



## Symbolism, solitude and modernity: science and scientists in porfirian Mexico

*Simbolismo, solidão e  
modernidade: ciência e  
cientistas no México  
porfiriano*

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### Abstract

The quest of Mexico for a distinctive national identity throughout the 19<sup>th</sup> century reached a climax during the period known as the *Porfiriato*, one of the principal features of which was the deep desire of Porfirio Díaz and his circle to turn Mexico into a 'modern' country perhaps without a clear definition of the meaning of this concept. The debate about national identity had addressed such issues as the rejection of indigenous cultures, blind passion for French culture, and how to go about creating a modern nation by means of industrialization and scientific modernization. The concept of nation in Mexico is definitively linked with the search for a national 'I', and with the struggle to overcome the solitude identified by Octavio Paz. Paradoxically, this very quest forms a part of this identity, and it seems to remain inconclusive.

Keywords: History of science; Latin American history; Mexican history; Mexican science.

### Resumo

*Ao longo do século XIX, a tentativa de construir uma identidade nacional para o México atingiu seu ápice no período conhecido como Porfiriato, que teve como uma das principais características o desejo profundo de Porfirio Díaz e seu grupo de transformar o país em uma nação moderna, sem ter uma definição clara do significado desse conceito. O debate sobre identidade nacional tinha enfrentado questões como a negação de culturas indígenas; a paixão cega pela cultura francesa e todo um savoir faire diante do esforço de se criar uma nação moderna através da industrialização e da modernização científica. O conceito de nação, no México, é estreitamente vinculado à busca pelo 'eu' nacional e à luta para ultrapassar a solidão descrita por Octávio Paz. Paradoxalmente, esta busca forma uma parte dessa identidade, e parece inconclusa.*

*Palavras-chave: história das ciências; história americana; história mexicana; ciência mexicana.*

The collapse of the Spanish monarchy in 1808, in the face of the Napoleonic invasion of the Iberian peninsula, plunged its American possessions into a profound crisis, which by the early-1820s had brought independence from Spain to all of Spanish America except for the islands of Cuba and Puerto Rico (which remained nominally Spanish until 1898, when the United States went to war with Spain to help Cuban rebels secure a highly-dubious independence, and to secure Puerto Rico for itself). The richest and most populous of the new nations that emerged in the early-nineteenth century, Mexico, which secured independence in 1821 largely because of the collapse of imperial authority rather than the strength of nationalism, was immediately confronted, like the other new countries that had suddenly emerged in the region, with the need to construct a national identity for the diverse territories that had been known in the colonial period as the viceroyalty of New Spain. The magnitude of the task was immediately demonstrated by the secession, in the aftermath of the collapse in 1824 of the short-lived experiment in monarchy established by Agustín de Iturbide (who ruled as Emperor Agustín I) of the Central American territories, which, after a brief and unsuccessful period of federation would themselves separate into five countries in 1840 (Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua).

In the meantime, Mexico had lost in 1836 the North-eastern province of Texas, as the consequence of the failure of its army, commanded in person by president Antonio López de Santa Anna, to defeat a revolt of the thousands of immigrants from the United States who had been allowed to settle there in the 1820s because of the desire of successive Mexican governments to whiten the population of the borderlands that were largely beyond the control of the authorities in Mexico City. In the short-term, 1836-1845, Texas was nominally an independent republic, but it was widely recognized – in Texas itself as in Washington and Mexico City – that it was only a matter of time before it would join the increasingly threatening and expansionist United States, where the election in 1844 to the presidency of James Polk on an annexationist platform made it abundantly clear that his broader aim was to acquire Mexican California, by purchase if possible (he sent an envoy to Mexico City in 1845 with instructions to offer the impoverished government there up to twenty million dollars for the territory) but by making war on Mexico if, as was the case, his offer were rejected. In the ensuing war of 1846-1848, provoked by US aggression on the border between Texas and Mexico and by a naive Mexican belief in the capacity of its army to resist an invasion from the United States, Mexico lost not only California but also New Mexico and Arizona, thereby concluding the process whereby its expansionist northern neighbor deprived it of half the national territory inherited from Spain in 1821. In the same period the task of trying to construct a national identity was further complicated by the persistent fear of attempted re-conquest by Spain, and repeated interference in the country's internal affairs by France and Britain, which would culminate in a large-scale invasion in 1861-1862 (initially supported by Spain and Britain) which turned into an alliance with conservative groups in 1863 to re-establish monarchy in the person of an imported European prince, Maximilian von Hapsburg. Following the withdrawal of French forces in 1867, in the face of unexpectedly fierce liberal resistance to their presence, led by Benito Juárez, Maximilian was executed and Juárez's forces were led

