

The 'Manchester Tinea', *Euclementia woodiella* (Curtis, 1830) (Lepidoptera: Cosmopterigidae), an entomological mystery unravelled

BRIAN V. RIDOUT

The Jenny Ring, Yielding Tree, Watery Lane, Broome, West Midlands DY9 0EL, U.K.

Synopsis

Specimens of *Euclementia woodiella* were collected on Kersal Moor, Manchester, in June 1829 but the species had never been found in the U.K. again. This paper demonstrates that it still occurs in the oak woodlands of the eastern U.S.A. and was probably brought to England in a cargo of bark.

Key words: Lepidoptera, Cosmopterigidae, *Euclementia woodiella*, history, identity, provenance.

Introduction

The story of the discovery and loss of this little yellowish orange moth by the intemperate Robert Cribb and an angry beer-house landlady in Manchester has been told many times (e.g. Brindle, 1952). Cribb's moth was never found again and the general conclusion remains that it became extinct. This is an unsatisfactory conclusion because it requires us to explain why the moth had become restricted to one hollow tree in a relatively undisturbed but frequently visited habitat. Contemporary entomologists searched diligently for the insect and doubtless so did many others during the course of the nineteenth century. Why could they not find it? This study examines all of the available evidence and provides a solution to the problem.

Found and lost

In January 1829 a group of dedicated naturalists in the Manchester area formed the Banksian Society, named in memory of Sir Joseph Banks, botanist, explorer and President of the Royal Society. The aim of the Society was to gather knowledge of botany, entomology and other natural sciences, by discussions, lectures and the formation of collections. Each member was expected to donate three perfect specimens each year. These were not people with significant leisure time, but men who might work ten or twelve hours a day, six days a week (Cash, 1873) and were prepared to walk, perhaps ten or twenty miles each way, to a good collecting location. One of these men was probably Robert Cribb and one of these locations was Kersal Moor. (The Manchester rate books show a Robert Cribbs in 1828 but a Robert Cribb is not recorded until 1837.)

Kersal Moor was unusually convenient for the Banksian Society members because it was a small area of undisturbed moorland that was only about two and a half miles from the centre of Manchester. Cosmo Melvill could still describe it in 1924 as '*probably the only relic left of primitive uncultivated land so near that immense centre of manufacture and population*'. It was here that Cribb (or Cribbs) obtained, over two or three days in mid June 1829, thirty to sixty (the number is uncertain) small yellowish orange moths flying around a hollow tree.

Our knowledge of this story comes from an account given by Joseph Sidebotham in 1884 to the Lancashire and Cheshire Entomological Society and subsequently published in *The Entomologist* (1884). He had heard the tale in 1840, probably from Sam Carter (see below) at a meeting of the Manchester Natural History Club (at the Manchester Mechanics Institute), to which the remaining members of the Banksian Society had migrated when the Society closed in 1836.

Sidebotham states that Cribb gave two specimens of his moth to Sam Carter (a cabinet maker), one to George Crozier (a saddler) and one to R. Wood. Crozier is an unlikely recipient because he did not move to Manchester until 1831 (Cash, 1873) and it seems probable that the three specimens still extant (Carter's and Wood's) were the only ones given away. This number may actually represent Cribb or Carter's required contribution to the Banksian Society. Surviving records (Banksian Society, 1829–1836) indicate that monthly meetings started with the exhibition and identification of specimens. It may have been at one of these meetings that R. Wood was asked to send one specimen to John Curtis, with whom he had evidently been corresponding.

Whatever the exact sequence of events, Curtis described the moth as *Pancalia woodiella* in volume 6 of his *British Entomology* (1830). Accompanying the illustration was a dedication: '*it was taken on Kersall Moor the middle of June by Mr R. Wood of Manchester to whom I have the pleasure of dedicating it – a most zealous and successful naturalist, to whose liberality I am indebted for this and many other valuable insects.*' (Curtis, 1830: 305). (The spelling of Kersall varies.)

The fact that Cribb discovered what had happened also suggests a close association with the Banksian Society because the minute book shows that the committee had voted to subscribe to the Curtis publication, and this expensive work would probably not have otherwise been available to an amateur working class naturalist.

Cribb was furious that the moth was named after Wood and refused to part with anymore specimens. Eventually, intemperate and presumably insolvent, he deposited the box with the landlady of a beer house in the Oldham Road as a pledge for a bar bill.

Sam Carter, described by Cash as '*a lad amongst the old men of the Banksian Society*', was determined to obtain the remainder of the insects and offered to pay the bill and to give an extra ten shillings as well. Unfortunately the landlady had grown tired of waiting and had put the box on the fire.

