

The Perth Museum Brandt's bat *Myotis brandtii*, collected in the 19th century, the first record for Scotland?

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The first, and until 2013, the only known record of Brandt's bat *Myotis brandtii* from Scotland is a single specimen currently held in the collections of Perth Museum and Art Gallery. The record is from a location in the southern Highlands, near Kinloch Rannoch, Perthshire, but the species distribution known from the late 20th Century extended northwards from England and Wales only as far north as the English side of the border with Scotland. For example R.E. Stebbings recorded Brandt's bat from bat roost boxes in Kielder Forest, in Northumberland, England, very close to the border with the Scottish Borders Council, Scotland (Stebbing and Walsh 1985).

The origin of the Perth Museum Brandt's bat

The Perth Museum bat was originally identified as a whiskered bat *Myotis mystacinus*, a species very similar in morphology to Brandt's bat. The species *Myotis brandtii* was described in 1845 by Eversmann based on Russian specimens, but was not recognised as a separate species resident in Europe until 1970 (Hanak 1970). It was proposed by G. Topal, (Hungary) in 1958 and V. Hanak (Czechoslovakia) in 1965, based on specimens from Central Europe, that there were two separate species of whiskered bat in Europe, viz. *M. mystacinus* and *M. brandtii*. It was only after 1970 that "whiskered bats" were examined widely in Europe to determine which species they should be assigned to, and as a result the distribution of Brandt's bat is now recognised to extend from the United Kingdom, France and Scandinavia eastwards through Siberia to the Kamchatka peninsula, Sakhalin island and northern Japan [from its distribution shown in Harris & Yalden (editors) 2008].

The Perth Museum specimen was identified by Oldfield Thomas as *Vespertilio mystacinus* Kuhl on 18.6.1891 (Perth Museum records). The name also illustrates change in scientific nomenclature and classification, since the genus *Myotis* was described by Kaup in 1829 but at the time of the identification, *Myotis* bats and other Vespertilionid bats

(species in the family Vespertilionidae) in the UK were included in the older genus *Vespertilio*. Carl Linnaeus published *Vespertilio* in 1758 in the original edition of *Systema Naturae*, but in the present day only two species are assigned to this genus, including *Vespertilio murinus*, the parti-coloured bat, found in continental Europe and an occasional vagrant in the UK.

Oldfield Thomas worked in the Zoological Department of the Natural History Museum in London from 1878 until 1929 (at the age of 71 he committed suicide by shooting himself with a handgun while sitting at his museum desk). (Obituary, 1929)

The first published information on the bat specimen appears in a book by William Evans (1892). In a reference to the whiskered bat, he states (p.23): (referring to a Mr. Harting) "I am indebted for a clue which has enabled me to trace an undoubted Scotch example (the only one on record) of this species also. The specimen, which is in the Manchester Museum (Owens College), was captured by Mr. J. Ray Hardy of that institution, who writes me as follows:- "I took the Bat you mention about four miles from Rannoch on the road to Pitlochry, early in June 1874, while sugaring for *Noctuae*. I struck at him with my entomological net, and the cane rim caught him and knocked him down. He died in my hand." "

A later account was given by J.A. Harvie-Brown (1906), who quotes the location given by Evans, but goes on to say: "On applying to Mr. Hoyle of Owens College Museum, and asking for further particulars, that gentleman informed me it was "obtained at Dall, in the Black Wood of Rannoch." This lies in the opposite direction from Kinloch Rannoch (which I presume is what is meant by "Rannoch" as quoted) and from "the Pitlochry road," and thus, being about four miles from Rannoch, would give a locality some eight miles further west. Mr. Hoyle also adds that "the Rannoch specimen was probably taken in July 1865." Mr. Evans quoted direct from information supplied by Mr. Ray Hardy himself, but when I pressed this point, Mr. Hoyle wrote that he had interviewed Mr. Ray Hardy also, and the latter, at such distance of time, could not feel quite certain of the exact locality, and advised the acceptance of Dall as the true one. It may seem finical to insist upon such a slight difference in the two accounts, but it might prove of more importance than appears on the surface, because the characters of the two localities are very different, Dall being within, or close to, the old original Black

Wood of Rannoch and amongst pines, and the Pitlochry road being mostly fringed with natural birch and hardwoods."

