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In the UK and Ireland 27 species of earthworm have been recorded living in natural environments. Earthworms are under-recorded and as a result we know very little about the true distribution of many of our species. In fact, distribution maps have only been published for a handful of species. The Earthworm Society of Britain (ESB) was set up to tackle this issue and now manages the National Earthworm Recording Scheme. The aims of this scheme are to train new earthworm recorders and produce new earthworm records.

Between 4<sup>th</sup> May 2013 and 22<sup>nd</sup> August 2014 Keiron Brown led a team of earthworm recorders to undertake earthworm sampling on Hampstead Heath (London). This report outlines some background information on earthworm ecology and the results of the sampling.

## Earthworm Ecology

Earthworms in the UK are divided into four groups, called ecotypes, each of which has a different life style.

### *Compost earthworms*

As their name would suggest, these are most likely to be found in a compost bin, but can also be found in manure heaps, sewage treatments works and other places with large amounts of organic matter. They prefer warm and moist environments with a ready supply of fresh compost material. They can very rapidly consume this material and also reproduce very quickly. Compost earthworms tend to be bright red in colour and stripy. Compost earthworm species include *Eisenia fetida* and *Eisenia veneta*

### *Epigeic earthworms*

Epigeic earthworms live on the surface of the soil in leaf litter. These species tend not to make burrows but live in and feed on the leaf litter. Epigeic earthworms are also often bright red or reddy-brown, but they are not stripy. Epigeic earthworm species include *Dendrobaena octaedra*, *Dendrobaena attemsi*, *Dendrodrilus rubidus*, *Eiseniella tetraedra*, *Heliodrilus oculatus*, *Lumbricus rubellus*, *Lumbricus castaneus*, *Lumbricus festivus*, *Lumbricus friendi*, *Satchellius mammalis*

### *Endogeic earthworms*

Endogeic earthworms live in and feed on the soil. They make horizontal burrows through the soil to move around and to feed and they will reuse these burrows to a certain extent. Endogeic earthworms are often pale colours, grey, pale pink, green or blue. Some can burrow very deeply in the soil. Endogeic earthworm species include *Allolobophora chlorotica*, *Apporectodea caliginosa*, *Apporectodea icterica*, *Apporectodea rosea*, *Murchieona muldali*, *Octolasion cyaneum* and *Octolasion lacteum*

### *Anecic earthworms*

Anecic earthworms make permanent vertical burrows in soil. They feed on leaves on the soil surface that they drag into their burrows. They also cast on the surface, and these casts can quite often be seen in grasslands. They also make middens (piles of casts) around the entrance to their burrows. Anecic species are the largest species of earthworms in the UK. They are darkly coloured at the head end (red or brown) and have paler tails. Anecic earthworm species include *Lumbricus terrestris* and *Apporectodea longa*

## Study Sites

Eight sites (see figure 1 and table 1) were chosen across Hampstead Heath that represented a range of habitats, including grassland, woodland, river bank and fen habitats. In addition to this, sites were selected within separate square kilometres (using the ordnance survey grid) in order to ensure sampling was distributed across the geographic range of Hampstead Heath.

Figure 1 (right): Satellite map of Hampstead Heath showing the location of sampling sites. The numbered red squares show the location of the soil pit sampling sites. The yellow stars indicate the locations where additional specimens were sampled using non-standardised methods.