into Mexico City by General Porfirio Díaz, who in due course (following the presidencies of Juárez, 1867-1872, and Sebastián Lerdo de Tejada, 1872-1876) would himself be elected president in 1876. Although he stood down, as the constitution required, at the end of his term of four years – in favor of his nominee and *compadre* Manuel González – Díaz was again elected president in 1884 and, having lost his antipathy to reelection, again in 1888 (following which the term was extended to six years), 1892, 1898, 1904 and 1910. He hung on to power for a few months following the outbreak in 1910 of *guerrilla* warfare – which came to be known as the Mexican Revolution – but was forced to resign in May 1911 and go into exile in France, a country he had never visited but had constantly admired from afar, where he died four years later.

Although the official historiography of post-Revolutionary Mexico continued, with a few honorable exceptions, throughout the greater part of the twentieth century to project an image of Díaz as a repressive dictator, it has become clearer recently that the *Porfiriato* would not have lasted as long as it did if repression alone had underpinned it. Clearly, Díaz was a skilled manipulator, who encouraged rivalries between elite factions while also making from rich, as he succeeded in attracting investment and diplomatic recognition from not only the United States but also France and other European powers, whose capital was particularly desirable in the quest to reduce reliance upon the neighbor to the north. By 1900 he was well on the way to turning Mexico into a ‘modern’ country, at least superficially, but had he and his circle succeeded in the quest, articulated since the 1850s by the liberals who sought to rebuild the ravaged country, to provide Mexico with a genuine national identity? This paper seeks to address this and related questions in the hope of providing at least a partial answer.

Colonial Mexico had been constructed from a complex blend of cultural and ideological components, which included, of course, the imposition of the structures of government and administration of the conquerors and the submission and exploitation of the indigenous (‘Indian’) populations whom they encountered there. Therefore, any discussion of the concept of nation is extremely complicated, since it involves many viewpoints and interpretations. However, for the purposes of this paper it is necessary to state only that in the past the prevalent interpretation of the process of the construction of nationalities in Latin America was that based upon the conceptual framework of the underdevelopment of the economic process rather than cultural and ideological factors. This paper explores the concept of nation and its relationship to science prevalent in the late-nineteenth and early-twentieth centuries amongst the educated Mexican elite, personified by Díaz during his 31 years as president following a long period of instability and struggles for power that had plunged the country into a prolonged civil war, and the subsequent attempts of Juárez and his liberal ministers to begin the painful process of national reconstruction. The continuing debate about the extent to which Porfirian ideas represented a continuation of the process initiated by Juárez or a more sophisticated attempt to secure a new consensus capable of uniting liberals and conservatives need not detain us unduly, but it is important to stress at this juncture that the quest for modernization with which Díaz had his circle become closely identified was designed in part to heal the deep political divisions that had prostrated Mexico during the first half-century of its post-colonial existence.

