

A German minerologist visits Peru

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Humboldt and Mining

Alexander von Humboldt became interested in mining in his youth. His first book, *Mineralogical Observations on Some Basalts in the Rhine Basin*, was published in 1790 when he was just 21. In 1791-92 Humboldt studied in the renowned Mining Academy of Freiburg, under the supervision of Professor Abraham Gottlob Werner, and was named “Asesor cum voto” in the Prussian Department of Mines in 1792. In 1793 Humboldt began his work as Superintendent of Mines in Franconia, and was appointed the following year as Counsellor on Mines. In 1795 Humboldt was appointed as Minister of Mines, the highest echelon below that of Prime Minister.¹

His years in the Freiburg Academy placed Humboldt in direct contact with mining deposits, as it was usual for the theoretical lessons to be supplemented with practical work. Therefore, like the miners, students had to make their way on workdays to the mineshafts at six in the morning, where they had to work all morning helping a miner. Lessons were given in the afternoon. Professor Werner required his students to prepare monographs on specific topics, and stimulated them to collect minerals. Humboldt was influenced in the Academy by the theories of Lavoisier – who turned chemistry into a modern, quantitative natural science – which he would later disseminate in his journeys.²

International scientists gathered at Freiburg under Professor Werner’s guidance during the time Humboldt was there; such as Spaniards, Portuguese and Norwegians, and other foreigners. By the late eighteenth century the

1. *Alejandro de Humboldt, 1769-1969*. InterNationes. Bad Godesberg, 1969, p. 162.

2. *Ibid.* p. 25.

Academy had clearly become the most important centre in Europe in the mining sciences.³

Humboldt's strong knowledge of mining was obviously of great help to him during his journey across America, not just when carrying out his geologic and especially his vulcanological studies, but also in purely practical terms – like when his advice on some mining deposits was requested during his stay in the Viceroyalty of Mexico. A man of his time, Humboldt also made some inventions, which were designed to assist miners in their surveys and extractive tasks. For instance, he invented an “inextinguishable lamp” and a “respiratory machine.” The lamp was a forerunner of the famed Davy lamp, and the second was a predecessor of modern gas masks.⁴

Hualgayoc: A Second Potosí?

Humboldt entered Peru in 1802 from the north through the province of Cajamarca finally arriving at the silver mines of Hualgayoc. In his own words, “the mountain Hualgayoc somewhat recalls the effect of the dolomitic cones, or rather the cracked crest of Montserrat in Catalonia, which I had the opportunity to visit...the mountain reveals a hundred galleries that crisscross it in all directions...the people call these apertures “the windows of Hualgayoc.”⁵ (see plate 1) The previous visit Humboldt had made to the Quito Audiencia allowed him to compare these apertures with those on the slopes of the Pichincha volcano, which were also called the “windowlets of Pichincha.”⁶ It has been stressed that Humboldt used to record the shape of the mountains that called his attention, making a precise drawing of them.⁷

At the mines of Hualgayoc Humboldt was impressed by the ruggedness of the landscape and the isolation of the town of Muicupampa, which lies at 3,620 metres above sea level, and where a population of 3,000-4,000 people lived “in a wasteland, without vegetation.”⁸ The weather was also annoying for him, as he noted that “the weather in Muicupampa is unpleasant.” Elsewhere Humboldt pointed out that “the weather in these towns is horrible ... at night the thermometer remains at 0.2°, and at 7 or 8 hours (in the morning) is still at 1°...it rarely goes over 8° at noon. Of course there are no trees nor nat-

3. Ibid. p. 26.

4. Ibid. p. 27. For further information on his inventions see: Douglas Botting, *Humboldt y el Cosmos. Vida, obra y viajes de un hombre universal*. (1769-1859). Ediciones del Serbal. Barcelona, 1995. pp.32, 33.

5. Estuardo Núñez y George Petersen. *Alexander von Humboldt en el Perú. Diario de viaje y otros escritos*. Banco Central de Reserva. Lima, 2002. pp.101,102.