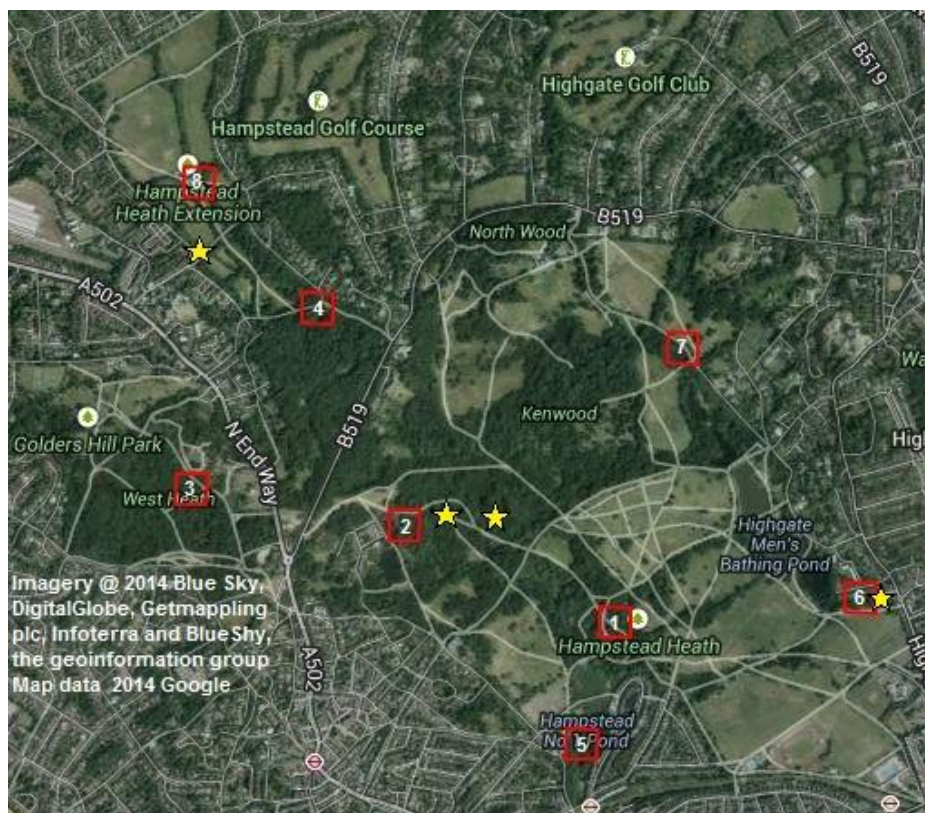


Table 1: Details of sampling locations in Hampstead Heath

Site No.	Grid Reference	Date	Altitude (m)	Habitat	Comments
1	TQ273862	23/11/13	90	Grassland	Steep slope
2	TQ266865	23/11/13	110	Semi-natural deciduous woodland	
3	TQ259866	20/12/13	110	Semi-natural deciduous woodland	Next to path
4	TQ263872	20/12/13	120	Semi-natural deciduous woodland	
5	TQ272858	18/05/14	80	Park	Under willow tree
6	TQ281863	18/05/14	60	Park	Next to tree row
7a	TQ275871	22/08/14	90	Grassland	Very dry soil
7b	TQ275871	22/08/14	90	Neutral grassland	
8	TQ259876	22/08/14	90	Park	

## Sampling Methods

Five soil pits were excavated at each site measuring approximately 25cm X 25cm X 10cm. The contents of each pit were hand sorted and any earthworms were removed and preserved in 80% alcohol on site. In addition to the sampling, a six figure grid reference of the location and habitat details were recorded.

Site 7 was sampled twice as two different types of grassland habitat were present. These were named 7a and 7b.

To improve the probability of finding species of earthworm less commonly found through hand-sorted soil pits, dead wood was examined at one site where soil pit sampling was undertaken and two extra sites. Leaf litter at a further extra site was also examined.

## Identification

All specimens were identified at the Natural History Museum (London) by volunteers experienced in earthworm identification. Earthworms were identified using binocular microscopes and the Field Studies Council *Key to the earthworms of Britain and Ireland* (Sherlock, 2012). All identifications were verified by experienced ESB recorders (Keiron Brown, Dan Carpenter and Emma Sherlock).

## Results

In total 11 species of earthworm were recorded through the soil pit sampling of 8 sites:

*Allolobophora chlorotica*  
*Aporrectodea caliginosa*  
*Aporrectodea icterica*  
*Aporrectodea longa*  
*Aporrectodea rosea*  
*Dendrobaena attemsi*  
*Dendrobaena octaedra*  
*Dendrodrilus rubidus*  
*Lumbricus castaneus*  
*Lumbricus festivus*  
*Lumbricus rubellus*

In total 4 species of earthworm were recorded through the investigation of deadwood at 3 sites:

*Allolobophora chlorotica*  
*Dendrodrilus rubidus*  
*Lumbricus castaneus*  
*Lumbricus rubellus*

1 species of earthworm was recorded through the investigation of leaf litter at 1 site:

*Dendrobaena octaedra*

*A. icterica*, *D. attemsi*, *D. octaedra* and *L. festivus* are all considered rare species. Further investigation regarding their true distribution and abundance in the UK is needed in order to verify the true rarity of these species.

**In total 11 species of earthworm were recorded as present on Hampstead Heath.**

## Recording on Hampstead Heath

All of the records have been submitted to the National Earthworm Recording Scheme and will be shared responsibly with external organisations, such as Local Biological Records Centres and the National Biodiversity Network. Earthworm records will be made freely available, alongside other wildlife records, to the general public.

I have attached copies of our Earthworm Recording Instructions, Soil Pit Sampling Instructions, Earthworm Recording Form and Earthworm Recording Sheet to this report as the Earthworm Society of Britain is always grateful to receive any new, or old, records. Please note that even single records of a species with no habitat information are still useful as geographic distribution data is still very limited with regards to earthworms. Please feel free to contact us if you are interested in organising any earthworm identification training for your staff.