There were now only three specimens of *E. woodiella* extant. The Curtis type went with him when he emigrated to Australia and is now in the Museum Victoria in Melbourne. The two remaining moths were in Carter's collection, either because he had been given them as Sidebotham claimed, or because Carter, who was curator of the Banksian Societies insect cabinet, acquired them when declining attendance and non-payment of subscriptions closed the Society. Carter's two moths were sold with the rest of his collection to the Manchester Museum of Natural History. One of the specimens is now in the Manchester Museum, whilst the other was exchanged by Lord Walsingham for a representative collection of over 2,000 British Microlepidoptera and is now in the Natural History Museum, London. All three specimens are shown in Figs 1–3 to illustrate pattern variability.

The Curtis type retains its original pin and bears only a recent holotype label and a genitalia slide number so that it would seem that Cribb did not label his specimens. Both the Manchester and the London insects have been subsequently double mounted, and each bears a label that reads 'Kearsall Moor, MANCHESTER, m.vi.1829, R. Cribb (S. Carter coll) Manchester Museum'. This must have been added after Carter's collection was sold to the Museum and there are no earlier labels.

The genus *Euclementia* Grote, 1878

Pancalia woodiella moved from genus to genus and from family to family until John D. Bradley (1953) formally declared that it was a species of *Euclementia*. The synonymy is given by Bradley but he states that his was not an original determination because someone had already assigned the London specimen to that genus in the Museum collection. This is interesting because Melvill (1924) states 'quite recently, however, the genus *Euclementia* has been proposed for *woodiella* as type and only species'. This is wrong – *Euclementia* was erected by Grote (1878) for *Hamadryas bassettella* Clemens, as the genus name *Hamadryas* was preoccupied.

The informal reassignment of *E. woodiella* seems to have occurred just prior to the incorporation of the Walsingham collection into the Natural History Museum following its donation in 1910. This would have been by John Hartley Durrant, who had been Walsingham's Private Secretary and Entomological Assistant and was 'bequeathed' to the museum with the collection. Both the Manchester and the London specimens carry paratype labels which they are not entitled to because they were not included with the specimen Curtis described. The Manchester specimen has 'det 1910' and both have Durrant's monogram. The Manchester specimen is named as *Euclementia woodiella* and carries the male sex symbol. The London specimen is labelled as *Pancalia woodiella* (*Euclementia* squeezed in as an afterthought) and carries the female symbol, although it is a male, as is the Curtis type. The Manchester specimen looks a little different from the other two and may be a female.

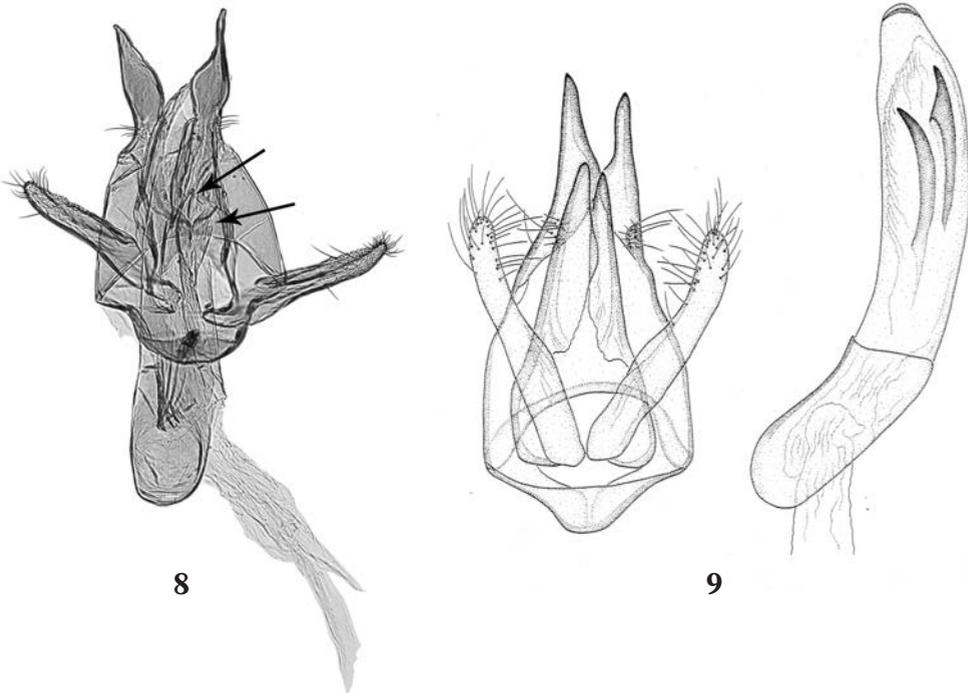
The genus *Euclementia* currently contains four species in addition to *E. woodiella*. Two are only known from the type specimens and their biology is unknown, but *E. bassettella* and *E. schwarziella* are both associated with gall-like scale insects (Coccoidea, Kermesidae). This family of Hemiptera is mostly associated with oak trees.

