Louis Daniel Beauperthuy: Pioneer in Yellow Fever and Leprosy Research

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Louis Daniel Beauperthuy's achievements in tropical medicine have for long been recognised by South American and French medical historians, but in the English-speaking world his name is virtually unknown. This article attempts to remedy the apparent British neglect of a great pioneer of tropical medicine.

Beauperthuy (Fig. 1) was born on 26th August 1807 in Sainte-Rose, Guadeloupe, a French island possession in the Caribbean, where his father, Pierre Daniel Beauperthuy (1783-1861), who derived from an old French family in the Perigord, practised as a physician. His mother, also French, was Marie Laurence Desbonnes Bélasse (1783-1859) and Louis Daniel was the second of their six children[1].

Beauperthuy was educated in France and studied medicine at l’École de Médecine, Paris, where the Dean of the Faculty was Mathieu Orfila (1787-1853) and his teachers included François Magendie (1787-1855). He attended courses in botany and entomology and developed a passionate interest in natural history. He was fascinated by the marvels revealed by the microscope and, as an extra-curricular activity, attended the course held by Alfred Donné (1801-78). During his vacations, while a student, he returned to the Caribbean where tropical diseases (yellow fever, in particular) were rife. It was then that the seed of the idea of the transmission by insects (especially mosquitoes) of human diseases began to germinate in his mind. In 1837, he qualified MD Paris, with a thesis entitled 'De la Climatologie'[2] in which he developed 'la theorie insectile'.

Following qualification, the Musée d'Histoire Naturelle, Paris, appointed him in 1837 as 'naturaliste voyageur' and during the next four years he explored the basin of the Orinoco, carried out researches on snakes and earthquakes and also made important anthropological observations, sending specimens back to the Paris museum.

In 1841, during one of his expeditions off Venezuela, he stopped in the city of Cumana (situated some 300 kilometres east of Caracas) and there he met a Venezuelan lady, Ignacia Sánchez Mayz, whom he married in 1842; three children were later born to them. He now made the important decision not to return to France but to remain in Cumana. In 1844 he obtained the further qualification MD Caracas and settled in medical practice in Cumana, with the intention of devoting his life to research into tropical disease (Fig. 2).

He remained in Cumana until the last few months of his life, when he took charge of a leprosy hospital in British Guiana and it was there, at Bartica, that he died suddenly, following a stroke, on 3rd September 1871, aged 64. His grave lies in the Officers' Cemetery of the British Guiana penal settlement on the River Mazuruni[3] (Fig. 3).

1. Louis Daniel Beauperthuy. (Oil painting by G. Da Villadda, in Faculty of Medicine, Rome, Italy. Courtesy Editions Hervas, Paris.)
Cholera

Beauperthuy was a medical student when the cholera epidemic of 1832 hit Paris and he was able to witness the ravages of this disease. In 1853, he was in Cumana when a major earthquake seriously damaged that city, a sequel of which were epidemics of yellow fever, smallpox and cholera. Beauperthuy was nominated ‘Médecin Sanitaire’, and became responsible for controlling the epidemic. Examining the excreta of the cholera victims, he detected the motile vibrios which he described in 1855[4]. This was 28 years before Robert Koch definitively isolated the causative organism of cholera.

Yellow Fever

In the 15 years 1838-53, Beauperthuy had ample opportunity of studying the manifestations of yellow fever during outbreaks in Guadeloupe, Caracas, Barcelona (Venezuela), Cumana and Guiana. He was impressed by both the manner in which the disease related to the rainy season as well as by its relative scarcity in the forests, and he noted a reduction of infection when anti-mosquito precautions were taken, e.g. the use of smoke and nets. He came to the conclusion that the mosquito must be the vector by which the infecting agent of yellow fever was transmitted, although he conceived that the infecting agent was particulate decomposing organic matter rather than a living micro-organism. He became convinced that it was the striped-legged mosquito (‘le moustique à pattes rayée de blanc’), Stegomyia fasciata (now known as Aedes aegypti) which was the variety of mosquito responsible for the spread of yellow fever[5].