The precise locality and the date of collection are therefore not known with certainty. Loch Rannoch runs west to east for 16km (10 miles), with the village of Kinloch Rannoch at its eastern end. The area is well known to Lepidopterists and a number of moth species were originally found here. Species with common names like "Rannoch Sprawler", "Rannoch Brindled Beauty" and "Rannoch Looper" are evidence of this. The Black Wood of Rannoch is approximately mid-way along the southern side of the loch. "Four miles from Rannoch on the Pitlochry road" suggests a locality approximately mid-way between Loch Rannoch and Loch Tummel on the B846 road. If one accepts Harvie-Brown's interpretation, then the locality is likely to be in the Caledonian Pine Forest remnant of the Black Wood of Rannoch (geographical coordinates 56°40'N 4°20'W). "Dall" in the 19th Century was Dall House plus associated estate buildings and housing. Today Dall is little changed from the late 19th century, as shown in a contemporary map, other than a few more houses built to the south of Dall House. The precise locality of collection in the Black Wood is unknown. There is a remnant of the original Black Wood straddling the Dall Burn at O.S. grid reference NN 586 555. It can only be a guess that if Hardy was "Sugaring for *Noctuae*" (moths) he would not have to go far along the Dall Burn to find a good location within the Black Wood. However the different versions of the date of collection mean that it could be either in July 1865 (Harvie-Brown 1906) or June 1874 (Evans 1892).

John Ray Hardy was a well-known entomologist at the Manchester Museum. Prior to his employment in this museum, he was Keeper of the Queen's Park Museum, Harpurhey, Manchester. During the 1880s he was involved in conservation

and transfer of collections from the Manchester Natural History Society and the Manchester Geological Society to the new museum buildings formally opened in 1888. He became an Assistant Keeper in the Zoology Department (the Manchester Museum) in 1889, and from 1901 held the title of Senior Assistant Keeper and Curator of Entomology until his retirement in 1918 (Standen 1921).

“Sugaring for *Noctuae*” refers to the practice, still used, of sugaring for moths, or smearing a sugary mixture on the bark of trees to attract Lepidoptera (*Noctuae* refers to moths in the genus *Noctua*, for example the large yellow underwing *Noctua pronuba*). It is reasonable to assume that while Hardy was sugaring for moths in the early part of the night, the bat flew in the vicinity of the sugaring site, perhaps attracted by the moths coming for the bait, or perhaps simply foraging in the area. He presumably swiped at it with his entomological net, hoping to catch it, but instead killed the bat with the rim of the net.

As to the date of collection, I have not been able to establish without doubt when Hardy was in the area, but his obituary, published in The Lancashire and Cheshire Naturalist (Standen 1921) provides some clues. John Ray Hardy was born on “Easter Sunday 1844” [7th April] and died on April 5th 1921. The obituary mentions that “... he collected extensively in Lancashire and adjoining counties, the Lincolnshire Fens, and North Wales. Later, he extended his excursions to Ireland and Scotland, on several occasions spending six months in a season at Killarney, or Rannoch (sic)” The implication is that he spent some months in the Rannoch area early in his life. There is also a mention of him collecting a rare beetle during a visit to Killarney in 1866. It is possible that Hardy collected the bat on a visit to the Black Wood of Rannoch in July 1865 when he was aged 21, the year prior to collecting in

Ireland. In his obituary there is a description of a trip to America in 1872 “to collect Coleoptera etc., on behalf of several gentlemen interested in Entomology” and “returning to England, after an absence of about 2 years” which suggests he returned home by 1874. Did he then make a collecting trip to Rannoch to collect insects in June 1874, rather than working on the collection made in America, “a great quantity of material, chiefly Insects, Mollusca, and Birds”? In my opinion, based on further investigation of collections made by Hardy, the later date is more likely.

