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Earthworm Society of Britain
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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.

On 7th June 2014 Keiron Brown led a team of experienced and trainee earthworm recorders to undertake earthworm sampling in Richmond Park (London). Further sampling trips were undertaken on 13th April 2015 and 24th April 2015. This report outlines some background information on earthworm ecology and the results of the sampling.

Earthworm Ecology

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 organic 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 *Dendrobaena 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*, and *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

Twelve sites (see figure 1) were sampled across Richmond Park that represented a range of habitats, including grassland, woodland, river bank and fen habitats. In addition to this, sites were spaced throughout the park in order to ensure sampling was distributed across the geographic range of Richmond Park. Environmental variables such as grid reference, altitude and habitat were recorded at each site (see table 1)



Figure 1 (above): Satellite map of Richmond Park showing the location of sampling sites. The numbered squares show the location of the soil pit sampling sites. Red squares indicate sampling in 2014 and blue squares indicate sampling in 2015. The yellow stars indicate the locations where additional microhabitats were sampled.

Table 1: Details of sampling locations in Richmond Park

Site No.	Grid Reference	Altitude (m)	Habitat	Comments
1	TQ188735	50	grassland	meadow ant nests <i>Lasius flavus</i>
2	TQ192735	50	grassland	lots of bracken
3	TQ196742	30	acid grassland	red/sheep fescue; creeping soft grass; heath bed straw, sheep's sorrel; Yorkshire fog
4	TQ202742	20	neutral grassland	deadwood also sampled
5	TQ204737	10	acid grassland	small stream bank; grassland either side of stream; rushes
6	TQ207727	50	deciduous woodland	sweet chestnut; sycamore; rhododendron understory; sandy soil; deadwood also sampled
7	TQ197727	30	fen	common reed; sedge; common skull cap; bracken; stagnant groundwater; tree row
8	TQ188724	40	neutral grassland	wood pasture with 600+ year old trees; close to path
9	TQ186730	60	rose garden	previously treated with compost; irrigated plant nursery and leaf mould/manure compost also sampled
10	TQ185728	40	grassland	deadwood and waterlogged soil next to spring also sampled
11	TQ200737	20	marsh	marsh next to pond; leaf litter and deadwood also sampled
12	TQ195739	30	neutral grassland	reasonable sized earthworm casts visible across the site

Sampling Method

The ESB's standard sampling protocol for earthworm sampling was followed in accordance with the National Earthworm Recording Scheme.

Soil Pit Sampling: 5 soil pits were excavated at each site measuring approximately 25 x 25 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.

Microhabitat Searches: To improve the probability of finding epigeic and compost species of earthworm, microhabitats were also searched at several sites (microhabitats included dead wood, a plant nursery, compost heaps, leaf litter and waterlogged soil)

For further details please see the ESB's 'Sampling Earthworms' webpage:

<http://www.earthwormsoc.org.uk/earthworm-identification/sampling-earthworms>

Identification

Earthworms were identified at the Natural History Museum (London) 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, Kerry Calloway, Dan Carpenter and Emma Sherlock).

Richmond Park Species List

The species list below lists the 19 species that were recorded in Richmond Park with the year(s) recorded in brackets:

<i>Allolobophora chlorotica</i>	(2014, 2015)	<i>Eiseniella tetraedra</i>	(2014, 2015)
<i>Allolobophoridella eiseni</i>	(2014)	<i>Helodrilus oculatus</i>	(2014)
<i>Aporrectodea caliginosa</i>	(2014, 2015)	<i>Lumbricus castaneus</i>	(2014, 2015)
<i>Aporrectodea icterica</i>	(2014, 2015)	<i>Lumbricus festivus</i>	(2014, 2015)
<i>Aporrectodea longa</i>	(2015)	<i>Lumbricus rubellus</i>	(2014, 2015)
<i>Aporrectodea rosea</i>	(2014, 2015)	<i>Lumbricus terrestris</i>	(2015)
<i>Dendrobaena hortensis</i>	(2015)	<i>Octolasion cyaneum</i>	(2015)
<i>Dendrobaena ocatetra</i>	(2014, 2015)	<i>Octolasion lacteum</i>	(2014, 2015)
<i>Dendrodrilus rubidus</i>	(2014, 2015)	<i>Satchellius mammalis</i>	(2014, 2015)
<i>Eisenia fetida</i>	(2014)		

Most of the species recorded are thought to be relatively common species with broad distributions, though some species that are thought to be either rare or very rare were recorded. However, please note that further investigation regarding the true distribution and abundance of individual earthworm species in the UK is needed in order to establish the true status of UK earthworm species populations.

In 2014 *A. eiseni*, *A. icterica* and *L. festivus* were all recorded and are considered rare species. *H. oculatus* is considered very rare as there are very few records of this species from the UK. Previous records of this species have been in wet deciduous woodland, whereas this species was recorded in the bank of a stream at Richmond Park. Furthermore, a rare morph of *A. caliginosa* (the nocturna morph) was also recorded at the stream bank site.

