



Dr William Osler and the Pictou County cattle disease

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Rural physicians are sometimes called upon to treat or offer an opinion on a sick animal. They carry on a noble tradition; the great Canadian physician of the late 19th and early 20th century, William Osler, was also not just a single-species doctor. Never one to leave an area of inquiry unrecorded, he published at least 13 articles on veterinary topics.¹ Among the topics Dr Osler would study was a mysterious disease that for decades had been afflicting cattle in Pictou County on the Northumberland Shore of Nova Scotia.

The problem

Between 1850 and 1881, Dr William McEachran recorded 1396 cattle deaths in Pictou County, and another 203 in 1881—the highest annual mortality to that date.²

A cow affected with the illness appeared listless, with a drooping head, moist muzzle, and prominent eyes. Its belly was large, its coat dull and greasy, and its legs and tail soiled by black liquid feces. The cow's milk was scanty and bitter, with an offensive smell. In some cases, just before death the cow would run about as if mad, bellowing and boring its horns into the ground. Some observed that their cows would start to decline in the winter and that once the cow started to show signs of the illness it would predictably die within 4 to 30 days. Yet, cows that shared the same stalls and water troughs with cows that died of the disease could remain healthy.

Losing even one cow could be serious for the small diversified family farm of the day. Each component contributed to survival: the wood lot, the fish caught, the orchard, and the vegetable garden. A dairy cow provided milk and butter for the family, and the surplus could be sold. Beef could be sold too, and salt beef was one of the essentials to get a family through the winter. Cattle hides were another important source of income.

The plight of the farmers in Pictou County did not trigger any official Canadian response for years, but in 1880, Dr E.F. Thayer, cattle commissioner for the US Treasury Department, was sent to Nova Scotia to determine whether limitation should be imposed on the export of livestock and hides from Nova Scotia to American soil.

It was Dr Thayer's opinion that the disease was not contagious, but despite this, in June 1881 the US consul in Pictou, Oscar Malmros, refused to allow cow and calf skins awaiting shipment to Boston to proceed.³ The embargo caused anxiety among the farmers facing yet more economic hardship. Mercifully, the embargo was lifted before the end of the summer.

Dr Thayer's theory was that the death of the cattle was caused by eating ragwort (*Senecio jacobaea*).³ Known as Stinking Willie in Scotland and Sweet William in England,* ragwort had been introduced to the area via ballast on a ship from Scotland in 1850.⁴ It was a prolific seed producer (>150000 annually per plant) and the seeds were hardy. Awaiting proper conditions for germination, they could lie dormant on surface soil up to 5 years or, if buried, up to 20 years. Immigrants to the Pictou area were familiar with the weed and did not associate it with cattle disease, but some of the locals suspected a connection, and the town of Pictou had passed an ordinance that land owners who did not destroy the weed would be fined.⁵

Investigations begin

Shortly after Thayer's visit the Canadian Government finally acted. In the fall of 1881 they sent the Inspector of Stock for the Dominion of Canada, Dr Duncan McEachran, to Pictou. Duncan McEachran was from Scotland, where ragwort was not known to cause any problem for cattle, so he was not inclined to agree with Dr Thayer's opinion, or the observation of locals that the disease had never occurred before the arrival of ragwort or on farms where ragwort did not grow. He assembled his team to systematically study the disease: Dr William McEachran (Montreal Veterinary College), to conduct a statistical analysis; Professor George Lawson (Dalhousie College, Halifax, NS), to analyze the area's soil and water; and Professor William Osler (McGill Medical College, Montreal, Que), to report on pathology.

Dr Osler had returned to McGill in 1874 following his postgraduate studies. There his early interest in natural history developed into the study of comparative medicine, which connected medicine and veterinary science. This overlapping interest led to his appointment as Professor at the Montreal Veterinary College at McGill, where he provided the veterinary students with lectures on medicine, a course on animal entozoa, and regular demonstrations of animal pathology. He was a member of the Veterinary Medical Association of Montreal, and in 1880 became its president.

Dr Duncan McEachran interviewed farmers and confirmed the well-known signs that the cattle displayed

*The English called the weed *Sweet William* after the Duke of Cumberland, who defeated the Jacobite uprising in 1745. The Scots detested the Duke for his savage reprisals and called him *Billie the Butcher*, and the weed *Stinking Willie*.

before dying. He then conducted 2 postmortem examinations on cows that died of the disease. He found ascites (5 gallons in the first cow and 4 gallons in the second) and that in both cows the entire alimentary tract had a submucous edematous infiltration, in some places "3/4 of an inch thick." There were also numerous small ulcers along the lining of the alimentary canal that he attributed to "being deprived of nutriment by the sub-mucus infiltrate," and he noted that "The liver was pale and firm ... the vessels were thickened by infiltration of serum."² These were findings similar to those of postmortem examinations conducted by Drs Thayer and William McEachran.