Hardy and his entomological collections at the Manchester Museum

I visited the Manchester Museum in December 2015 in order to examine specimens collected by Hardy, and to look for any documentation of his collecting. As Dr. Dmitri Logunov (Curator of Arthropods at The Manchester Museum) previously explained to me, there was very little published information from Hardy during his time at the museum, labelling of specimens was often very basic, and some of the lepidopteran and coleopteran material he had apparently collected was not present in the current collection, with no historical explanation for its absence.

Colin Johnson of the Entomology Department, The Manchester Museum, published a review in 2004, “British Coleoptera Collections in the Manchester Museum”. He provides accounts and biographies of collectors, and his comments under John Ray Hardy are significant.

Here are some of Johnston’s comments: “Notes: most locality data in his collection is very unreliable” “Specimens are/ were kept in small glass-topped circular pill boxes and printed locality labels placed inside next to the specimens; these pill boxes may also have similar or different data handwritten underneath each pill box. It is quite common to find numbers of

chalk land species of south eastern England labelled as being “shaken out of refuse, Mersey Banks” as well as many Scottish pine forest species labelled Sherwood! Some card mounts are actually recognisable as coming from several separate collectors, but this is either not acknowledged or erroneous information is given. Hardy’s old records, even when published, should not be uncritically accepted nowadays” “Hardy and Sidebotham were the last links with the old Natural History Museum and Owen’s College, and they came from an age when the importance of precise capture data of insects and other natural history specimens was only starting to be appreciated.”

I looked through hundreds of Coleoptera specimens in the Hardy Collection cabinet, hoping to find some with precise locality and date data from the 1860s or 1870s but found that this sort of information only started to appear in the 1880s, with dates including months only becoming the norm from 1900 onwards. There were a few early specimens labelled “Rannoch” with no other data. The earliest specimen with more precise information (because clearly he collected from “Rannoch” on a number of occasions) was a Chrysomelid beetle labelled on the box “Rannoch, Perthshire, off Birch, Dall JRH” and alongside the specimen “Rannoch 1883”. Incidentally, in his handwriting, “Rannoch” can look like “Rannock”, but I believe he always spelled it correctly with an “h”.

Although Hardy published a number of notes and short papers in “The Entomologist’s Monthly Magazine” from 1865 onwards, I could not find any reference to collecting in Scotland. He wrote a letter from his Manchester address, published in his journal, dated January 1874, so he can be presumed to be back from his American travels by then. Although my search of his beetle collection was not exhaustive, I found only one pill box containing beetles presumably

from his transatlantic expedition. These were unidentified Chrysomelids simply labelled “Arizona” with no other data.

Hardy’s obituary includes some telling statements: “He was an excellent taxidermist and osteologist; a keen ornithologist, and entomologist, with a special liking for Beetles which were, first and always, his chief favourites, and a group in which he made many important discoveries. It was unfortunate that these discoveries should, in many cases through his reluctance to place them on record, fall to the credit of others who subsequently published them. Of late years he fully recognised the importance of recording notes and observations, as will be seen on reference to the prior volumes of this journal (sic). But it will always be a matter of regret to his friends that the many interesting observations made during his long life, which he could relate in the course of conversation but had never published and much valuable information he had acquired, should in a measure, die with him.” (Standen 1921).

Early specimens of bats in the Manchester Museum

I was also able to examine bat specimens from the 19th century currently in the museum’s collection. Although the current collection is well documented and recorded on a computer database, there are no records of how the earliest specimens originally came to be in the collection, other than those labels for the specimens themselves. The condition, and mode of preservation of the Perth bat, indicates that it must have been prepared soon after collection, and not after a gap of years as either a dried specimen or preserved in spirit. The only other specimen in the collection preserved in the same way (i.e. dried skin with separate skull, see below) was donated on 13/07/1917. Only 7 specimens in the collection date from before 1900. The earliest label is 1893, 2 years after the Perth bat was identified. It is possible that

there were more bat specimens in the 1860s or 1870s but they deteriorated and were thrown out, but it is unlikely that there were very many. What is the likelihood of a specimen being donated in the 1860s or 1870s becoming mixed up with another specimen from that era? In other words, what is the probability of Hardy's specimen becoming mixed up with another bat, and in fact the Brandt's bat specimen came from elsewhere in the UK, such as the English midlands? It is a possibility.