Of the rare earthworms, *A. icterica* and *L. festivus* were recorded again in 2015. An additional rare species, *D. hortensis*, was also recorded in 2015 from the leaf mould/manure compost heap. The rare *A. caliginosa* nocturna morph was also recorded again in 2015. Taxonomists are currently working on splitting three *A. caliginosa* morphs into separate species and it is likely that the nocturna morph will be named as a separate species in the near future.

E. tetraedra is an earthworm commonly found in waterlogged sites and was found in at Pen Ponds, Barn Wood Pond and an irrigated plant nursery sampled at Pembroke Lodge.

National Earthworm Recording Scheme

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.

The ESB website (www.earthwormsoc.org.uk) contains guidance on sampling, identifying and recording earthworms and includes PDF copies of our:

Creating & Submitting Earthworm Records – A guide to the essential and desired earthworm record fields for the National Earthworm Recording Scheme. This also includes instruction for using the iRecord Earthworm Survey form

ESB Sampling Standard Protocol – A guide to sampling earthworms using the National Earthworm Recording Scheme sampling standard protocol. This includes guidance on how to undertake soil pit sampling and organise your soil pits, as well as guidance on undertaking microhabitat searches.

Earthworm Field Sampling Form – A form for recording site data when undertaking earthworm sampling.

Earthworm Records Submission Sheet – An excel spreadsheet that can be used to submit earthworm records to the National Earthworm Recording Scheme.

The ESB 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

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](#)

[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](#)

Please contact the author of this report, Keiron Derek Brown, at info@earthwormsoc.org.uk if you have any queries regarding this report.

Table 2: Records collected through soil pit sampling of 8 sites across Richmond Park by Keiron Brown on 7th June 2014.

Species	Grid Reference	Date (dd/mm/yyyy)	Habitat	Substrate
<i>Aporrectodea caliginosa</i>	TQ188724	07/06/2014	neutral grassland	soil
<i>Aporrectodea rosea</i>	TQ188724	07/06/2014	neutral grassland	soil
<i>Dendrodrilus rubidus</i>	TQ188724	07/06/2014	neutral grassland	soil
<i>Lumbricus rubellus</i>	TQ188724	07/06/2014	neutral grassland	soil
<i>Dendrobaena octaedra</i>	TQ188735	07/06/2014	grassland	soil
<i>Lumbricus rubellus</i>	TQ188735	07/06/2014	grassland	soil
<i>Eisenia fetida</i>	TQ202742	07/06/2014	neutral grassland	dead wood
<i>Lumbricus rubellus</i>	TQ202742	07/06/2014	neutral grassland	dead wood
<i>Satchellius mammalis</i>	TQ202742	07/06/2014	neutral grassland	dead wood
<i>Allolobophora chlorotica</i>	TQ202742	07/06/2014	neutral grassland	soil
<i>Aporrectodea caliginosa</i>	TQ202742	07/06/2014	neutral grassland	soil
<i>Aporrectodea rosea</i>	TQ202742	07/06/2014	neutral grassland	soil
<i>Lumbricus castaneus</i>	TQ202742	07/06/2014	neutral grassland	soil
<i>Allolobophora chlorotica</i>	TQ200737	24/04/2015	marsh	soil
<i>Aporrectodea caliginosa</i>	TQ200737	24/04/2015	marsh	soil
<i>Aporrectodea longa</i>	TQ200737	24/04/2015	marsh	soil
<i>Aporrectodea rosea</i>	TQ200737	24/04/2015	marsh	soil
<i>Eiseniella tetraedra</i>	TQ200737	24/04/2015	marsh	soil
<i>Octolasion cyaneum</i>	TQ200737	24/04/2015	marsh	soil
<i>Satchellius mammalis</i>	TQ200737	24/04/2015	marsh	soil
<i>Eiseniella tetraedra</i>	TQ200737	24/04/2015	marsh	dead wood
<i>Lumbricus festivus</i>	TQ200737	24/04/2015	marsh	dead wood
<i>Satchellius mammalis</i>	TQ200737	24/04/2015	marsh	dead wood
<i>Aporrectodea caliginosa</i>	TQ200737	24/04/2015	marsh	leaf litter
<i>Eiseniella tetraedra</i>	TQ200737	24/04/2015	marsh	leaf litter
<i>Allolobophora chlorotica</i>	TQ204737	07/06/2014	acid grassland	soil
<i>Aporrectodea caliginosa</i>	TQ204737	07/06/2014	acid grassland	soil
<i>Aporrectodea caliginosa</i> (nocturna morph)	TQ204737	07/06/2014	acid grassland	soil
<i>Aporrectodea icterica</i>	TQ204737	07/06/2014	acid grassland	soil
<i>Helodrilus oculatus</i>	TQ204737	07/06/2014	acid grassland	soil
<i>Lumbricus festivus</i>	TQ204737	07/06/2014	acid grassland	soil
<i>Octolasion lacteum</i>	TQ204737	07/06/2014	acid grassland	soil
<i>Allolobophora chlorotica</i>	TQ195739	24/04/2015	neutral grassland	soil
<i>Aporrectodea caliginosa</i>	TQ195739	24/04/2015	neutral grassland	soil
<i>Aporrectodea caliginosa</i> (nocturna morph)	TQ195739	24/04/2015	neutral grassland	soil
<i>Aporrectodea icterica</i>	TQ195739	24/04/2015	neutral grassland	soil
<i>Aporrectodea rosea</i>	TQ195739	24/04/2015	neutral grassland	soil
<i>Satchellius mammalis</i>	TQ195739	24/04/2015	neutral grassland	soil