The female scale insects live on bark wounds, along branches and on new growth. The second instar females secrete a hard waxy covering and when they are sexually mature their integument becomes heavily sclerotized so that they resemble a gall. That 'gall' protects the several thousand eggs laid by the female in the brood chamber beneath her (Hamon, Lambdin & Koszarab, 1976).

Hollinger & Parks (1919) found that the larvae of *E. bassettella* lived within the gall-like body of the female, feeding on the dead insect and the egg mass she had laid. The sequence (for the moth) of egg laying and larval behaviour that resulted in this is unknown, but the fully grown larvae (about 5 mm long by 2 mm thick) were each found living in a U shaped burrow within a scale insect. When ready to pupate they made a circular hole in the scale, which was then sealed with silk



Figs 1–7. *Euclementia* spp. 1, *E. woodiella*, Holotype, Museum of Victoria, Melbourne. 2, *E. woodiella*, Natural History Museum London (specimen BMNH (E) #1324997) Kearsall Moor, Manchester. 3, *E. woodiella*, Manchester Museum, Kearsall Moor, Manchester. 4, *E. schwarziella*, Type no 5356 US National Museum, Santa Rita Mountains Arizona. 5, *Euclementia* sp. Lady Bird Johnson Wildflower Centre, Austin, Texas. 6, detail of 5 showing white palps and face. 7, detail of 1 showing white palps and face.



Figs 8, 9. *Euclemensia* spp. 8, *E. schwarziella*, Type ♂ No 5356, Slide No 7781. 9, *E. woodiella*, Holotype ♂, Slide JFL 1478 (MMA), reproduced with kind permission from Koster & Sinev (2003). (Curtis had incorrectly described this specimen as a female!)



Fig. 10. *Manchester from Kersal Moor*. Water colour by William Wyld, 1852. Royal Collection Trust.

so that the emerging moth only had to push through the prepared exit hole to escape. *E. bassettella* seems to have an extensive distribution, being found along most of the east coast of the USA where it infests a range of Kermesidae living on a variety of oak species.

Euclementia schwarziella was described by Busck in 1900 from six specimens sent to him by E. A. Schwarz. These emerged in June from some type of *Kermes* living on oak in the Santa Rita Mountains, Arizona.

In July 2013 Valerie Bugh of the North American Photographers Group at the Mississippi Entomological Museum photographed a moth, thought to be *E. schwarziella*, at the Lady Bird Johnson Wildflower Centre in Austin, Texas. This identification was made using Hodges (1978) but the illustration in that book is very small. When the Austin specimen is compared with the type of *E. schwarziella* (Figs 4, 5) it can be seen that there are similarities but also differences, particularly in the intensity of the white on the costal margin of the forewing. Other differences may not be significant because Hodges (1978), working with the type series and also specimens from Nogales, Arizona, observed that '*the forewing pattern varies in degree of separation of the orange marks*'. He also notes that the forewing length is variable (5.0–5.3 mm). The significance of such small differences in markings is unclear, but Austin is 900 miles away from the Santa Rita Mountains on the other side of the country so there may be population variations.

If we compare the Austin specimen with the holotype of *E. woodiella* (Figs 1, 5) then we find that the patterns are very similar. The most noticeable difference between the two insects appears to be the white on the head and legs, but Cribb's moths are now almost 200 years old, faded and in poor condition. A closer image shows that the face and legs of Cribb's insect are also white (Fig. 7) and we conclude that the Austin specimen is the lost *Euclementia woodiella*. There is a strong suggestion that *E. schwarziella* is a junior synonym of *E. woodiella* but to confirm this further material must be studied.

Each specimen of the syntypic series of *E. schwarziella* bears the label 'Type No 5356' and Hodges designated a female as the Lectotype. He studied a male from the series and Hodges states that it has '*two stout cornuti in the vesica; the male of bassettella has one cornutus*'. Figure 8 shows the genitalia of one of the series. The two cornuti are not easily visible (see arrows) because the aedeagus has not been removed from the armature, but they are visible in *E. woodiella* (Fig. 9). The genitalia of the two species are very similar, but Lee & Brown (2011) also found this with *E. bassettella* and their new species *E. barksdaleensis* (also called *E. barksdaleella* in the same paper). They concluded that these species cannot be reliably differentiated by the genitalia.

Why was *Euclementia woodiella* in Manchester?