The fact that Hardy lived in Manchester and worked for the Manchester Museum explains why the specimen arrived in its mammal collection. However he was not formally employed by the Manchester Museum until the late 1880s, and since there is no record of when the specimen was acquired by the museum, it cannot be certain whether it was donated as a fresh specimen, or if it was prepared and mounted elsewhere, and later donated, as were other bat specimens still in the collection. The earliest record of the specimen being in the Manchester Museum is from 1891 when it was identified as a whiskered bat by Oldfield Thomas (Perth Museum records). The location of the Perth specimen between its collection date (either 1865 or 1874) and 1891 is therefore unknown.

The Brandt's bat specimen in Perth Museum

As a result of the publication of the record by first Evans and then Harvie-Brown, Perth Museum requested that the specimen be transferred from Manchester to the Scottish museum. The information on the specimen recorded on the current Perth Museum database states that "Henry Coates arranged for the transfer of the bat from Manchester Museum". Henry Coates was a curator at Perth Museum at the time. The record also states that the specimen was a donation, dated 19th

February 1916, from (Dr.) W. Tattersall, Manchester Museum.

The Perth specimen remained on the record as a whiskered bat, until it was sent to Robert E. Stebbings for examination in 1988. The museum has a letter from R.E. Stebbings, at the time one of the foremost experts on bats in the UK, and working at the Institute of Terrestrial Ecology, Monks Wood Experimental Station, in Northamptonshire, which no longer exists. In his letter dated 10th May 1988 to Steve Hewitt (working at Perth Museum) he states that the "whiskered bat" is a *Myotis brandtii*, "probably a 3 yr old+ adult". He adds the note, "An interesting record. Now find the colony!". Hewitt published this record in the Glasgow Naturalist journal (1989).

I examined the Brandt's bat specimen in Perth Museum in December 2014. Stebbings, in his letter (1988) says that "identification was confirmed by the size of the extra cusp on the 3rd upper premolar but also by the fact the p1 and p2 of the mandible were of similar size whereas for *M. mystacinus* p2 is very small." (p1 and p2 = 1st and 2nd premolar teeth)

The specimen consists of two preserved components. The skin has been dried and mounted, and is contained in a glass display case with a wooden base. The skull and mandibles (lower jaw) have been cleaned and preserved separately. Identification of mammals using skull and dentition has long been a standard method used.

I was able to confirm the identification features described by Stebbings, still a normal morphological method for separating Brandt's bat from whiskered bat, which it closely resembles. Illustrated below (Fig.1) is a drawing from Hanak (1970) showing the differences in dentition.

Photo 1 the Perth Museum specimen of Brandt's bat *Myotis brandtii* mounted in its glass case. The colours of the skin and fur have faded with time and exposure to light. (photos 1 – 4, J. Haddow 02/12/2014)