Species	Grid Reference	Date (dd/mm/yy)	Habitat	Substrate
<i>Dendrobaena hortensis</i>	TQ186730	13/04/2015	compost heap	compost
<i>Allolobophora chlorotica</i>	TQ186730	13/04/2015	rose garden	soil
<i>Aporrectodea caliginosa</i>	TQ186730	13/04/2015	rose garden	soil
<i>Dendrodrilus rubidus</i>	TQ186730	13/04/2015	rose garden	soil
<i>Lumbricus rubellus</i>	TQ186730	13/04/2015	rose garden	soil
<i>Allolobophora chlorotica</i>	TQ185728	13/04/2015	grassland	soil
<i>Aporrectodea caliginosa</i>	TQ185728	13/04/2015	grassland	soil
<i>Aporrectodea icterica</i>	TQ185728	13/04/2015	grassland	soil
<i>Aporrectodea rosea</i>	TQ185728	13/04/2015	grassland	soil
<i>Lumbricus rubellus</i>	TQ185728	13/04/2015	grassland	soil
<i>Aporrectodea longa</i>	TQ185728	13/04/2015	scrub	soil
<i>Allolobophora chlorotica</i>	TQ185728	13/04/2015	scrub	dead wood
<i>Lumbricus castaneus</i>	TQ185728	13/04/2015	scrub	dead wood
<i>Lumbricus rubellus</i>	TQ185728	13/04/2015	scrub	dead wood
<i>Satchellius mammalis</i>	TQ185728	13/04/2015	scrub	dead wood
<i>Allolobophora chlorotica</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Dendrobaena octaedra</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Eiseniella tetraedra</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Lumbricus castaneus</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Lumbricus festivus</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Lumbricus rubellus</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Lumbricus terrestris</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Octolasion lacteum</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Satchellius mammalis</i>	TQ186730	13/04/2015	plant nursery	concrete
<i>Allolobophora chlorotica</i>	TQ197727	07/06/2014	fen	soil
<i>Eiseniella tetraedra</i>	TQ197727	07/06/2014	fen	soil
<i>Lumbricus rubellus</i>	TQ197727	07/06/2014	fen	soil
<i>Eisenia fetida</i>	TQ185737	07/06/2014	tree row	dead wood
<i>Aporrectodea caliginosa</i>	TQ196742	07/06/2014	acid grassland	soil
<i>Aporrectodea icterica</i>	TQ196742	07/06/2014	acid grassland	soil
<i>Aporrectodea rosea</i>	TQ196742	07/06/2014	acid grassland	soil
<i>Allolobophoridella eiseni</i>	TQ207727	07/06/2014	deciduous woodland	dead wood
<i>Lumbricus rubellus</i>	TQ207727	07/06/2014	deciduous woodland	dead wood
<i>Dendrobaena octaedra</i>	TQ207727	07/06/2014	deciduous woodland	soil

Acknowledgements

We would also like to thank all of the participants (see table 3 below) for all their contribution to the Richmond Park sampling initiative.

Table 3: The volunteers that were involved in the earthworm sampling of Richmond Park and the identification of specimens.

Individuals involved in specimen collection	Individuals involved in specimen identification
Keiron Brown	Keiron Brown
Victoria Burton	Kerry Calloway
Kerry Calloway	Dan Carpenter
Julia Clark	John Chesebro
Rachel Clark	Rachel Clark
Raelene Edwards	Robert Day
Sharon Evans	Jo Edge
Harry French	Irfaan Junaideen
John Hatto	Katie Luxmore
Michael Howard	Alex Marshall
Joanna Klys	Kathy Pain
Alex Marshall	Sophie Potter
Brian McDonald	Matthew Shepherd
Olivia Morton	Emma Sherlock
Russell Ritchin	Katie Yexley
Matthew Shepherd	
Michelle Sutton	
Karl Terry	
Renee Tiefenthaler	
Yann Vallentin	
Jean Wagstaff	
Mark Wagstaff	
Claudia Watts	
Sam Wilkinson	
Becky Wilson	

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