

The Coprolite Industry in South East Cambridgeshire

Introduction

The mining of Coprolites (somewhat incorrectly known as fossilised dinosaur dung) provided a short lived economic boom in the mid- to late-nineteenth century (approximately 1860 to 1890) in this part of Cambridgeshire. There was a need to find new sources of fertiliser in Britain due to:

- increased demand for food due to population increase,
- movement of people from rural to urban environments,
- improved farming methods (requiring more fertiliser), and
- the high cost of imported fertiliser.

In the 1830s bones were discovered to be a useful source of phosphate fertiliser and when dinosaur deposits were discovered in Southern England it was soon realised that these could also provide a relatively cheap supply of this fertiliser. In our neighbourhood phosphatic material was found along a geological outcrop, the Cambridgeshire Greensand, stretching from Soham to Royston.

However the boom did not last as:

- From 1878 cheaper imports of fertiliser from abroad, particularly the US,
- Poor weather. In the late 1870s there was a period of several years of heavy rain,
- This ruined crops and reduced harvests. Farmers therefore didn't apply fertiliser if the crop was destroyed and also couldn't afford as much fertiliser,
- It also meant that working in the coprolite pits was more dangerous,
- Free trade meant that there was an influx of cheap grain and meat (following improvement in refrigeration). This, combined with the poor harvests, meant a significant depression in agriculture in the 1880s,
- Depletion of coprolite seams
- Increases in freight charges'
- New government regulations (1894) laying down strict safety rules for pits deeper than 25 feet.

What is Coprolite ?

The term coprolite was first introduced by Rev. William Buckland, The Dean of Winchester and the first professor of Geology and mineralogy at Oxford University. Its basis is the Greek "kopros" meaning dung and "lithos" meaning stone.

However, there was significant misunderstanding and a number of different terms have been found in census data for the period: copperlight, copper light, coperlite, copperlite, (possibly due to a confusion with belief that they were copper deposits) and corporolite, coprelite, coprolithe, coparlite, coproilite, coperalite, coupperlite, coprolite in addition to the correct form: coprolite.

Geologists felt that the deposits should not strictly be termed coprolites and the term is now used to describe phosphatic nodules of various origins. Cambridgeshire coprolite is believed to be made from the fossilised teeth, bones and claws of a variety of land and marine organisms and the shells and internal casts of mollusc such as *Halamites* and *Ammonites* in which the original calcareous material has been replaced by phosphate of lime. Unsurprisingly, the term 'coprolites' stuck as a marketing term and local descriptions of the industry. However, a sample from Barrington has been shown to be a dinosaur's rectal content.

The colour of the nodules ranged from brown to grey or black with a blue hue.

The phosphate content of the nodules ranged from 14-70% (percentage of phosphorous pentoxide). Yields varied. The average was about 250 tons per acre worth up to £ 650 per acre (compared with agricultural rents of about £2.00 per acre). However, there could be patches without any deposits.

Phosphate as fertiliser

During the nineteenth century scientists had discovered that addition of phosphate to the soil could improve productivity as it was a major nutrient in plant growth. Agriculturalists were therefore interested in finding cheap sources of this material. In 1828 phosphate material was imported from Canada (rock phosphate/phosphorite) and then guano (phosphate rich bird droppings imported from South America). However, these were relatively expensive. Guano sold for £12 per ton in the late 1830s. The "real price" of £12 in 1830 would be £878.70 in 2013 (the labour value would be £ 8.853 and the income value £14,130)¹.

Slightly later it was discovered that bones could be a source of phosphate and an industry developed methods of crushing or burning bones from the knackers' yard and selling as bone meal. However, local sources were not enough so bones were imported from abroad. In 1839 the bone business was estimated to be worth £ 150,000 annually (current "real price" approximately £11m), even though the method of release of the chemicals into the soil was not very efficient.

In the midnineteenth century another source was found - fossils. In 1842 the professor of Botany at Cambridge, Rev. John Henslow, realised that fossils that he found in the Suffolk Red Crag near Felixstowe could possibly be a source of phosphates. A Hertfordshire landowner tried dissolving phosphorite, animal bones and samples from the deposits near Felixstowe in sulphuric acid. This resulted in a solution high in phosphates which could be absorbed more effectively by plant roots. He called it superphosphate of lime. . He produced 200 tons per week and sold it at up to £7 per ton.

Modern gardeners will be familiar with both bone meal and superphosphate of lime as fertilisers.