Mexican society has always been interested in scientific advances achieved in Europe, and historically Europeans have not been slow to exploit this characteristic as a powerful tool for the expansion of their cultural domination over not only Mexico but also Latin America generally, as well as other regions of the world. However the mechanisms through which scientific knowledge is transmitted from one culture to another have not been analyzed in depth by the scholarly community. Perhaps one reason for this neglect is that the study of cultural exchanges inevitably requires a deep knowledge of all the cultures involved in the process and, as appropriate, sometimes a suitable comprehension of two or more languages. In the case of Latin America the landscape becomes even more complicated, because of the region's social and racial complexity, which is reflected in the fact that there are as many ways of understanding the world as cultural groups that exist. In spite of this multiculturalism, one of the links which give cohesion to Latin American cultures is the continuous searching for an identity. This quest involves the continuous imitation of the other – until the end of the nineteenth century Europe, increasingly in the twentieth the United States – and the measurement of the success, individual or collective, of the process, using as a parameter the similarities to the 'other', that other which represents the unattainable ideal.

This paper also explores the specific way in which Mexico received and embodied modern science into its national culture, emphasizing features such as the partial or total scientific ignorance of Porfirian politicians when they talked and wrote about science, and sought to reinforce their political arguments by making science synonymous with truth and enlightenment. The ability or otherwise of different socio-racial groups to understand science was also used as a weapon in the armory employed to exclude Mexico's Indian population from proper participation in the determination of the country's future. The racial and intellectual superiority of Europeans was firmly established upon the basis of natural selection, which, despite deep struggles and controversies, the American population – or at least those of them permitted to participate in the process – implicitly accepted, and, indeed, continuously attempted to imitate (Kohn, 2004, p.9-15).

It has been suggested that the way in which scientific knowledge was incorporated into Mexican culture resulted in a mutual modification. Thus, scientific knowledge did not remain unchanged, because the comprehension of ideas and the interpretation of the very concept of science within the Mexican vision of the world created some particularities that differentiated the process there from what occurred in other parts of the world. This notion does not reflect an attempt to adopt a defensive position, by stressing the general acceptance of the importance of the contributions made by indigenous medicine to medical knowledge. It is more important in this paper to discuss the differing ways in which Porfirian politicians understood and used science. It is clear, for example, that for Francisco Bulnes (the influential essayist and engineer whose writings articulated *científica* ideology) or Matias Romero (a former *juarista* who, following Diaz's re-election in 1884, was appointed Mexican Minister to Washington, with a brief to seek investment capital) the idea of science had little or nothing to do with what Europeans actually understood as science. When they referred to science they did so with absolute respect and it seems that they were talking of something intangible, which had been destined to

remain the preserve of those with superior intelligence. However, in the ever-contradictory Mexican understanding of foreign ideas, it is also possible to identify a hint of irony when they discussed science or related matters.

### **Porfirian science and the identity of the 'self'**

Searching for identity involved, therefore, defining the identity of the 'self' in terms of the 'otherness' of the other, that who is not me; the otherness which submerges Mexican-ness *mexicanidad* in a sea of solitude, that solitude brilliantly scrutinized by Octavio Paz through the analysis of the inferiority complex of the Mexican people whose identity apparently is reflected in the search for the self itself (Paz, 1999). In the Porfirian period, perhaps, the country managed to construct and consolidate some symbols of *patria*. Díaz re-wrote and established some other symbols of Mexican identity. The pompous celebration of the centenary of independence in 1910, which became one of the more important representation of the nation, is a good example, even though the official celebration now commemorates a date and a year that are historically inaccurate with respect to the actual securing of independence eleven years after the abortive revolution declared on 16 September 1810 by Miguel Hidalgo y Costilla. These symbols continue to represent an exacerbated nationalism, reflecting the need for the construction of the self resulting from the misfortune of not being the other. But this perception of the superiority of the other was not a creation of the *Porfiriato*. Rather, it permeated Mexico's history from the moment of the so-called discovery of America and the subsequent conquest of large parts of the continent by the Spanish and Portuguese crowns. One can discover the other in oneself, realizing that we are not a homogeneous substance, radically foreign to everything which is not oneself; one is the other. As Tzvetan Todorov reveals, the discovery of the other continents and peoples by Europeans did not incorporate a sense of radical surprise, because Europeans had never been completely unaware of the existence of Africa, India and China. This explains the fact that the Europeans reflected themselves in the exploration of that 'new people' recently 'discovered' in the XVI century. At this historical juncture, Todorov continues, Europeans discovered the totality of which they are a part; previously they were a part without totality (Todorov, 2003, p.13-58). So, it is not difficult to understand that this confusion of identities and otherness also concerned the American indigenous peoples and later the creole and mestizo population of Mexico (and to a variable degree other parts of Latin America). Their identity was questioned, making it necessary to construct a new idea of the world and humanity. The route followed by the political and economic events in Mexico could be a consequence of this fact that Latin America was first seen simply as a territory inhabited by some primitive creatures whose humanity was seriously questioned, giving rise to all sorts of fantastic stories about creatures living in the 'new continent' (Fisher, Priego, Oct. 2006, p.528-538). The subsequent polemic about the true nature of the Indian required the participation of such a powerful institution as the Catholic Church. Curiously, however, in this and other controversies, indigenous people were not consulted: they were not permitted to participate in the construction of their own definition and classification in the complicated network of races and identities