Beauperthuy published his findings in a local journal Gaceta Oficial de Cumana on 23rd May 1854[6], but an obscure Venezuelan journal did not circulate widely in those days. He followed this up with a report in 1856 to Marie Jean Pierre Flourens (1794-1867), Secretary of the Académie des Sciences, Paris, entitled ‘Recherches sur la cause du cholera asiatique, sur celle du typhus icterico et des fièvres des marécages’[7]. ‘Typhus icterico’ was yellow fever and ‘fièvres des marécages’ was marsh fever or malaria. To consider Beauperthuy’s theory that ‘le moustique inocule la fièvre jaune’, the Académie des Sciences set up a special committee of three eminent physicians: Etienne Serres (1786-1868), Gabriel Andral (1797-1876) and Jean Baptiste Boussingault (1801-87) which gave a favourable report and Beauperthuy’s paper was presented to a meeting of the Académie on 14th April 1856 and published later that year in the Comptes Rendus de l’Académie des Sciences[8]. Beauperthuy’s discovery was subsequently republished in L’Abételle Médicale (1856)[9], in the Escuela Medica (Caracas, 1875)[10] and in 1891 in the collected Travaux Scientifiques which were published posthumously, edited by his brother, Pierre Daniel Beauperthuy[11].

Yellow Fever represented the discovery of an agent which had not before been identified – but that the former was not misinterpreted as ‘insects’ and it was thus that the priority for the discovery of the association of the mosquito with the spread of yellow fever has been erroneously ascribed to Nott[13].

Beauperthuy was certainly well in advance of Carlos Juan Finlay (1833-1915) to whom the discovery of the role of the mosquito in yellow fever has also been attributed. Finlay, the son of a Scottish physician who married a Frenchwoman and emigrated to Cuba, studied medicine in the USA, qualifying MD Philadelphia, and then returned to practise in Havana. It was not until 1881, twenty-five years after Beauperthuy, that he presented his famous paper on the role of the mosquito in yellow fever.

When the USA occupied Cuba in the Spanish-American War (1898) an American Army Commission on Yellow Fever in Havana, consisting of Walter Reed (1851-1902), James Carroll (1854-1907), Jesse William Lazear (1866-1900) and Aristide Agramonte (1868-1911), was set up and its report was published in 1901, almost half a century after Beauperthuy had made his original crucial observations on the association of yellow fever with the mosquito, knowledge which was later put to dramatic and successful use by William Cranford Gorgas (1854-1920) in his control of yellow fever in Havana and during the construction of the Panama Canal[14].

Beauperthuy, Yellow Fever and Sir William Osler

Sir William Osler (1849-1919) was aware of the importance of Beauperthuy’s contribution to the unravelling of the mystery of yellow fever. In his ‘An Address on the Nation and the Tropics’ delivered at the London School...
of Tropical Medicine in 1909, Osler presented the following version of the yellow fever story:

For centuries there has been a popular belief in the transmission of disease through mosquitoes and flies, and in the middle of the nineteenth century that remarkable clinician and anthropologist, Nott of Mobile, suggested the association between the mosquito and yellow fever and malaria. A more scientific presentation of the question was made by the French physician Beauperthuy, an enthusiastic student of the epidemics in the Spanish Main. But the first clear demonstration of a mosquito-borne disease was made by Manson (in 1877) in the case of filariasis. . .

This lecture was published in The Lancet (1909)[15] which in a later issue (1910)[16] contained a letter from Juan Gutteras, Director of Public Health, Cuba, protesting at Osler’s omission of Carlos Finlay, to which the Editor responded:

It is probable that the theories of Beauperthuy had already been rife amongst the medical men in the West Indies and on the mainland. Beauperthuy and Finlay will stand bracketed together. . . It is open to everyone to examine the respective writings of both Beauperthuy and Finlay. Both were original thinkers and both came to the same conclusion, but Beauperthuy formulated his opinions earlier; Finlay coming later expressed his views more clearly and in a way more in conformity with modern thinking.

This editorial comment was followed by the following letter to the Editor:

Sir,

The omission of Dr Finlay’s name was a pure inadvertence for which I am very sorry. His work, of course, on the subject, has been all important.

I am, Sir, yours faithfully,

Wm. Osier.

Malaria

During his researches into tropical diseases, Beauperthuy addressed himself also to the problem of malaria and by 1854 considered that, as in yellow fever, the mosquito (but a different variety from the striped-legged Stegomyia) was the vector responsible for transmitting this disease. As early as 1868 he was recommending the use of mosquito nets as an anti-malarial measure[17].

In this context, it is important to remember that Beauperthuy’s observations were long in advance of the demonstration by Sir Patrick Manson (1844-1922) of the role of the mosquito in filariasis sanguinis hominis in 1877; also of Alphonse Laveran (1845-1922) who first revealed the cycle of Plasmodium malariae in 1880; of Albert King (1841-1914) who in 1882 favoured the transmission of malaria by mosquitoes; and of Sir Ronald Ross (1857-1932) who in 1897 finally provided the scientific proof that was needed.