Mining and processing

In most cases the coprolites had to be dug out from between 3 and 6 metres. Tools ranged from simple shovels, pick axes and crowbars to more extensive workings with planks and even tramways to ship the material excavated. At Bassingbourn a shaft was dug and the material brought up by steam power. However, most mining was open cast and even at Bassingbourn they soon returned to more conventional methods as the seams were not very thick.

An essential component was a mill to clean the earth around the fossils. These could be horse or steam driven and became more sophisticated as the extent of mining developed.

The whole process became much more mechanised when some major seams were reopened and worked during World War 1. However this was not in Meldreth.

¹ Real price uses RPI for the calculation

Labour value is the relative wage someone would need to buy the commodity

Income value uses the relative average income that would be required to buy this amount of the commodity. It uses GDP per capita

	MATERIAL	PROCESS	LOCATION
1	In Earth	Dig Trench then Dig Out the Fossils ("Mined")	Farmland
2	Nodules	Washed	On Site or Local Wash Mill
3	Washed Nodules	Milled	Local Coprolite Mill Meldreth Station
4	Coprolite Powder	Manufacture	Manufacturer's Buildings e.g. Cambridge Manure Company, Duxford
5	Super phosphate	Distribution	Distributing Company e.g. Joseph Fison, Shelford

Accidents were numerous. Drowning in flooded workings, material falling on workers, people run over by vehicles or clothing being caught in machinery were all reported in the local press

Sometimes crops were damaged. There is a record of Herbert Fordham being accused of damaging G Warren's barley crop in Meldreth. £5 10s was agreed as compensation.

Impact on the local economy

The advent of the coprolite industry had a very significant effect on the economic and social life of the villages affected.

Farmers realised that they could make more from coprolite workings than farming (although the seams were sometimes fairly thin. Agricultural labourers were able to demand higher wages for working at coprolite digging and there was an influx of external labourers. Equipment, buildings and accommodation were required and entrepreneurs stepped in as contractors with machinery and processing plant. Banks were keen to make loans to support the investment in the coprolite industry.

However, as we have seen, the "boom" was short lived and several of the entrepreneurs went bankrupt and the farm labourers had a hard time after the boom as farming also hit a period of depression as the coprolite industry declined.

There were a number of different systems of working the land for coprolite:

- Initially, especially on smaller finds, the farmer might work it himself; depending on whether he owned or leased the land. Work would normally be carried out during the slack farming periods during the winter months;
- Later, and for larger scale operations, a contractor would be engaged. This might involve local tenants losing their farmhouses to accommodate managers and workers for the contractor. After about 1870 the coprolite firms would approach the landowner to negotiate terms for extraction. Initially royalty payments were by weight of coprolite extracted, which meant the use of weigh bridges. Later royalties were paid in relation to the amount of land dug over in a year. This involved work for land agents and surveying firms like Bidwell and Carter Jonas who are still in existence today.

Royalties could range from an annual amount of £30 to £400 per acre, with an average of approximately £100. This was significantly higher than agricultural rents of the period (at about £2-2.50 per acre). A tenant farmer could be compensated at a rate of about £10 per acre.

In the 1870s the weekly wage for an agricultural labourer would be 7s (35p) to 14s (70p) per week. In comparison the average weekly wage for coprolite workers was £2-£3, often payment was by cubic yard dug. Woman and girls were also employed. This competing higher wage meant that farmers had to raise their agricultural wage or reduce their cottage rents.

This obviously impacted on the local businesses and it was a boom time for local enterprises such as various artisans. There were collateral economic advantages as buildings were constructed and there was an increase in purchases from local stores. The breweries were particular beneficiaries. In Whaddon the "barracks" built for the labourers each had a beer house in the men's quarters. There are accounts of concern about the effect of the new labourers on the morals of the villages. In 1885 a fossil digger was fined 15s (0.75p) for being drunk and disorderly in Melbourn. The Cambridge University and Coprolite Visiting Societies were established to evangelise amongst the diggers. In Bassingbourn, the local Congregational Church built a large room for reading and instruction of the workers and employed an evangelist and there are reports of the workers getting involved in sports and other leisure activities.

Acknowledgements and further reading

I am hugely indebted to the excellent publications and lectures given by Bernard O'Connor based on extensive research on the subject: <http://bernardoconnor.org.uk/>. His books can be purchased at www.lulu.com/spotlight/coprolite

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