migration of the hardy Indian-Portuguese-Negro crossbreeds to the waters of the Amazon. Here they were exploited without mercy by middlemen who advanced them food, clothing and the infamous trade guns on condition that they repaid the debt by collecting rubber. Inevitably the advances were at inflated costs and the rubber was bought at miserly rates. The middlemen prospered and the workers died by their thousands.

The stories of the “rubber towns” and the money that poured into them are stories of consumer opulence on a scale unheard of even in the gold-rush country not all that far north. On the Amazon the boom towns were Pará, Manaus and, to a lesser extent, Santarem. The story of Manaus is typical: at the turn of the century it was a small settlement but, as the rubber boom came, it grew into a city of 75,000 residents with \$40 million of foreign funding to build the complex quay and wharves needed to cope with the tides, and an annual income from rubber export taxes that reached \$8 million. Living costs were more than five times that of New York and it was more luxurious per resident than Paris. Prestigious (and ostentatious) buildings were thrown up everywhere but it was far from a tropical paradise. A gilded Opera House was built and a company of Italian opera singers recruited. Within days of their arrival half the vocalists had died of yellow fever and the rest returned to Italy. A pleasure city it certainly was, but cultural, not.

But what of the natives who tapped the trees and produced the rubber? Their story is different and rarely documented, particularly along the Amazon, but perhaps the most complete story of their exploitation is to be found in the "Putumayo" affair, so named after its geographical location in Colombia where it occupies an area about the size of Belgium. The absolute ruler of this area was one Julio Cesar Arana who preferred to operate through a British company because this was where his rubber was sold and the British banks were very happy to advance him funds to help him develop his lifestyle.

For over a decade at the beginning of the century he stripped what rubber he could from the Putumayo (not, of course, with his own hands) and manipulated his financial dealings with the skill of a true city expert although he had started his working life as a hat salesman. Although rumours of his working practices had been rife for a number of years, the true facts only came to light when the atrocities came before the British Parliament in 1912. Here, Arana admitted most of the crimes committed in his name as a starting point in attempting to prove that they were carried out without his knowledge! They are too numerous to even start listing here but they can be deduced from the fact that the contribution of Putumayo to the world's demand for rubber between 1900 and 1910 was some 4,000 tons, worth 7 million pounds on the UK market at that time **and the lives of an estimated 20,000 Indians**. Arana survived (the British courts had no jurisdiction over him) and he continued to do very well for himself in Colombia even after the wild rubber bubble had burst.

If one takes a reasonable estimate of the rubber to come out of the Americas over the first decade of the century as something under half a million tons and assume that Arana's regime was only twice as savage as the average, the South American contribution to the industrialization of the "developed world" over this period was, in addition to the rubber, some 1 million lives.

1877 HM Stanley And The Africa Crossing

The story of natural rubber is not only that of *Hevea Brasiliensis* although, in the industrialized world, most other sources were of only passing importance. By far the most important of these was the Congo vine.

Before Stanley's epic three-year journey from Zanzibar to the mouth of the Congo, the centre of Africa was a blank on any map. However, the fact that he had made the journey, and the stories he had to tell, opened up the possibility of commercial exploitation of the Congo basin. Stanley first tried to interest the British but they were too concerned with Egypt to take on another African excursion so he turned to The King of the Belgians, Leopold II.

Leopold had already, in 1876, organized an international African conference out of which came the *Association Internationale Africaine* with himself as its president. This was quickly reorganized into the International Association of the Congo, a device which would enable him to strip the Congo bare of whatever was there and one thing known to be there was rubber; in the form of a latex-producing vine. It was explained to the natives that the Europeans wanted it and would pay for it, an opportunity the natives could hardly believe to make money, but it was not long before the proverb "*botofi bo le iwa*" (rubber is death) came into being. In 1887, 30 tons came down the Congo and in the next year 130 tons. To really open up the river, steamboats were transported

above the lower falls, which had effectively blocked previous access to the interior, and one was captained by a Polish sea captain, Teodor Korzeniowski. Some years later, as Joseph Conrad, he wrote of his experiences in “**Heart of Darkness**” and “**An Outpost of Progress**”.

By 1885 Leopold held absolute sway over some 1 million square miles of Africa, compared with the 12,000 finally held by Arana. Otherwise the stories run parallel and on a pro rata scale. In the late 1880’s various estimates of the population of the Congo ranged between 20-30 million. In 1911 the official figure was about 8.5 million; well over 10 million had suffered the same fate as had Arana’s tappers. Between 1898 and 1908 some 50,000 tons of rubber came out of the Congo with a market value of \$80 million, 80% of the total value of goods and materials exported from that region. How much went to him personally will never be untangled but, of his three basic units of enterprise, the “Domaine Privé (or National)”, an assortment of companies and the **very** private estate of some 100,000 square miles, he never held less than 50% of the total ownership in his own hands and in some cases it reached 100%.

The statistics of money and atrocities ran hand in hand until Leopold’s death in 1909. After that many more years were spent unravelling his financial manipulations and, eventually, in spite of a decade of spending as many tens of millions as he could possibly manage, he left an “official” \$3 million, which quickly grew to \$16 million as various secret investments and companies came to light. How much was never found will remain a mystery.

What Arana achieved, starting as a hat salesman, Leopold magnified to a royal art form.

The four events of the late 1870’s came together and set the world on its way by providing mass transport and all that goes with it. Without the wild rubber of America and Africa the world of 1914 would have been a very different place. By 1914 the world’s output of plantation rubber had equaled that of wild rubber and by 1918, plantation rubber was the only way forward. The story of wild rubber was essentially over.

Perhaps a final thought: two thirds of today’s rubber is used in tires; the story of rubber started with the great technical achievements of the tropical American Indians, who never invented the wheel!