throughout the world. But the nature of the recently discovered world was not the only attraction for European intellectual groups. The Catholic concept of the finite nature of the universe, and the accepted idea of the cosmic order were also questioned. It became necessary to search for a new order of the things which simultaneously would allow the exploitation of the new territory and justify its existence, with its inhabitants included. Colonization and *mestizaje* complicated things, because it was also imperative to find a place in the 'human hierarchy' for not just Indians, but also that new, unexpected and growing population of mestizos, which sooner or later would claim its own identity and rights.

It is not difficult to insert into this historical setting the confusion and search for identity of the mestizo and creole elites in Mexico. On the other hand, three centuries of colonization and subjugation to European governments reached its end as a consequence of the European crisis of the Napoleonic era and the result was the independence of the American colonies. As mentioned above, this marked the start of a new step in the construction of a national identity for the countries of Latin America. Mexican identity has been constructed slowly with the different stories of the nation, which have been inserted into the different 'símbolos patrios'; education continues to be seen as the route towards modernity, the symbol of progress and the abandonment of barbarity. But science remains as the symbol of that unreachd modernity exactly because Mexican society is not participating in its development. Science and all that is related to it are part of another culture, which has been imposed from Western Europe upon the rest of the world, as part of the quest for modernity.

### **The *Porfiriato*, science and ideology**

In this context, Díaz and his generation were confronted with the task of seeking a collective identity for the country against a background characterized by the contradictions and rivalries between on the one hand liberals, inspired by French models, and, on the other, conservative groups fortified by their Catholic traditions, inherited from the colonial period (Colom, 2005). Thus, the search for the reconciliation of these two ideologies was carried out alongside the promotion of economic progress and, on the other hand, the exclusion from political life of the sectors marginalized during the colonial period: basically the Indian population.

Although Díaz did not act alone, it is convenient to study him as a representative of that period of Mexican history which is commonly called the *Porfiriato*. Díaz has been identified as either a tyrant or hero, depending upon the viewpoints of different historians or historiographical and political fashion. However, it is impossible to understand the history of Mexico during the late-nineteenth and early-twentieth centuries without constant reference to him (Garner, 2005, p.13-27). As Mauricio Tenorios states, we can find the origins of the majority of the tinsels and honey of our era in the intellectual life of the *Porfiriato* rather than in the cultural tendencies of the twentieth century. Besides – Tenorios continues – the so-called 'Frenchification' of the Porfirian intellectual elite is a subject which deserves a deeper analysis than any yet available, because this depiction lacks meaning without a wider analysis of the Porfirian intellectual and cultural life than any currently available. (Tenorio Trillo, 2006, p.14-21).