The similarities between *E. woodiella*, *E. schwarziella* and the Austin *Euclementia* sp. are so marked that it seems probable that *E. woodiella* was accidentally imported from the east coast of the U.S.A. This is not a novel suggestion because Bradley (1953) thought it might have been imported with un-barked oak logs and Koster & Sinev (2003) suggested un-barked small trees although neither suggested where from. Either may be correct, but both present problems because Latham (1967), in his history of the Liverpool timber trade,

states that timber was imported from the U.S.A. as baulks and even his illustrations of 'logs' show huge squared timbers. Presumably sawn timber would stow more economically and efficiently than round. The exceptions to this might perhaps be valuable veneer logs for peeling and curved live oak (evergreen oaks) timbers that were used for smaller components of ships. Live oak imported from the Southern States of the U.S.A. seems a possibility, but were these timbers imported un-barked and why would a stowaway moth end up on Kersal Moor, 50 miles from the docks and the shipyards?

Bark was important because it was a valuable commodity in its own right and not likely to be exported on timber. About 90% of the tanning industry still used oak bark, and the tanning industry was heavily dependent on the timber industry. The level of bark consumption was dependent on the demand for leather and, since more than half the output was used for footwear, demand was driven by population density (Clarkson, 1974). The population of Manchester increased dramatically during the XIX Century because of developments in the textile industry and the demand for bark could not have been supplied by home-grown trees. Monteath (1831: 354) describes the situation in 1831:

'there is also vast quantities of foreign bark imported into the London and Liverpool markets. Some of the French and Dutch coppice oak sells at the same price as the Welsh bark: there is also a large quantity imported from America, Russia and Norway but it is of a much coarser and inferior quality.'

Monteath also informs us that (at least in Scotland) the bark is stripped from the trees and air dried for 8–10 days, before cutting into about 3 inch (75 mm) lengths and packing into sacks.

If the American processing was similar, then 5 mm scale insects in rough bark might not be damaged and any moth larvae within them would also be protected by the hard waxy kermes shell under which they were living.

A second possibility would be bark from the Eastern Black Oak (*Quercus velutina* Lam.) the inner bark of which was used to produce the yellow pigment Quercitron. This tree grows on the eastern side of North America, from Canada to the U.S.A. (Georgia). The dye was discovered and patented by Edward Bancroft in 1775 and when his patent expired in 1799 it became the most cost effective source of colours from lemon yellow to chocolate in what was known as the 'drab style'. The pigment was used in large quantities by textile dyers and printers until it began to be supplanted by chrome yellow in the 1830s. The best quality came from the ground inner bark, but the outer bark could also be used. It was also useful for tanning.

'American Artisan', writing in *The Prairie Farmer* in 1870, informs us that 'much or most' of the product was exported to Liverpool and that it either came from Philadelphia as ground inner bark packed in hogsheads (a size of cask) or from Baltimore packed in bags. The Baltimore product was much cheaper because it was of inferior quality. This probably meant that it was a coarser mix, which perhaps contained lumps of outer bark.

Much of the industrial expansion in Manchester was along the banks of the River Irwell because imported goods and raw materials were brought by sailing barges down the Mersey Irwell Navigation. This was a route constructed in the eighteenth century by joining up the Mersey and Irwell with various man-made channels and eight locks. The purpose was to provide a direct route from the Port

of Liverpool to the industrial heart of Manchester and the journey of about 50 miles could be accomplished in around 24 hours (Corbridge, 1979). A section of the Irwell, just after Salford, meandered across Kersal Moor (Fig. 10) and any moths emerging, perhaps from an open or damaged bag of bark, could have been conveyed directly to the location where Cribb discovered *E. woodiella*. The printing and dying of textiles was a major industry in Manchester. The Ordnance Survey Map of 1848 shows a print works across the Irwell from Kersal Moor, whilst Fig. 10 shows industrial Manchester from the Moor in 1852. The Moor was a small area of countryside encircled by industry.

The number of moths Cribb found (30–60) is significant because it must mean that either the species was breeding or a large number had emerged from a cargo at the same time. The latter may be correct, but it is highly unlikely that a large group would ultimately congregate around the same tree unless it was the only tree in the area with *Kermes*, which seems improbable. Koster & Sinev (2003) have stated that the European *Kermes* are only about 5 mm long and too small to act as a host for the moths but this is not correct. Two species of scale insects definitely associated with *E. bassettella* are *Allokermes galliformis* and *A. kingii* – both are 5 mm long (Kosztarab, 1996). However, if *E. woodiella* could breed on Kersal Moor then why was there such a small population that Cribb could catch them all and no one else could find any? The likely solution would seem to be that the population that Cribb found was the progeny of a single fertile female in June 1828. Any other fertile females, leaving a moving barge, either did not find a suitable habitat or established temporary colonies that died out without being discovered.

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