Inbreeding caused demise of the Spanish Habsburg dynasty, new study reveals

One of Europe's most powerful royal dynasties was so obsessed with securing its blue-blooded inheritance through family marriages that it brought about its own extinction through inbreeding, scientists have found.

By Fiona Govan in Madrid
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The Hapsburgs ruled Spain from 1516 to 1700, presiding over the first global empire, but died out after generations of intermarriage, according to the first genetic analysis of the family.

The royal fashion of marrying relatives to preserve the dynastic heritage culminated in a monarch who was so genetically inbred that he was unable to provide an heir and power passed to the French Bourbons.

The dynasty was one of the most important and influential royal families in Europe - branches of the family ruled Austria, Hungary, Belgium, the Netherlands, the German empire and Spain.

Scientists have examined the family tree of the last of the Spanish Habsburgs, King Charles II, who died in 1700 at the age of 39, and discovered that, as a result of repeated marriages between close relatives, he was almost as inbred as the offspring of an incestuous relationship between a brother and sister or father and daughter.

The study found that nine out of 11 marriages over the 200 years were between first cousins or uncles and nieces, producing a small gene pool that made rare recessive genetic illnesses more prevalent.

Only half of the babies born to the dynasty during the period studied lived to see their first birthday, compared with about 80 per cent of children in Spanish villages at the time.

The study, published this week in the journal Public Library of Science One, indicated that Charles II suffered from two separate rare genetic conditions, which were almost certainly the result of his ancestors' marriage patterns and which effectively assured that the dynasty died out with him.

Nicknamed El Hechizado ("the hexed") because of his deformities, Charles II was not only inflicted with an extreme version of the Hapsburg chin, as immortalised in portraits by Titian and Velazquez, but his tongue was said to be so big for his mouth that he had difficulty speaking and drooled.

Historical accounts record that he also suffered from an oversized head, intestinal upsets, convulsions and, according to his first wife, premature ejaculation and his second wife, impotence.
He was unable to speak until the age of four, and could not walk until the age of eight. He was short, weak, and quite lean and thin," said Gonzalo Alvarez, of the University of Santiago de Compostela, who led the study.

"He looked like an old person when he was 30 years old, suffering edemas [swellings] on his feet, legs, abdomen, and face. During the last years of his life he could barely stand up and suffered from hallucinations and convulsive episodes," he said.

The scientists concluded that medical problems of Charles II were not random but could be symptoms of two genetic disorders; an inherited thyroid deficiency, and renal tubular acidosis, a type of kidney failure that can cause metabolic problems.
Inbreeding wiped out Spanish Habsburgs, say researchers

Royal inbreeding extinguished the Spanish Habsburg dynasty which ended with the death of King Charles II in 1700, genetic evidence suggests.

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The Spanish branch of the Austrian royal family ruled from 1516 to 1700, and brought Spain to the pinnacle of its influence and power in Europe.

But when Charles II died childless from both his two marriages the dynasty perished too, to be replaced by the French Bourbons.

The king's inability to produce an heir has been blamed on physical and mental handicaps caused by generations of inbreeding.

However until now there has been no scientific evidence to support these claims.

The Spanish Habsburg kings were famous for marrying close relatives such as uncles, nieces or first cousins.

Nine of the dynasty's 11 marriages over a period of 200 years were "consanguineous", according to research published today in the online journal PLoS ONE.

A team of Spanish scientists studied genealogical information for Charles II and 3,000 of his relatives and ancestors spanning 16 generations.

Using this data, the researchers calculated an "inbreeding coefficient" (F), based on the probability of inheriting similar genes from both parental lines, for each individual.

"F" was a figure reflecting the degree to which a person was affected by inbreeding between relatives. It was found to increase down the generations - from 0.025 for the dynasty's founder, Philip I, to 0.254 for Charles II.

Several members of the dynasty had inbreeding coefficients higher than 0.20, which meant that more than 20% of the genetic code was made up of mother-father elements that matched.

Charles II and his grandfather, Philip III, were the two individuals with the highest inbreeding coefficients.
Although both were sons of uncle-niece marriages, their F values were almost as high as would be expected from offspring of incestuous marriages between parents and children or bothers and sisters.

Gonzalo Alvarez, from University of Santiago de Compostela, and colleagues calculated that inbreeding at the level of first cousin reduced the likelihood of a child surviving to the age of 10 by almost 18%.

Only half the dynasty babies born during the period studied lived to see their first birthday, compared with about 80% of children in Spanish villages.

Charles II's disorders and illnesses earned him the nickname "El Hechizado" ("The Hexed"), since many believed they were due to witchcraft or sorcery.

The researchers wrote: "He was unable to speak until the age of four, and could not walk until the age of eight. He was short, weak and quite lean and thin."

At 30 he looked like an "old person", suffering from swellings due to water retention on his feet, legs, abdomen and face.

His first wife talked of his premature ejaculation while his second complained of impotency.

During the last years of his life he could barely stand up and suffered from hallucinations and convulsions. He finally died at the young age of 39.