One of the most important parts of the discourse of Díaz was the modernity of the nation. The objective of his government was to turn Mexico into a modern country 'like Europe': an imaginary Mexico because the country was far from being a homogeneous society. Its complexity was represented, for example, by its racial and ethnic diversity and the difficulty of integrating all races and ethnic groups into a collective imaginary of the nation (Rojas, 2005, p.1155-1175). Similarly, Europe, too, was not a homogeneous entity, in terms of either economic or scientific growth. In these years, modern science was experiencing a period of consolidation in France, Britain and Germany, reflected in the birth of bacteriology and its enormous influence on medicine. Taking the concept used by Tenorio, it is possible to say that the fact of not being Britain or the United States, has determined our vision of the achievements or failures of the regime (Tenorio Trillo, 2005, p.20).

Even though some progress has been made in studying Mexican attitudes towards science during the Porfirian period, it remains very difficult to know if Díaz had any real understanding of what science meant or of its potential role in the promotion of modernity. Justo Sierra, the famous poet/essayist/historian who collaborated closely with Díaz and served as Minister of Education during a part of this period, declared in the famous discourse that he delivered in 1910 at the ceremony held to celebrate the re-opening of the Autonomous National University in 1910 that "the university can not be educative, in the complete sense of the word; the university is a simple science producer" (Sierra, 1991, p. 448). He referred to the need to 'nationalize', or 'Mexicans' science and scientific knowledge, trying to express the commitment of the Porfirian government to provide Mexico with the modernity and enlightenment (*luces*) which only science, as the highest attainment of mankind and the owner of absolute truth, could contribute to the transformation of the reality of the country. For Sierra, theological truth had been replaced by scientific truth and, mentioning recent inventions, such as electrical energy or Roentgen's X-rays, he created an erudite construction in which there was no place for any doubt about the need for that thing called science. References to telescopes, microscopes, and the telegraph all appeared in Sierra's discourse, delivered precisely at the time of the celebration of the centenary of Mexican independence (although, as noted above, in reality independence had come in 1821 not 1810). However, what was Sierra thinking about when he spoke about science? Probably it will be impossible to answer this question with exactitude but, again, in his discourse there is clear evidence of the idea of the superiority of those people (obviously Europeans) who were able to invent science, and the need to imitate them as the only way to abandon barbarism and achieve modernity. Thus, it is possible to see the way in which the Mexican intellectual elite accepted the superiority of Europe and showed complicity with these ideas in its attempts to be like it. Of course, we are not arguing that Sierra and his positivist colleagues were a group of ignorant or treacherous people; instead, they were just looking for a Mexican identity, for the acceptance of the country as a civilized society, able to embody the highest results of human activity: science. In this way, science became one of the most important flags for the promotion of the group in the power, even though they did not have, in the vast majority of cases, sufficient scientific knowledge to enable them to read and understand the literature arriving in Mexico, written mainly in English, French and German, related to recent scientific discoveries.

In the long term, the promotion of science through political discourses and, more importantly, the provision of courses in the National University, achieved the aforementioned objective of embodying science into Mexican culture. However, the question of determining whether or not science was Mexicanized or nationalized, although of evident interest, is a complex one, which remains beyond the scope of this paper.

Díaz never visited Europe, until his forced resignation and consequent political asylum in France, where, as noted, he died in 1915 (Tello Díaz, 2005). However, he was a very important promoter of the domestication of modern science in Mexico, believing that its introduction and incorporation into Mexican culture would itself a factor of modernity, which would help secure for the country the admiration and recognition of Europe (Priego, 2002). Most Mexican historians are agreed upon this point, although many have not sought to determine what is meant by the concept of nation or the particular correlation of terms such as science, modernity, and being like Europe in Díaz's thinking. However, this is very difficult topic, and historians do not have many sources for undertaking the task of analyzing Díaz's thinking on the matter, not least because his memoirs, eventually published in 1994, deal almost exclusively with details of his military victories, supplemented by quotations from his supporters and comments about his detractors, but saying nothing about science. It is obvious that he was far from being an illiterate or ignorant soldier, for he had graduated from the seminary of Oaxaca at the age of nineteen – but refused to be ordained – and went on to study law before joining the Oaxaca national guard in 1856 during the War of the Reform. Presumably, therefore, he had some intellectual basis that helped him to comprehend the importance of the introduction of science in the country (Díaz, 1994, p. 29-43).