Dr Duncan McEachran sent blood and serum samples as well as pathological specimens to Dr Osler for examination at his McGill laboratory. The pathological specimens gave "no clue to the nature of the disease," but none of the tissues contained bacilli.² Dr Osler stated that the blood had begun to decompose. The white corpuscles seemed to be increased and he could find no bacteria, although there were filaments with little spore-like bodies that closely resembled *Bacillus anthracis*. He then "inoculated" the blood into 2 guinea pigs and 1 rabbit. All 3 animals remained well. He injected 2 mice, which subsequently died of septicemia but "not from the development of the anthrax bacillus." He then said that the experiments were probably not valid owing to the decomposition of the blood.²

Professor Lawson prepared a detailed analysis of the soil and water on the affected farms, which turned up nothing of a suspicious nature. At the end of his report he mentioned ragwort: "The most remarkable plant in the district is a European weed that has become naturalized around the town of Pictou, and in some cases fills whole fields to the exclusion of useful herbage. The range of this plant is to some extent coincident with the prevalence of the cattle disease." However, he concluded, like Duncan McEachran, that "this plant is not uncommon in Britain and other counties in Western Europe, growing in pastures where it is left untouched by the cattle, and no evil effects have ever been attributed to it, so far as can be ascertained from a careful search through the writing of botanists and agriculturists of those countries."²

These various findings were assembled in McEachran's preliminary report, which concluded that the pathology found in the cows was due to a lack of albuminoids in their food. Hay that was harvested late after it had gone to seed was particularly low in nutritional value. McEachran thought the mysterious disease was of a contagious (as yet unknown) nature and that it was incurable. He called for a series of carefully conducted experiments to be done by a competent veterinarian to determine the true nature of the disease. In the meantime, he recommended that the diseased cattle be slaughtered, properly

buried, and their owners paid one-third their value; cows suspected to have the disease should be treated in the same way and their owners paid two-thirds their value; and barns housing diseased cattle should be quarantined until properly disinfected and inspected.

Dr Osler arrives in Pictou

In the following autumn, 1882, Dr Osler was sent by the Minister of Agriculture to Pictou to see if he could shed more light on the nature of the disease. He worked with Dr William McEachran, now the resident inspector. Together they performed 4 postmortem examinations on diseased cows, the findings of which were consistent with the previous autopsy reports. They conducted 5 more experiments from September to December:

- A calf was injected with intestinal fluid from a diseased cow in September. The calf remained well and was sacrificed in December. On postmortem examination there was no evidence of disease.
- A similar experiment was performed on a sheep, with no evidence of disease.
- A 2-year-old steer was fed half a pound of chopped ragwort mixed with bran daily for 2.5 months, with no signs of illness.
- A 2-year-old heifer was fed the same mixture for the same period of time. The heifer displayed no signs of the disease and on postmortem examination her organs were all healthy.
- A 2-year-old heifer was placed in a stall that had been occupied by a diseased cow, and the straw was saturated with excreta. The heifer remained perfectly healthy for 2.5 months and was then sent to quarantine.

The experiments completed, Dr Osler concluded that "we are still in the dark as to the true nature of this affliction." He commented that measures taken to date had not been altogether favourable to scientific investigation and that they needed to establish an experimental station to acquire more data.⁶

Finding the true nature of the disease

For the next 20 years the Pictou County cattle disease continued unabated. In 1902 the Veterinarian-General of Canada, Dr J.R. Rutherford, visited eastern Nova Scotia and witnessed the ongoing unchecked effects of the Pictou County cattle disease. He recommended that a research station within the disease area be set up where the disease could be studied and where feeding and other experiments could be conducted long enough to make the results conclusive.

In 1904 the research station was set up in Cloverville in Antigonish County (by now the disease had spread eastward to Antigonish and Guysborough counties). Dr W.H. Pethick, a veterinarian with special training in pathology, ran a 2-year research program in which he conclusively proved that the cows died of advanced

cirrhosis of the liver, the result of a toxin in ragwort causing hepatitis. The average life of a cow after starting a ragwort feeding program was 17 months. Average life expectancy after signs of the disease developed was 40 days.⁵ Dr Pethick's experiments were the same as Dr Osler's except that he used more cows with specific feeding programs and continued them until he could prove the "true nature and causes" of the disease.⁴

Before the barn door closes

The toxins in ragwort that cause irreversible liver cirrhosis are pyrrolizidine alkaloids. The winds on the Northumberland Strait are westerlies in the summer. Nova Scotia counties to the north, west, and south of Pictou County were not affected by the Pictou County cattle disease.

When faced with a dilemma, Dr Osler did not shrink from saying that he was in the dark. If his feeding experiments had been continued for 24 months instead of 2.5 months he would have discovered the root of the problem. He did insist on looking at the disease in a systematic and thorough manner, an approach that was a hallmark of his career and is pertinent today when we do not have an answer to a medical problem. I vividly remember a farming relative zealously uprooting ragwort. "Bad for the cattle," he would say. An eradication and education program did bring an end to Pictou County cattle disease.

The direction the wind was blowing, spreading ragwort seed along the Northumberland Shore, might not have crossed Dr Osler's mind, but the winds of change were clearly filling the sails of his career. In 1885 he left McGill to become Professor of Clinical Medicine at the University of Pennsylvania in Philadelphia. In 1888 he moved on to Johns Hopkins Hospital in Baltimore, where he became a founder and first Physician-in-Chief of Johns Hopkins School of Medicine. To cap off his career, in 1904 he was appointed Regius Professor of Medicine at Oxford University in England. 

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Competing interests

None declared

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