Speculating on the cause of his ill-health, the researchers pointed to the simultaneous occurrence of two different genetic disorders, combined pituitary hormone deficiency and distal renal tubular acidosis. Both were linked to genetic mutations that could have been the result of inbreeding.

"We may speculate that most of the symptomatology showed by Charles II could be explained by two different genetic disorders produced by detrimental recessive alleles (gene types) at two unlinked loci (sites in the genetic code).

"Evidently, the probability of an affected individual suffering from two very rare recessive traits (traits caused by having two copies of a particular gene) must be very low, but it must be taken into account that inbreeding may cause the association of two recessive traits even for unlinked loci."

Recent studies also suggested that the genetic effects of inbreeding may be even greater than expected from looking at family lineages.
The Spanish tragedy

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Miranda France reviews The Disinherited: the Exiles who Created Spanish Culture by Henry Kamen

I wonder if Spaniards are wholeheartedly grateful for Professor Henry Kamen. This British historian, resident in Barcelona, is one of their most devoted and meticulous scholars, and yet he also makes a habit of cutting their achievements down to size. A nimble torero, he has taken several Spanish bulls firmly by the horns. Spain's Road to Empire showed how that empire was forged thanks only to foreign expertise and money. Before that, he revealed that the Spanish Inquisition was less powerful than history - and Monty Python - had led us to believe.

The beefier the legend, it seems, the greater Kamen's urge to stand in front of it waving a pink cape. In The Disinherited, he tackles two of Spain's most cherished beliefs about itself. The first is that medieval Spain was a country where Christians, Jews and Muslims lived together harmoniously (the so-called convivencia). The second is that a history of exiles and expulsions has prevented Spain from producing more world-class scientists, philosophers and musicians. "Spain is the only European country to have attempted to consolidate itself over the centuries not through offering shelter but through a policy of exclusion," writes Kamen.

The first great exodus was that of the Jews in 1492, after the Inquisition found that Jewish converts to Christianity were being lured back to "heretical" ways. Historians have recently cast this as a defining tragedy for Spain, but Kamen argues that the numbers involved were much smaller than has been claimed - perhaps 50,000, rather than 200,000 - though the expulsion left Spain with a legacy of anti-Semitism.

As Spain grew increasingly fearful of the powerful Turkish Empire, and of Muslim uprisings at home, the Moors were ejected between 1609 and 1614, 900 years after they first arrived and began to build up a rich culture in southern Spain.

Other groups followed, in smaller numbers - Habsburgs, Bourbons, clerics and Communists, Nationalists and Republicans - chased across borders or herded on to boats. In 1767, 5,700 Jesuit priests were dumped on the island of Corsica, "as though we were a herd of filthy animals". In 1823, Thomas Carlyle noted the arrival in London of thousands of Spanish Liberals: "stately tragic figures, in proud threadbare cloaks, perambulating, mostly with closed lips, the broad pavements of Euston Square and the regions about St Pancras New Church."

Since 1492, Kamen estimates three million people have been forced to leave Spain. What was the impact on those left behind? It is not true that intellectual life became impoverished because of their absence, says Kamen: that was a result of failures at home. One result is that Spain became a homogeneous society, which arguably explains its attraction to outsiders. Spaniards
seem sure of who they are - there is no wavering between curry, Chinese or the chippy on a Friday night.

Yet a theme running through this book is their constant agonising about "identity". For centuries, Spain's rulers and thinkers both courted European approval and dismissed it as worthless. Kamen does not mention here Franco's policy of "re-Spanishification", but he shows how ordinary people's willingness to accept differences was set against an authority that doggedly pursued the concept of a "Catholic" Spain.

Some interesting exiles are profiled here, including Pablo Picasso, the politician and scholar Salvador de Madariaga, who made England his home, and the cellist Pablo Casals. But surely not all were "disinherited". The 16th-century travellers Kamen writes about were often nobles who studied abroad and later returned home. Kamen finds space to squeeze in Goya, who was not really an exile, but spent time studying art in Italy. The composer Manuel de Falla had no political reason to move to Argentina.

Kamen is on even less sure ground when he writes about Spaniards who stayed put, such as Lorca, but were "internal exiles". It is pushing it, I think, to include Salvador Dalí on the grounds that he was "an exile from all types of reality".

As always, Kamen's strength is in the way he goes behind the scenes, allowing us to eavesdrop on contemporary voices, such as the official of the Inquisition who opposed the ejection of the Moors because "they are Spaniards like ourselves" or the Christian villager who asked, in 1501, "who knows which is the better religion, ours or those of the Muslims and the Jews?"

But as he follows peripatetic Spaniards in all directions, there are inevitably some problems of organisation. The biographies are interesting, but they interrupt the flow, meaning that, while The Disinherited is an excellent work of reference, it is an unwieldy read. I even found myself wondering, for the first time ever, if this book might work better as a website, but such a heretical idea makes one fear a visit from the Inquisition.