Leprosy

In 1867, Beauperthuy was placed in charge of the local lepers in Cumana, which provided an opportunity for him to make a more careful study of the disease. Lepers had first been seen in Cumana in 1730 and, as elsewhere throughout the world, they were considered to be incurable and treated as pariahs. Beauperthuy’s observations, however, convinced him that the disease was treatable and could be controlled. He disposed of the theory that leprosy was hereditary and concluded that the disease was contagious, a living agent being responsible for the infection and its transmission. Shortly afterwards, in 1871, the Norwegian, Gerhard Armauer Hansen (1841-1912) first demonstrated the leprosy bacillus.

Beauperthuy considered that lepers should be treated in special isolation hospitals, where their resistance to infection could be enhanced by improved hygiene and nutrition. His medicinal treatment was by internal remedies, e.g. mercury bichloride; as external applications he favoured cashew-nut oil (‘l’huile d’acajou’), and the cautery or silver nitrate. On this regime, he was able to demonstrate beneficial responses which, if not complete cures, were at least considerably palliative.

The news of Beauperthuy’s success with his lepers reached Robert Bakewell, the acting medical superintendent of the leper asylum in the neighbouring British colony of Trinidad. Bakewell sent some of his patients to Cumana and also spent three months in Cumana in 1868, following which he provided Governor Gordon of Trinidad with a favourable report[18,19]. In 1869, Governor Gordon forwarded Bakewell’s report to the Secretary of
State for the Colonies, Lord Buckingham, who in turn sent it to the Royal College of Physicians.

The Royal College of Physicians had for some time been taking an interest in leprosy in the West Indies and in 1863 had constituted a Leprosy Committee, composed of five Fellows: Arthur Farre (1811-87), George Rees (1813-89), Edward Greenhow (1814-88), Sir William Gull (1816-90) and Gavin Milroy (1805-86). This committee reported in 1867 that leprosy was ‘a constitutional cachexy’, was not contagious and therefore special isolation facilities for treatment were not recommended. This, in fact, remained the official position of the Royal College of Physicians until, at the Leprosy Conference held in Berlin in 1897, it was convinced that leprosy was a contagious disease[20].

On receipt of Bakewell’s report in 1869, the Royal College of Physicians suggested the appointment of ‘a competent and disinterested person to enquire into the exact evidence of results of Dr Beauperthuy’s treatment’. It was not until Bakewell forwarded a second report in 1870 that the College decided to judge Beauperthuy’s claims.

Meanwhile, it had become Beauperthuy’s ambition to pursue his leprosy researches in a hospital adequately isolated and especially equipped for the purpose. The authorities in Venezuela would not provide the necessary funds. Beauperthuy and Bakewell had become friends and eventually, through Bakewell’s contacts in London, the British government was persuaded to sanction the creation of a leper hospital in British Guiana and Beauperthuy was placed in charge for a period of two years. There was already in British Guiana a leper asylum at Mahaica, 50 km from Georgetown. This was visited by Beauperthuy, who found the cases too advanced and conditions too crowded for his purpose. Governor Scott of British Guiana finally assigned the beautiful little island of Kaow, situated in the river Mazuruni off Bartica, which lay at the confluence of the rivers Mazuruni, Cuyuni and Essequibo. The island was well drained and free of mosquitoes and the hospital, for 60 patients, was built in pavilion style, one patient per hut. This hospital—basic and simple—was the first of its kind in the world to be built exclusively for the study of leprosy.

Beauperthuy arrived in British Guiana in February 1871 and lived in a house at Bartica Grove on the mainland, opposite the island of Kaow. He immediately set to work, being joined in July 1871 by Gavin Milroy, but sadly, two months later, Beauperthuy suffered a stroke and died on 3rd September 1871.

The leper hospital at Kaow was later abandoned.

Beauperthuy, Leprosy and Milroy

Following Beauperthuy’s death, Milroy continued on his travels in the West Indies, visiting Jamaica, Barbados, Antigua and Trinidad, investigating leprosy but also studying other tropical diseases, especially yaws in Jamaica. On his return to England, his Report on Leprosy and Yaws in the West Indies (1873)[21] contained this vivid comment on his visit to the leprosy asylum at Mahaica:

On leaving the building I could not but feel that the case of the leper at the present time is much like that of the poor lunatic at the close of the last century: a hopeless outcast, regarded as a burden and possibly a danger, to be immured and kept apart with only food sufficient for his subsistence.