Photo 2 the label accompanying the Perth Museum specimen

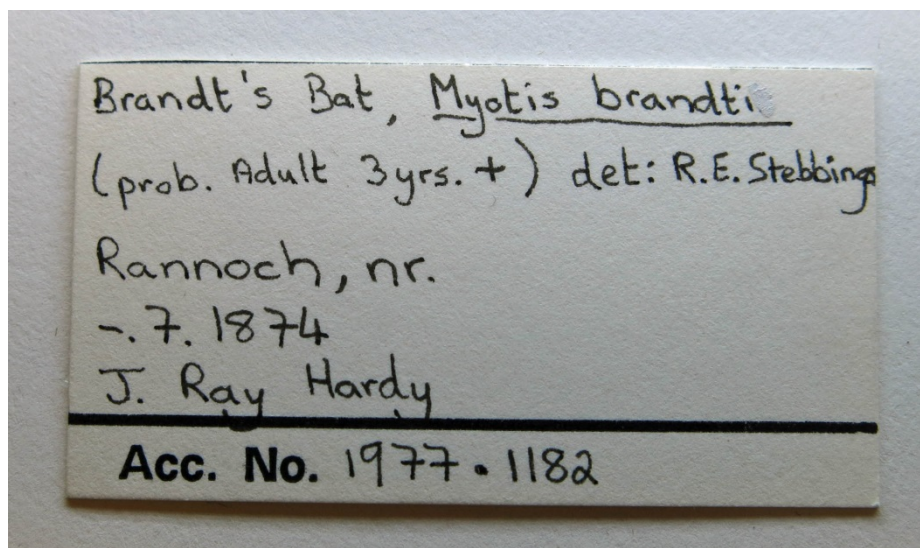


Photo 3 The Perth Museum Brandt's bat skull. The species can be identified by the small cusp at the front of the large upper premolar 3, similar in height to the small pm2 in front of it.

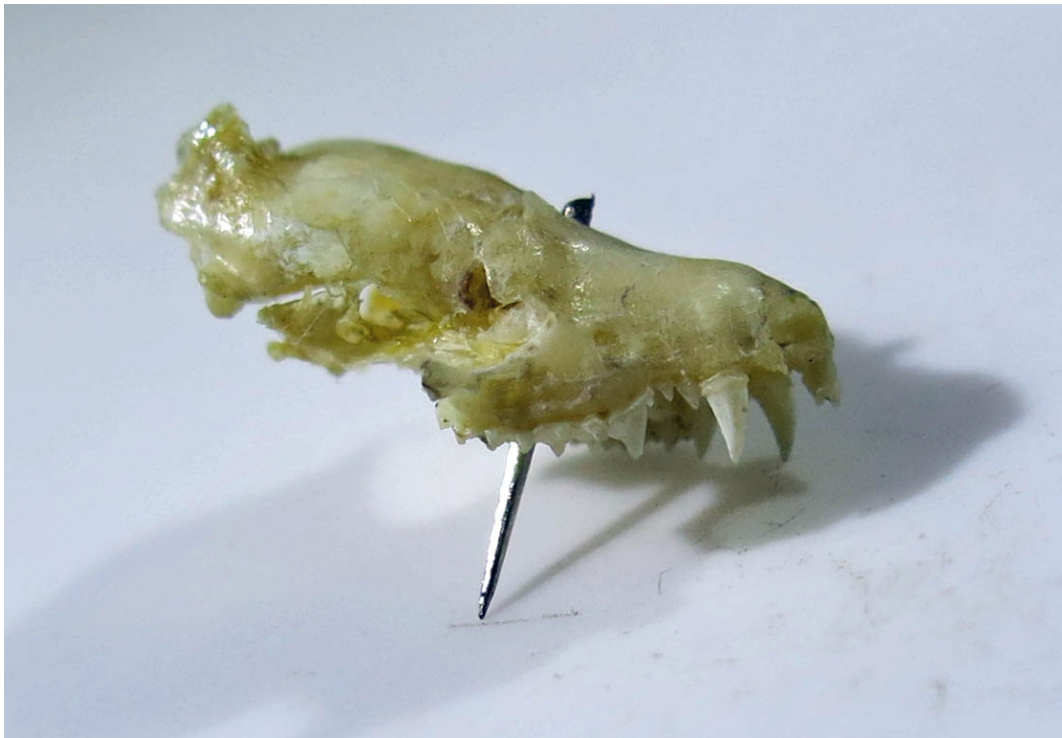


Photo 4 the mandible (lower jaw) of the Perth Museum specimen showing the similar sized premolar 1 and 2 (premolar 2 in *M. mystacinus* is very small)