Díaz assumed the task of securing the unity of his country, that is to say seeking the perhaps impossible homogenization of a society with enormous inequalities and cultural diversity. Nevertheless, he was not interested in the social or political participation of Indians. The debate about their racial inferiority, although inconclusive, was very influential in shaping the attitudes of Díaz and his close collaborators. This is very clear in, for example, what Francisco Bulnes wrote about education, for he insisted that when people of the lower class (overwhelmingly Indian, at least in part, in nineteenth-century Mexico) are given some education, it just serves to demonstrate to them their poverty and makes them become subversives (Bulnes, n.d., p.233-265). Bulnes' analysis of the Porfirian period deserves more attention than many scholars have given it, especially because of its use and abuse of the term 'science' or 'scientific', which help us to understand how Díaz's collaborators as a whole thought. Thus, for Bulnes the definition of Revolution became scientific because he used medical analogies for his explanation of the Mexican Revolution (Bulnes, n.d., p.5, 6). This fact provides a clear example of the confused ideas of Mexico's Porfirian political elite about the meaning of science and scientific analysis. Like Sierra, Bulnes used freely the terms 'scientific' and 'science', but he gave them a very different sense, using them to express his disdain for some undefined activities of Jose Ives Limantour, the French-born Minister of Finance during the latter years of Díaz's regime, stating that if Limantour had dedicated himself solely to his 'scientific functions' his role in Mexican history would have been more successful (Bulnes, n.d., p.102).



The appropriation of the wealth of Mexico during the *Porfiriato* was profoundly unequal and the same occurred with science. The imaginary of creating the modern nation through the application of science, held by Díaz, consolidated the previous division between different sectors of the population and science was no exception. Its inclusion in the teaching programmes of the School of Medicine and the School of Agriculture was a process replete with obstacles and determined not by academic or scientific interests, but by the interests of the power groups in the different institutions, notably the School of Medicine. It has been generally accepted that Díaz was supported by a group of intellectuals, known popularly as 'the scientists', because of their adhesion to positivist ideas (Zea, 1966). However, the name 'scientists' was used ironically by their political adversaries, reflecting their political inclinations rather than their scientific interests, and the poor respect or misunderstanding of people about science. Bulnes established clearly his rejection of everything that purported or appeared to be scientific, except for that clearly related to physics, chemistry or bacteriology; for him the 'scientists' were nothing more than a political group (Bulnes, n.d., p. 240). In this way, politics and science weaved a complex interdependence: science would supply politics with credibility and seriousness, and politics would provide science with the necessary financial and promotional support.

Even though historians have not agreed exactly who was part of this select group, with such an original nickname, it is possible to deduce that some of them could have been people with some interest in science, including physicians and amateurs who liked to dabble in science, and in some cases it has been established that they were strong promoters of modernity through the introduction of scientific knowledge in Mexican educational programmes. Although this was an important contribution, they were named 'scientists' because, as aforementioned, they supported their arguments and projects by reference to positivist idea of progress, which in Europe was represented by science. European and, particularly French, universalism permeated the Mexican structures of power, under the cloak of the idea that science provided the only way of discovering the secrets of nature for the welfare of human beings.

It is unlikely that Díaz saw in science a factor which would allow him to show off Mexico as a healthy country, with a growing population, capable of receiving foreign capital. It is more suitable to think in terms of the Porfirian elite being dazzled by the industrial development of Britain and the emergence in Europe of modern ideas of progress and development. This hypothesis is supported by the fact that Díaz did not display any interest in promoting the education and technical training of the population for the industrial development of the country; his principal objective was to promote and facilitate foreign investment by countries like Britain, France, Germany, and the United States (Katz, 2006, p.118-180). Thus, for Díaz science represented just a symbol, instead of something with practical utility. In that period the Mexican intellectual community was far from understanding the modern concept of science, as has been demonstrated elsewhere (Priego, 2006, p.97-125). Science and its quotidian practice were just slowly permeating Mexican thinking. The concept of science was slowly absorbed by Mexican society through its small professional communities, such as those of engineers and physicians. These small groups, which have been wrongly described as a 'scientific community' by other