6. Ibid. p. 102.

7. Jaime Labastida. “Una jornada de trabajo de Alexander von Humboldt: su método científico.” Leopoldo Zea y Hernán Taboada (compiladores) *Humboldt y la Modernidad*. F.C.E. México, 2001. p.55.

8. Núñez y Petersen. *Alexander* p.102

ural greenery.”⁹ One gets the impression that the combination of altitude and low temperatures affected Humboldt¹⁰ and maybe discouraged him to explore other mines located even higher as Pasco or Huancavelica. However, the German traveller ascertained that despite the manifest aridity of the land, the mines of Hualgayoc were not lacking in supplies at all insofar as goods were constantly brought from Jaén, Chota, Chachapoyas, and Cajamarca.¹¹ But the commercial network provisioning Hualgayoc was actually far larger. For instance, the customs records (*Libros de Aduana*) at Cajamarca registered the arrival of fish from Lambayeque, coca from Chachapoyas, sweets from Cajamarca and Lambayeque, brandy (*aguardiente*) from Ica through Callao-Pacasmayo or Callao-Huanchaco sea route; and from Lima *yerba mate*, textiles and imported goods from Castille, and hardware.¹²

During his stay, Humboldt also noticed that whereas Hualgayoc and Fuentestiana held a great amount of water, in the mine of Purgatorio (Purgatory) on the contrary there was a complete lack of it.¹³ This mine had been given that name due “to the heat inside it, which is considerable in regard to the altitude of the region as it comes to 19°C, whereas outdoors it is 5°C.”¹⁴ Hence the workmen carried out their tasks clothes-less, and considered the heat in Purgatorio to be stifling.

The mines of Hualgayoc had been discovered in 1771 by Don Rodrigo de Torres y Ocaña and Don Juan José de Casanova in the ranch of Apán, some fourteen leagues from Cajamarca.¹⁵ By 1776 there were 96 running mills (*ingenios corrientes*). The mines attracted many peninsulars who came not only from the Basque region, as usually happen in the colonial mining centers, but also from Catalonia, Asturias, Jaén, Toledo, Galicia, Andalusia, becoming mine owners. Labour, on the other hand, had a multi ethnical composition, including *mestizos*, *zambos*, mulattoes, and Indians from the neighboring provinces of Cajamarca, Huamachuco, Pataz, and Conchucos¹⁶.

9. Ibid. p. 65

10. He was, for example, unable to reach the summit of Chimborazo, in Quito. See: Wolf Lepenies. “Alexander von Humboldt: su pasado y su presente.” Leopoldo Zea y Hernán Taboada (compiladores) *Humboldt y la Modernidad*. F.C.E. México, 2001. p.65. Not surprisingly Humboldt underlined the fact that Muicupampa was 700 mts. higher than Quito. Núñez y Petersen. *Alexander*. p.132.

11. Núñez y Petersen. *Alexander*. p.65.

12. Archivo General de la Nación, Lima. Libros de Aduana de Cajamarca.

13. Núñez y Petersen. *Alexander*. p. 104.

14. Ibid. p. 145.

15. Joaquín Ramón Iturralde. “Relación Descriptiva del cerro de Hualgayoc descubierto con poderosas vetas de plata en la provincia de Cajamarca, con noticias exactas de su fatal estado, 1776.” Fernando Silva Santisteban, Waldemar Espinosa Soriano, Rogger Ravines (compiladores). *Historia de Cajamarca. Siglos XVI-XVIII*. I.N.C. Cajamarca, 1986. p.316.

16. Scarlett O’Phelan Godoy. “Vivir y morir en el mineral de Hualgayoc a fines de la colonia.” *Jahrbuch für Geschichte...Lateinamerika*. No.30 (1993). pp. 81, 86.