Further information on the National Earthworm Recording Scheme can be found on our website: [www.earthwormsoc.org.uk](http://www.earthwormsoc.org.uk)

## Further Information

Carpenter D, Sherlock E, Jones DT, Chiminoides J, Writer T, Neilson R, Boag B, Keith AM, Eggleton P (2012) Mapping of earthworm distributions for the British Isles and Eire highlights the under-recording of an ecologically important group. *Biodiversity Conservation* 21:475-485

Natural England (2014) Earthworms in England: distribution, abundance and habitats. PDF available at: <http://publications.naturalengland.org.uk/publication/5174957155811328>

Sims RW, Gerrard BM (1999) Earthworms. *Synopses of the British Fauna (New Series)*. 39. London: Linnean Society of London.

Sherlock E (2012) Key to the earthworms of the UK and Ireland. Field Studies Council

# Hampstead Heath Earthworm Report

Table 2 : Records collected through soil pit sampling of 8 sites across Hampstead Heath.

Species	Date	Grid Reference	Number	Altitude (m)	Habitat	Comment
<i>Aporrectodea caliginosa</i>	23/11/13	TQ273862	7	90	Grassland	Verified by Emma Sherlock
<i>Aporrectodea icterica</i>	23/11/13	TQ273862	5	90	Grassland	Verified by Emma Sherlock
<i>Aporrectodea longa</i>	23/11/13	TQ273862	4	90	Grassland	Verified by Emma Sherlock
<i>Lumbricus festivus</i>	23/11/13	TQ273862	1	90	Grassland	Verified by Emma Sherlock
<i>Lumbricus rubellus</i>	23/11/13	TQ273862	2	90	Grassland	Verified by Emma Sherlock
<i>Aporrectodea caliginosa</i>	23/11/13	TQ266865	1	110	Semi-natural deciduous woodland	Verified by Emma Sherlock
<i>Lumbricus rubellus</i>	23/11/13	TQ266865	8	110	Semi-natural deciduous woodland	Verified by Emma Sherlock
<i>Dendrobaena attemsi</i>	20/12/13	TQ259866	4	110	Semi-natural deciduous woodland	Next to path. Verified by Emma Sherlock
<i>Lumbricus rubellus</i>	20/12/13	TQ259866	2	110	Semi-natural deciduous woodland	Next to path. Verified by Emma Sherlock
<i>Dendrobaena octaedra</i>	20/12/13	TQ263872	1	120	Semi-natural deciduous woodland	Next to path. Verified by Emma Sherlock
<i>Aporrectodea caliginosa</i>	18/05/14	TQ272858	2	80	Park	Under willow tree
<i>Aporrectodea rosea</i>	18/05/14	TQ281863	2	60	Park	Next to tree row
<i>Dendrodrilus rubidus</i>	18/05/14	TQ281863	1	60	Park	Next to tree row
<i>Lumbricus castaneus</i>	18/05/14	TQ281863	6	60	Park	Next to tree row
<i>Lumbricus festivus</i>	18/05/14	TQ281863	4	60	Park	Next to tree row
<i>Lumbricus rubellus</i>	18/05/14	TQ281863	9	60	Park	Next to tree row
<i>Lumbricus rubellus</i>	22/08/14	TQ275871	1	90	Grassland	Dry soil.
<i>Aporrectodea caliginosa</i>	22/08/14	TQ275871	4	90	Neutral Grassland	
<i>Lumbricus rubellus</i>	22/08/14	TQ275871	5	90	Neutral Grassland	
<i>Allolobophora chlorotica</i>	22/08/14	TQ257876	4	80	Park	Lawn.
<i>Aporrectodea longa</i>	22/08/14	TQ257876	11	80	Park	Lawn.

# Hampstead Heath Earthworm Report

**Table 3: Records collected through dead wood sampling across Hampstead Heath.**

Species	Date	Grid Reference	Number	Altitude (m)	Habitat	Comment
<i>Dendrodrilus rubidus</i>	04/05/13	TQ265867	1	130	Semi-natural deciduous woodland	Search of deadwood
<i>Lumbricus rubellus</i>	04/05/13	TQ265867	1	130	Semi-natural deciduous woodland	Search of deadwood
<i>Lumbricus castaneus</i>	18/05/14	TQ281863	2	60	Park	Search of deadwood in tree row
<i>Lumbricus rubellus</i>	18/05/14	TQ281863	1	60	Park	Search of deadwood in tree row
<i>Allolobophora chlorotica</i>	22/08/14	TQ259874	1	90	Park	Search of deadwood on verge

**Table 4: Records collected through leaf litter sampling across Hampstead Heath.**

Species	Date	Grid Reference	Number	Altitude (m)	Habitat	Comment
<i>Dendrobaena octaedra</i>	04/05/13	TQ269866	1	110	Semi-natural deciduous woodland	Search of top soil and leaf litter

**Table 5: The volunteers that were involved in the earthworm sampling of Hampstead Heath and the identification of specimens.**

ESB recorders involved in specimen collection	ESB recorders involved in specimen identification
Keiron Brown	Keiron Brown
Victoria Burton	Rachel Clark
Kerry Calloway	SalmaMostafa
Salma Mostafa	Emma Sherlock
Sophie Potter	