commentators – who, exhibiting their innocent nationalism, try to hide the clear backwardness of Mexico with respect to Europe in scientific matters – were just following that collective imaginary of modernity, and modernity was synonymous with Europe, particularly western Europe. Thus, nation, modernity and science were closely related to the construction of national identity, as well as other aspects, such as industrialization. ‘Scientificism’ and ‘national identity’ were part of an interesting mix of feelings and interpretations of ‘Mexican-ness’ and its social implications for the ‘decent people’, who were the only groups of political importance during the *Porfiriato* (Arredondo, 2005, p.71-95). Precisely at this point it becomes necessary to recognize the resilience of the concept of nation in Mexico, because this so-called scientific community has also been elevated by the country’s so-called historians of science (but not by the author of this paper) to the category of national heroes, in the continuous search for the construction of a mythical past, one more of the stories of nation which Francisco Colom recognizes as necessary in the consolidation of a nation (Colom, 2005, p.16).

In Porfirian Mexico, these small professional communities, which should be better described as promoters of science rather than scientists (but not to be confused with the aforementioned political group named ‘the scientists’), were trying to understand science and translate it into something understandable for a society such as that of Mexico, which has not participated in its gestation. The gestation of modern science was itself an exclusive process, which excluded countries like Spain and Portugal, as well as those of Latin America, putting them in the dubious place of ‘peripheral’ countries, as they have recently been described by some commentators (Macleod, 1988; Nicol, 1998). However, for Mexican elite in power during the *Porfiriato* science represented illustration and erudition, concepts that were strongly linked to the idea of comfort, which from their perspective was most clearly represented by Europe. The Mexican literature of this period is full of reports written by a number of scientists who had visited France, Germany or Britain in an attempt trying to obtain access to their scientific institutions, with a view to establishing similar institutions in Mexico.

Obviously Díaz was also impressed by these descriptions. Although, as noted above, he was not committed to the promotion of technical education as a means of promoting industrialization, he took onto his shoulders the enormous task of ‘civilizing’ Mexico by promoting its integration through education. In so doing he accepted the argument of Justo Sierra, put forward in an international context discussing the real nature of the American people and their more-or-less accepted inferiority *vis-à-vis* Europeans, that the only way forward for the development of Mexico would be provided by education. This idea constituted one of the theoretical bases for the long permanence of Díaz in power, for he was seen as a hero by the elites who also aspired to secure the ‘civilization’ of the country (Sierra, 1969).

Díaz established the most important scientific institutions of late-nineteenth century Mexico, including the National Medical Institute (1885) and the National Bacteriological Institute, created in 1888. The medical elite behind the walls of these well-endowed institutions were entrusted with the adoption and domestication of modern science. Thus, science was turned into a reinforcement of the imaginary of modernity and, at the same

time, it was used to reinforce the image of Díaz as a promoter of education and modernity. This was the point of convergence between the interests of the medical community and those of politicians close to Díaz, who together with the medical elite, promoted the establishment of these institutions (Priego, 2006).

The creation of these and other institutions was intended to promote science and, indeed, the first significant attempts to undertake scientific research and teaching were carried out in them. Nevertheless, it remains the case that it is difficult to pin down precisely what concept – or concepts – of science prevailed in that period in the minds of politicians. It is illustrative to mention one more example which highlights this difficulty: as early as 1872 Matías Romero – the tireless advocate in Washington in the late-1880s of the opportunities available in Mexico for investment in commercial agriculture, and himself a substantial investor in coffee growing in Oaxaca – wrote about the importance of chemistry, agriculture and botany as tools for the development of the rubber industry in Mexico. Even though the document claimed to be exhaustive – in the words of the editor of the volume in which it was published in 1999 – and it is possible to see that he had gathered, apparently accurately, information on the topic from various publications in the United States and Europe, it remains difficult to acquire from it a deep interpretation of Romero's idea of science (Mac Gregor, 1999, p.387-424). The same situation exists with regard to the rest of the Porfirian politicians: they wrote about science and its importance, but none of them seemed capable of defining their concept of it.