Hualgayoc had not been granted *mita* labourers, as was the case of the mines of Huancavelica and Potosi, and thus had to extensively rely on free workers. Even so, a project was prepared by the Bishop of Trujillo, Don Baltazar Jaime Martínez de Compañón, which intended to transfer settlers to the areas surrounding the mines, who would be given patches of land in exchange for their working in the mines.¹⁷ It was estimated that about one thousand settlers were required, who according to José Ignacio de Lequanda would have to settle permanently in the mines.¹⁸ This project was an answer to the constant complaints made by the mine owners regarding the lack of labourers, or the temporary condition of many of the workmen.¹⁹

Humboldt was a sharp critic of the mining techniques used in colonial Peru. For him, the mines were worked following the whim of the owners and without the supervision of a technician acquainted with the subject.²⁰ On one occasion he remarked that Peru was a country “where the government is not concerned by technology.” Some work methods alarmed him, as when he found that in some mines the counterforts, columns and props holding up the roof had been removed, therefore causing their collapse.²¹ Humboldt was also surprised to find that instead of installing carts or rollers (*rodillos*) to haul the mineral, the workmen carried it in baskets and sacks on their back, along narrow and dangerous corridors²² (see plate 2). He was likewise astonished to find that inside the mine the mineral was not moved through the ventilation shafts but along galleries, and that no carts were used²³ (see plate 3). Humboldt also was intrigued by the fact that iron hammers, so widely spread throughout Europe, were not used in the Andes. He wrote: “the wedges are inserted with a dreadful instrument called a *comba*, a mace weighing between 28 and 30 pounds, [which is] too heavy to guide, [and] slow because two or three successive blows cannot be given... It is somewhat understandable, with such miserable tools, no piecework, and almost no supervision, why a gallery [made] at an ass’s pace has, for example, cost 500-800 pesos, and even 1,200 pesos.”²⁴

But who were the miners who worked the deposits of Hualgayoc with methods described as inefficient? During his stay, Humboldt had the opportu-

17. Ibid. p. 77. See also Carlos Contreras. *Los Mineros y el Rey. Los Andes del norte: Hualgayoc 1770-1825*. IEP. Lima, 1995. pp.98,99.

18. José Ignacio de Lequanda. “Descripción de la provincia de Caxamarca.” *Mercurio Peruano* (1792), tomo X. p.210.

19. Baltasar Jaime Martínez Compañón y Bujanda. “Sobre el ruinoso estado de las minas de Hualgayoc y modo de restablecerlas.” *Historia de Cajamarca. Siglos XVI-XVIII*. I.N.C. Cajamarca, 1986. p.213.

20. Nuñez y Petersen. *Alexander*. p. 57.

21. Ibid. p. 60.

22. Ibid. p. 58.

23. Nuñez y Petersen. *Alexander*. p. 63.

24. Ibid. p. 64.

nity to establish contact with some of them. His host seems to have been Don Joaquín de Arvayza, whom he described as “a very wealthy man, and with an open and energetic character.”²⁵ Arvayza had been born in Cajamarca, but his father came from Spain. Humboldt also mentioned three other families of miners in Hualgayoc: the Espinach, the Casanova, and the Bueno.

The Arvayza and the Bueno were kin. Thus Tomás Bueno y Ravines was a native of Cajamarca who had mining interests in Hualgayoc. Melchora Torres y Sánchez, his first wife, bore him no children. After widowing, Don Tomás married a second time with Ana María Arvayza y Escalante, the legitimate daughter of the wealthy miner Joaquín de Arvayza. He had a son with his second wife, Jose Antonio, who was to be his heir.²⁶ Endogamy seems to have been wide spread among the mining guild in order to increase properties and fortunes.

As for the Espinach, the reference obviously meant Don Miguel Espinach, clearly one of the most important and influential individuals in Hualgayoc. A native of Catalonia, Espinach combined his mining activities with those of a supplier. He had also held several positions of authority, such as Mining Deputy for Hualgayoc, mayor of Cajamarca, and subdelegate of the *Partido* of Chota. He was a man who wielded power. In 1798 Espinach owned 7 mines, and had 18 employees and 167 labourers. He had smelted 343,830 silver marks (close to 20 per cent of the total output of Hualgayoc) in 29 years dedicated to mining (1775-1803), thus amassing a sizable fortune.²⁷