It was this attitude towards the leper which Beauperthuy had set out to revolutionise. In his report, Milroy described Beauperthuy’s views on the nature and treatment of leprosy but concluded that Beauperthuy’s treatment did not achieve a cure although it did possibly alleviate the leprosy lesions.

The Royal College of Physicians set up a special committee to consider Milroy’s report, consisting of three fellows with experience of leprosy in India: John Jackson (1804-87), William Tilbury Fox (1836-79) and Sir Joseph Fayrer (1824-1907). They concluded that, to date, no cure for leprosy had been discovered and that Beauperthuy’s treatment was not founded on any new principle, differing from others only in detail. However, they went on to say:

Great credit is due to Dr Beauperthuy for re-exciting the flagging attention of the medical profession to the possibility of alleviating the condition of leprosy, especially by improved hygiene and diet and the use of medicinal tonics.

Their report was accepted by the Royal College of Physicians and a Lancet leader, commenting on this verdict, said that the Royal College of Physicians had ‘given the profession what was much needed—viz. a distinct and authoritative decision on the value of the Beauperthuy plan of treating the leprosurs’[22].

The archives of the Royal College of Physicians contain a translated note (which appeared in The Creole Newspaper, Georgetown, 22nd April 1874) by Dr G. F. van Coppenaal, accompanying a letter forwarded to the Colonial Secretary, Lord Kimberley, in which the writer castigates Milroy for a too hasty and erroneous assessment of Beauperthuy’s treatment of lepers[23].

Beauperthuy’s methods were later tried out around the world (Europe, India, South America) with varying degrees of success.

Finale

Louis Daniel Beauperthuy was undoubtedly one of that great band of pioneer medical scientists who, in the second half of the nineteenth century, addressed themselves to unravelling the secrets of tropical disease.

His doctrine of insect-borne diseases and especially his discovery of the association of the Stegomyia mosquito with the spread of yellow fever were fundamental observations on which later investigators could build up more scientifically our knowledge of the nature and control of these diseases.

In the case of leprosy, Beauperthuy may not have discovered a specific cure for the disease, but the enlightened fresh approach he brought to bear on the attitude towards and the handling of lepers provided inspiration for other leprosy workers around the world and also offered fresh hope to the millions of sufferers from that dread disease.
Acknowledgements

I should like to express my appreciation of Madame Rosario Beauperthuy de Benedetti, whose Écrits de Beauperthuy (1985) provides testimony to her efforts, during the past 25 years, to establish appropriate recognition of her illustrious ancestor.

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Before the Computer

In the era of computer medicine even we, the elderly innumerate, know that a byte means information, not mastication. We are trying to love the data base locked away on floppy disk. Did Francis Clifton foresee this when in 1731 he published his ‘Tabular Observations Recommended as the Plainest and Surest Way of Practising and Improving Physic’? He argued that ‘Physic is only improvable by observation’ and added that his ‘experiment is attended with no manner of inconvenience or hazard to the patient’. He created a simple table in which the left-hand column was for recording the age, sex, and occupation of the patient with a comment on the patient’s constitution and ‘way of life as to eating, drinking and exercise.’ The middle column was for morbid phenomena, dated by the day of disease and the calendar date. Then followed a column for remedies and a final right-hand column headed Eventus which translates smoothly to outcome.

Dr Clifton had a short career, ending in mysterious disaster. The son of a merchant of Great Yarmouth, he obtained his MD in the University of Leiden in 1724. He was known for his love and knowledge of the classics and published a Latin edition of the works of Hippocrates. He was so keen on the father of Western medicine that he wrote a paper attempting to show that Hippocrates had anticipated Newton’s work on gravity and published proposals for the printing by subscription of ‘All the works of Hippocrates in Latin and Greek, digested in a new and regular manner’. No one subscribed and the project flopped.

Clifton’s classical learning earned him the friendship of Sir Hans Sloane who helped him to the Fellowship of the Royal Society in 1727 and in setting him up in a fashionable London practice. Cambridge University awarded him an honorary MD in 1728 and the College elected him a Fellow a year later. He gave the Gulstonian Lecture and was appointed physician to the Prince of Wales.

Then suddenly and inexplicably all went wrong for Clifton. Leaving his house in Hanover Square, his rich patients and his influential friends, he set sail in 1734 for Kingston, Jamaica. There he made a start on writing an account of the diseases found in the island but some family disaster seems to have overwhelmed him. On 3rd May 1736 he wrote to Sloane: ‘My misfortunes come so fast upon me and my brother’s provocations were so frequently repeated that I was hurried in a manner to death about them’. Indeed he was, for within a few weeks of writing the letter he died.