Figure 1 illustration from Hanak 1970 showing the lower (left) and upper jaws (right) of *M. brandtii* (upper drawings) and *M. mystacinus* (lower drawings)

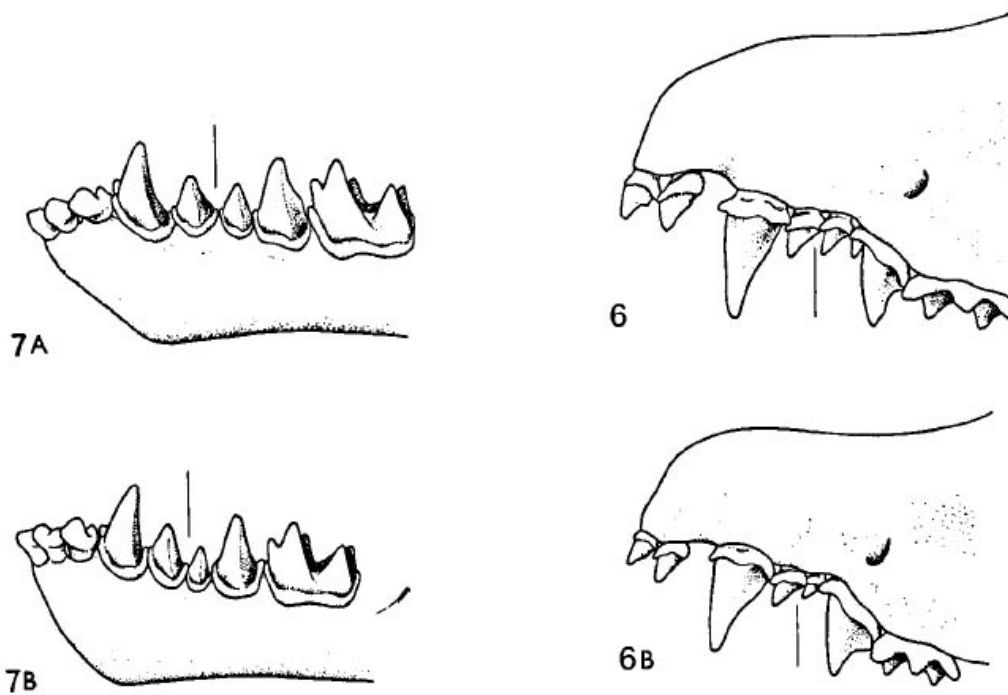


Figure 2a Brandt's bat distribution in the UK (JNCC) – the red spot shows where the Perth Museum bat was recorded.

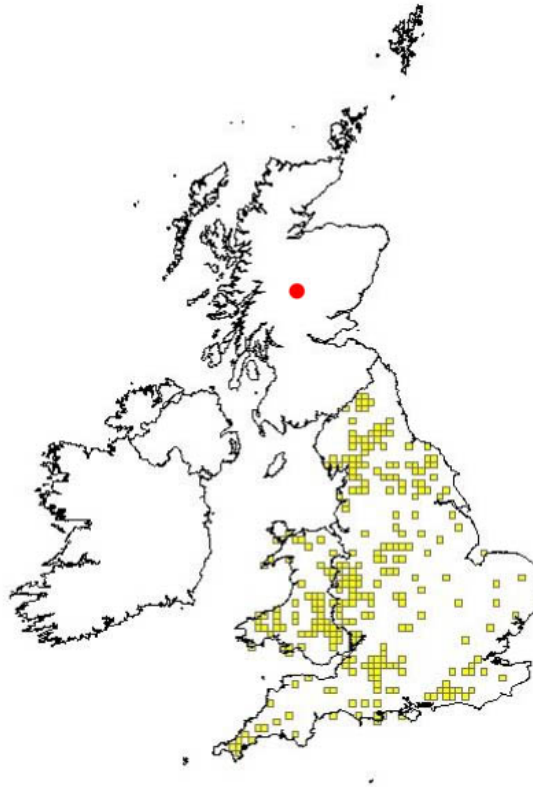


Figure 2b whiskered bat distribution in the UK (JNCC)