The Casanovas were another family mentioned by Humboldt. He clearly meant the family formed by Don Juan José Casanova, a native of Pamplona, Spain, and the discoverer of the mine, who died in 1791. At his death Rudecindo, his son, took over the mining firm. He married Doña Isabel Estrada and had no legitimate children. But he did have two illegitimate ones: Blas and Casimiro, born in his illicit liaison with Doña Juana Urrutia. Rudecindo left each of his sons 20 mine *varas* in the Purgatorio lode in Hualgayoc.²⁸

According to Humboldt, the Espinach, Casanova and Bueno “seize everything and labour to destroy one another. Lawsuits are filed and whoever can sacrifice the most wins.” The German traveller even noted that whereas in Saxony a miner was distinguished by his moral qualities, in Peru “this class is the most profligate and licentious.” The truth is that colonial miners comprised all kinds: some, like the Count of the Real Confianza even boasted

25. Ibid. p. 57.

26. Scarlett O’Phelan Godoy. “Hijos naturales ‘sin impedimento alguno.’ La ilegitimidad en el mineral de Hualgayoc, Cajamarca. (1780-1845)” Scarlett O’Phelan e Yves Saint-Geours. (comp.) *El Norte en la Historia Regional*. Cipca/Ifea. Lima, 1996. p.227.

27. Carlos Contreras. *Los mineros y el Rey*. p.45.

28. Scarlett O’Phelan Godoy. “Hijos Naturales...” p.232.

their titles of nobility, and in fact Don Juan José de Casanova himself was related with the Marquises of Casa Boza.²⁹ On the other hand, it is true that there were miners who were “adventurers,” like those described by Tandeter in his study on Potosí.³⁰ However, Humboldt did have a better opinion of Mexican families involved in mining activity, as the Fagoada or the Alamán, whom, in his own words, were “well illustrated and philanthropists.”³¹

Despite all of the limitations noted by Humboldt in terms of mining in Peru, he concluded that with a more enlightened government Hualgayoc would be a second Potosí, “as in fact its minerals are richer than those of Potosí itself, more stable in their yield than those of Huantajaya, and their extraction is simpler than at Yauricocha.”³² His enthusiastic prediction would not, however, be fulfilled. Hualgayoc entered a period of stagnation shortly after his visit, and Cerro de Pasco became the major mining centre throughout the nineteenth century.

Pasco, the Worst Managed Mines in Spanish America

The mines of Pasco were discovered in 1630. In 1758 a new gallery was opened – an undertaking that was finished in 1760 with the extraction of some 50,000-89,000 marks. The productivity of the mine rose to 122,000 silver marks in 1780, and by then Pasco was considered “the most valuable of the mines.”³³ In the 1790s the output level increased remarkably, reaching for example 291,254 marks in 1794. It was precisely in this period that the protectionist policies the Bourbon project had for mining came into effect, and crystallised in the establishment of the *Tribunal de Minería* and the *Banco de Rescates*.

Unlike Hualgayoc, Humboldt did not visit the mines of Pasco. However, he noted that “thanks to the mineralogical collection of Baron Nordenflicht, and his many plans and descriptions of mines, I am perfectly able to form a geognostic idea of the mining site of Pasco.”³⁴ Again, the inefficiency of the production system of Pasco astounded and worried Humboldt. For instance, he noticed that the abundant waters present in Pasco were extracted, “not by means of hydraulic wheels or *malacatas* – as is done in Mexico – but with pumps powered by the arm of a man; ... draining the mines is thus exceed-

29. Scarlett O’Phelan Godoy. “Vivir y morir...” p.77.

30. Enrique Tandeter. *Coacción y mercado. La minería de la plata en el Potosí colonial, 1692-1826*. Centro de Estudios Regionales Andinos Bartolomé de las Casas. Cuzco, 1992. p.186.

31. Salvador Méndez Reyes. “Humboldt y las elites de origen colonial. Algunas notas acerca de su relación con Alamán y los Fagoaga.” Leopoldo Zea y Mario Magallán. (compiladores) *El Mundo que encontró Humboldt*. F.C.E. México, 1999. pp.76, 77.