The powerful political group named 'the scientists' was of increasing importance in Porfirian Mexico, at least until 1900, when the combination of the onset of economic depression and growing criticism from aspiring politicians who were not part of the magic circle, led to increasing criticism of their power, which, in its turn, provoked increased political repression. Many of them were associated with the foreign businesses established in Mexico in the 1880s and 1890s, and also received political favors from Díaz. Given this context, it is not difficult to suppose that the use of this nickname for this powerful group was an important factor in the hostility displayed towards the scientific institutions established by Díaz by the revolutionary governments which followed the Revolution which had started in 1910 (Priego, 2002, p.91-149). Thus, the misuse of the term 'science' during the *Porfiriato*, was in part responsible for the post-revolutionary fate of 'scientific' institutions like the aforementioned National Medical Institute, and the National Bacteriological Institute; their sudden suppression, in spite of their indisputable role as promoters of the diffusion of science in Mexico, in 1914 by President Venustiano Carranza, a military man who had little interest in the 'eccentricities' that had been fundamental to Porfirian thinking, supports our premise.

The Revolution put a brake on the incipient embodiment of science in Mexico, as political instability and serious economic problems returned to become prominent features of the Mexican scenery. Although some attempts were made to ensure the survival of activities such as the production of vaccines, even though in very precarious conditions, the revolutionary governments faced many pressing problems, and the promotion of science, apparently, was not one of them, at least in the short term. Nevertheless, as violence diminished and the Revolution was institutionalized in the 1920s, the ground

was prepared for another, and more sustained, attempt in the 1930s to undertake the same quest upon which Díaz had embarked half-a-century earlier: the modernization of the country, based on this occasion, upon industrialization.

The attempts of Díaz and his collaborators to promote modernization, as a means of securing 'modernity', were thus repeated most prominently during the presidency of Lázaro Cárdenas (1934-1940), who was also promoting 'modernity', but this time using as its principal support education and science (Cárdenas, 1972, p.214-223). Cárdenas also tried to turn Mexico in a modern country, industrialized and economically, strong. However, there were some differences in the strategies used by both presidents: while Díaz excluded the Indian and marginalized population from the process, Cárdenas included them, at least at the discursive level, stressing repeatedly the need to educate the proletariat and the peasantry, but with a clear interest in embodying them into political organizations. He saw this embodiment as an essential part of their education, and was clearly influenced in reaching this view by the syndicalism preached by the powerful workers' unions formed in the United States in this period. Moreover, while for Díaz science was important more as a symbol of modernity, to be promoted just for the use of a small elite close to him, Cárdenas saw in science a useful tool for the exploitation of natural resources and helpful in the process of the formation of consciousness among the working class. Porfirian supporters of modernization, by contrast, were shaped by the strong need to be like the other; their imitation of foreign countries and the negation of Mexican reality were important obstacles to the autonomous development, which provoked the reinforcement of Mexican dependency upon foreign investment capital, with the vulnerability that this involved. Finally, the main difference between the modernity sought by Díaz and Cárdenas respectively was that Cárdenas used – or tried to use – education and science to achieve the desired modernization and industrialization of the country, promoting an endogenous development instead of foreign investment. The similarities and differences between these two key periods in Mexican history are deserving of much more detailed research in the future. For the time, we conclude by highlighting one of the issues that has been discussed in this paper: although both regimes were strong promoters of science in Mexico, even though with different – and sometimes unclear – objectives and concepts of science itself, they clearly shared one of the main features of Mexican – and Latin American – culture, which is the imitation of the other, that continuous search for the self of a young country, always infatuated by the 'development' of western Europe and the United States.

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