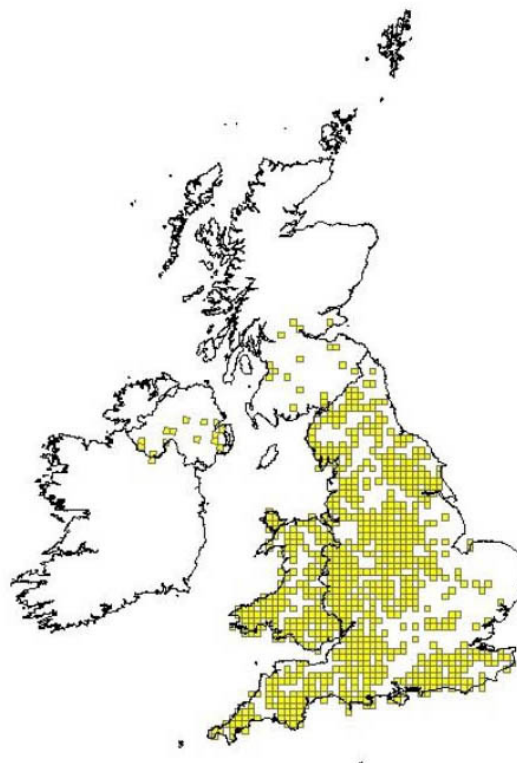


Photo 5 the Black Wood of Rannoch and the Dall burn (photo J. Haddow 05/04/2015)



Photo 6 John Ray Hardy (standing, second from right) and the Manchester Museum staff in 1898 (source, the Manchester Museum)



The Perth Museum bat in relation to other records of Brandt's bat in the UK

In 2013 a small roost of Brandt's bat was identified in a building owned by the Forestry Commission, near Newton Stewart in Dumfries & Galloway (R. Osborne *pers. comm.*). Identification of the contained DNA as from *Myotis brandtii* was confirmed using a faecal sample collected in the roost. The analysis was carried out at the School of Life Sciences, University of Warwick, where there is a laboratory dedicated to providing this service.

The known distribution of this bat species in the UK includes much of England and Wales, north to the Scottish border, so finding the species in southwest Scotland is not surprising (Fig.2a). Whiskered bats are found further north, uncommon, but one small nursery roost has been recorded north of Glasgow, in Blanehead, Stirlingshire, discovered in 1993 (Haddow 1993) (Fig 2b). The occurrence of Brandt's bat in the heart of the Scottish Highlands, so far north of any other records of the species, is an enigma. Is it possible that there was a more extensive population of the species in the 19th century? Was this a single stray bat that just happened to fly too close to an enthusiastic entomologist's hand net? If it was a stray bat, where did it stray from? Could it have reached the Highlands from southern Scotland, or did it fly over the North Sea from continental Europe?

Finally, it is necessary to add a cautionary question mark to the origins of this *Myotis brandtii* specimen. While there seems little doubt that John Ray Hardy collected a bat during one of his entomological trips to Scotland, there is a possibility that this specimen is not the same bat. Uncertainty over its early history makes it possible that at some date between the specimen arriving in the Manchester, possibly in 1874, and its identification as a whiskered bat by Oldfield Thomas in 1891, that it was

mixed up with another bat specimen. The origin of the bat in Perth Museum cannot be considered reliable. Unless there is further evidence for the presence of Brandt's bat in the Scottish Highlands, now or during the 19th Century, the northern limit of its natural range in Scotland should be considered to be Dumfries-shire and possibly the Scottish Borders.

Acknowledgements

Grateful thanks for their assistance are due to Mark Simmons, Collections Manager at Perth Museum; Dr. Dmitri Logunov (Curator of Arthropods), Philip Rispin (entomology) and Rachel Petts (vertebrates) of The Manchester Museum.

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