32. John Fisher, *Minas y Mineros*. p.53.

33. Nuñez y Petersen. *Alexander*. p.133.

34. *Ibid.* p. 136.

ingly costly ... The mine of Yauricocha would yield the same amount of silver as Guanajuato if hydraulic machines or steam pumps were built in it...³⁵

The truth is that although there were plans to manufacture hydraulic machines, these came to nothing. Thus in 1793 the Hualgayoc miner Don Tomás Bueno hired the services of Don Ignacio Martorell, to build a “bronze machine to drain said mines” for 3,000 pesos. Humboldt later mentioned Martorell as “a mason who has himself called a maths professor, who promised the miners to make the water disappear through tin siphons.”³⁶ For him, the experiment was a complete failure. This incident shows that although there were plans to modernise the production process in mining, the problem here lay in the scant preparation of those who acted as technicians, and had not received proper training. It should not be forgotten that although the Bourbons had a plan to establish a *Colegio de Minería* in Perú, it did not open, unlike Mexico, where since 1792 it benefited the miners and the mining industry of New Spain. At the *colegio* students were taught mineralogy, metallurgy and other subjects less specialized, such as French and Mathematics. Among the board of teachers there were distinguished professors, as Andrés del Río, who did study with Humboldt in Freiburg.³⁷

The Distressing Accident of the Mine of Santa Bárbara, in Huancavelica

While Humboldt was in Peru, the famed mine of Santa Bárbara was completely abandoned due to the collapse that had taken place in the Brocal mining claim. For the German traveller, “greed and neglect were the causes of this distressing accident.” According to Humboldt’s account, the intendant of Huancavelica removed the pillars which supported the ceiling of the mine in order to increase productivity, thus causing its collapse. Humboldt once more blamed this on the deficient training of Peruvian miners. He said: “the procedure had consequences that any educated miner would easily have guessed: with the support gone, the rock yielded to pressure, the roof caved in, and this collapse affected most of the upper claim, namely, the Brocal, and therefore work had to be stopped.”³⁸ Entangled in the affair, the intendant defended himself arguing that he had removed the pillars after consulting with master miners. In other words, the incompetence pointed out by Humboldt had some validity.

35. Ibid. p. 131.

36. Núñez y Petersen. *Alexander*. p.62.

37. David Brading. *Mineros y Comerciantes en el México borbónico, 1763-1810*. F.C.E. México, 1975. p.227.

38. Núñez y Petersen. *Alexander*. p.139.

Humboldt fully agreed with Nordenflicht in that it was false that the mine of Santa Bárbara was worked out when it collapsed. What happened was that the miners in charge of excavating the deposit had no knowledge of subterranean geometry, and had therefore been digging where the mineral was least abundant. In any case, his recommendation was that the collapsed mine should not be cleared as this would require extensive resources, and the gallery system was so poorly laid out that no benefit could be had in this state.³⁹

Humboldt and the Expedition of Baron Nordenflicht

In order to place the journey of Humboldt to Peru in its proper context, a reference must be made to the mineralogical expedition under Baron Nordenflicht that preceded him. Although Humboldt arrived at Peru twelve years after the Baron, the connections are clear. It was not just that he lived in Lima in the Baron's house, using the laboratory the Tribunal de Minería had assembled for his host; Nordenflicht also became his closest interlocutor in matters regarding the extractive activity. Undoubtedly the Baron's experience in Peru predisposed Humboldt's opinion in several matters. It will be useful, therefore, to have a brief look at the Baron's expedition in Peruvian soil.

In October 1790, after leaving Potosí, Nordenflicht reached Huancavelica, where he joined Helms, who had been busy replacing the not-too-efficient furnaces of Almadén used to process the mercury, with a smaller number of the modern furnaces from Idria.⁴⁰ But when Nordenflicht arrived at Huancavelica, Helms and his work were paralysed due to an astounding increase in the cost of the exploitation; this was because in order to benefit with the operation, the intendant had supplied the building materials at exorbitant prices.⁴¹

FIGURE 32-1.



39. Núñez y Petersen. *Alexander*. pp.141, 142.

40. John Fisher. *Minas y Mineros*. p.131.

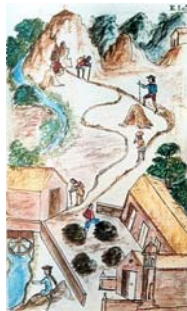
41. *Ibid.*

In early 1791 Nordenflicht, already established in Lima, presented a report to the viceroy where he requested that the mines of Huancavelica be closed for two years, while a central shaft and lateral galleries were built that would allow the work to be done safely and efficiently. The Baron also explicitly noted in his report that he had no intention of returning to Huancavelica, and suggested that Friedrich Mothes, another member of his expedition, should relieve him at the command of the mine.

Although Mothes remained in Huancavelica until late 1792, he did not receive the official permission to begin modernising the mine. He would shortly thereafter be entrusted with the excavation of a shaft in Hualgayoc, where the Saxon technician arrived in September 1794. For Fisher, Mothes was “the most able of Nordenflicht’s assistants, after Helms.”⁴²

The presence of Mothes in Hualgayoc was controversial, and it split the miners into two sides—those who strongly resented the contempt Mothes had for the local technical traditions, and those who showed an interest for the proposed innovations, which could increase their profits. But the sector that resisted Mothes included two of the most prominent miners: Miguel de Espinach and Rudecindo Casanova. Both doggedly opposed the appointment of Mothes as *Perito Facultativo y Director del Mineral*.⁴³

FIGURE 32-2.



It is therefore very likely that in the many conversations he must have had with Humboldt, Nordenflicht acquainted him with the opposition against Mothes, and the campaign made to discredit him and the new techniques the Baron and his mission were trying to implement, organised by the above-mentioned miners of Hualgayoc. This would explain the acid comments Humboldt made in his journal, specifically against Espinach and Casanova, the main detractors of Mothes, and therefore of Thaddeus von Nordenflicht.

42. Ibid. Capítulo IV.

43. Carlos Contreras. *Los mineros y el Rey*. pp.132,133.

It could be said, therefore, that in many occasions Humboldt saw things through Nordenflicht's eyes.

The Peruvian miners somehow felt that first Nordenflicht, and then Humboldt, had arrived to convince them of the superiority the European techniques had in processing the metal.⁴⁴ Even Viceroy Gil de Taboada commented that Nordenflicht had not realised that Peruvian minerals were different from those found in Germany, and therefore required a different treatment.⁴⁵ Helms, in turn, did not hesitate in pointing out that the members of the Mining Tribunal “lacked any mineralogical knowledge whatsoever.” In other words, they were ignoramuses.

FIGURE 32-3.



However, the evidence suggests that although Born's barrel method helped save time and lowered the number of labourers required to extract the silver, it was not necessarily better than the traditional patio system, and even worse, it did not lower the consumption of quicksilver (see plate 4). Something similar happened in Mexico, where Sonneschmidt had to admit – in his famed treatise on amalgamation – that “with ten years of work I have been unable to introduce, either Born's refining process or any other method preferable to that of the patio.”⁴⁶ Not surprisingly the Spanish minerologist Fausto Elhuyar and Sonneschmidt concluded—in the Mexican case – that Born's method was not adequate for the type of extractive silver industry that had developed in Spanish America, where the mining centres were scattered and isolated; where good timber and iron were hard to come by; and where miners had shown a preference for the existing systems over the risks entailed by innovations of uncertain results.⁴⁷ There was even the extended opinion that Born's method was only a slightly variation from the *cazo*

44. John Fisher. *Minas y Mineros*. p.134.

45. *Ibid.* p.139.

46. *Ibid.* p.141.

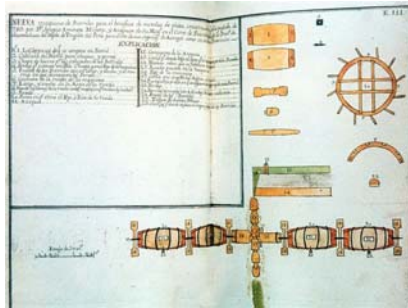
47. John Fisher. *Minas y mineros*. p.151.

method invented by the Peruvian Alonso de Barba in the XVIIth century.⁴⁸ The poor reception given to the barrel technique comes through clearly in the bitter remarks made by Humboldt: “during my stay in the Andean Cordillera, I only saw two mining districts where Mr. Born’s method of amalgamation in barrels was followed with some success, to wit, Tallenga and the Real de Recuay, in the *Partido* of Cajatambo.”⁴⁹ His visit to the Peruvian mines was therefore, not very stimulating.

Miners and Military

In coming in contact with the miners, Humboldt was able to ascertain the importance the military career was acquiring in Spanish America. The establishment of a regular army, subject to permanent training, was one of the goals of the Bourbon project: ports had to be watched guarded, frontiers had to be garrisoned, the plebeians had to be controlled, and the cities safeguarded. Even so, it was only in the 1760s that the reorganisation of the army and militia came into effect in Spanish America. In Peru, the presence of Viceroy Amat was crucial for the implementation of the military reforms.

FIGURE 32-4.



For the Bourbons, nobility and the army were no longer mutually exclusive. The data Juan Marchena presents on the social composition of the veteran officer corps in the Spanish American army is most revealing in this regard.⁵⁰ For example, whereas in 1740-49 only 12.5 percent of the veteran corps were nobles, in 1770-79 the number of nobles included in the army had risen substantially to 51.6 percent. This means that numerous individuals of

48. David Brading. *Mineros y Comerciantes*. p.227.

49. Núñez y Petersen. *Alexander*. p.143.

50. Juan Marchena Fernández, “The Social World of the Military in Peru and New Granada”. J. Fisher, A. Kuethe, and A. McFarlane (eds.) *Reform and Insurrection in Bourbon New Granada and Peru*, Louisiana State University Press, 1990, p. 57.

noble origins decided to follow the military career. Humboldt was astonished to find, during his Peruvian sojourn, that even in the provinces merchants had become colonels, captains and sergeant-majors. Members of notable families, on the other hand, aspired to the rank of colonel or brigadier.⁵¹

During his stay in Cajamarca, Humboldt lodged in the house of Don Santiago Pizarro, a well-known miner in Hualgayoc. Don Santiago was a legitimate son of Matías Pizarro, a native of the Canary Islands, and of Petronila Rodríguez, who was born in Contumazá, Cajamarca. He must have been a wealthy man, because when he married Manuela Guerrero, he contributed with the Hacienda Galindo, for which he paid 36,000 pesos in cash. He also owned land, mills where minerals were ground and several houses.⁵² Humboldt must have stayed in one of these houses.

While being in Cajamarca, Humboldt was under the impression that there were miners like Colonel Don Tomás Bueno or the Subdelegate Eduardo Pimentel, who were “conceited with the militia regiments and all the officers in the high command.”⁵³ In the specific case of his host, the above-mentioned Santiago Pizarro, Humboldt notes that he had offered to “give 25,000 pesos to the king if he made him a colonel in the army.”⁵⁴ According to Humboldt’s estimates, “there were over 1,200 civilians dressed as officers, honouring one another, but the soldiers only have wooden rifles, are not trained and surely do not have 4,000 weapons.”⁵⁵ In his opinion, all this paraphernalia was nothing more than “a ridiculous comedy, harmful in the present state of public service because the jurisdictional exceptions rose with the military commissions.”⁵⁶

But there was more. Humboldt noted that although in their present condition the militias would not be overly useful nor would they have any significant role, they could become an imminent danger for the king of Spain should their discipline and weaponry be improved. He was not mistaken in this regard. With the development of a regular army, properly equipped and trained, the Bourbons sowed the seeds of their own destruction, as was clearly shown years later, during the wars of independence.

51. *Ibid.*, p. 59.

52. Scarlett O’Phelan, “Hijos naturales...” p. 234.

53. Núñez y Petersen, *Alexander*. p. 71.

54. *Ibid.* p.71.

55. *Ibid.*

56. *Ibid.*