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Abstract

Background

Understanding the relationships between wildlife biodiversity and zoonotic infectious diseases in a changing climate is a challenging issue that scientists must address to support further policy actions. We aim at tackling this challenge by focusing on small mammal-borne diseases in temperate forests and large urban green spaces. Small mammals are important reservoirs of zoonotic agents; forests and green spaces are environments where small mammals are abundant, human/domestic-wildlife interactions are plausible to occur, and efforts are undertaken to preserve biodiversity.

New information

The dataset contains occurrences of small terrestrial mammals (Rodentia and Soricomorpha) trapped in forested areas in Eastern France (administrative departments: Rhône, Ain, Jura). The sampling sites correspond to different degrees of anthropization. Forests included in biological reserves are the less anthropized sites, then public forests and urban parks experience increasing levels of anthropization. Data were collected during spring and autumn 2020 (three to four sampling sites), 2021 (six sampling sites) and 2022 (four sampling sites). These variations in the number of sites between years were due to lockdown restrictions in 2020, or to the legal authorization to trap around biological reserves granted in 2021 only. The capture of animals was carried out in various types of forests (pine, deciduous, mixed), and in different habitats within urban parks (wooded areas, buildings, hay storage yards, riverside vegetation, restaurants, playground for kids, botanical garden, landfills…). Captures were realised using live traps that were set on the ground for one to 11 nights. During this study period, 1593 small mammals were trapped and identified. They belong to 15 species, among which there are nine species of rodents (Muridae, Cricetidae, Gliridae) and six species of shrews (Soricidae). They were weighted (gram) and measured (cm): both head body length, tail and hind foot length. Sexual characteristics were also recorded. This dataset aims to better understand the relationships between small terrestrial mammal biodiversity and health in the context of global change, and in particular of forest anthropization and urbanization. It is part of the European Biodiversa BioRodDis project (https://www6.inrae.fr/biodiversa-bioroddis). Here we present the data gathered in France. The dataset will enable to describe the diversity of small terrestrial mammal communities in forested areas corresponding to different levels of anthropization, and to evaluate the variability of this diversity over time, between seasons and years.

Keywords

Rodents, shrews, community, biodiversity, forests, urban parks, global changes, dilution effect

Introduction

These last centuries, humans have strongly impacted ecosystems, through the development of activities including, among others, land use changes, overexploitation of natural resources including wood, or introduction of non-native species (Ellis et al. 2013). Urbanization, the process of environmental change resulting from dense human presence and occupancy, is an extreme case of anthropogenic transformation.

Anthropization, and in particular urbanization, have led to unprecedented levels of disturbance, disrupting ecological processes, eroding biodiversity and modifying communities towards simplified assemblages (Grimm et al. 2008). Indeed, not all species may adapt to such rapid and intense changes associated with anthropization. This may result in an impoverishment in the diversity of communities and the selection of species characterised by particular life history traits that enable them to tolerate or benefit from these new environmental conditions (Santini et al. 2018).

These shifts in species diversity and composition may have pervasive cascading effects on Public health. First, biological diversity alteration may be associated with the disruption of the regulation of pathogen circulation or emergence, including zoonotic ones. Two processes may interact to influence disease danger in anthropized ecosystems. On the one hand, high host diversity can “dilute” pathogen transmission, (“dilution effect”, Keesing et al. 2006). As such, negative anthropogenic impacts on diversity may increase pathogen transmission. On the other hand, biodiversity may be associated with enhanced risk of pathogen emergence (“amplification effect”, Keesing et al. 2006). Each reservoir species may bring its own pathogens, in particular non-native species can lead to the introduction of new pathogens. Second, animal life history traits associated with adaptation to human pressures (e.g. small body size, fast life history) also seem to correlate with reservoir competence and pathogen transmission (Gibb et al. 2020, Albery et al. 2021).

As such, it is urgent to elucidate the interlinkages between anthropization and animal community diversity and assemblages, to better predict and prevent zoonotic diseases risk. Several studies have described biodiversity changes for animal communities along urbanization gradients (e.g. Cavia et al. 2009, Matthies et al. 2017). Nevertheless there is little information on the effect of urbanization on mammal communities, most studies focusing on birds or insects.

In this paper, we provide occurrence data on small mammals (rodents and shrews) surveyed during two years along a gradient of forest anthropization, including biological reserves, managed forests and urban parks, in Eastern France. Small mammals are important reservoirs of zoonotic agents; forests and urban green spaces are environments where small mammals are abundant, human/domestic-wildlife interactions are plausible to occur, and efforts are undertaken to preserve biodiversity while limiting disease risk. These data will hence contribute to advancement of the knowledge of i) the distribution of small mammals in this geographic area, including urban parks that have been scarcely studied and ii) the shifts in community diversity and assemblage associated with anthropization.

General description

Purpose: This paper provides data collected during Biodiversa Bioroddis project in France (2020-2022). The dataset contains occurrences of small terrestrial mammals (Rodentia and Soricomorpha) trapped in forested areas in Eastern France (administrative departments: Rhône, Ain, Jura). The sampling sites correspond to different degrees of anthropization. Forests included in biological reserves are the less anthropized sites, then public forests and urban parks experience increasing levels of anthropization. The dataset will enable to describe the diversity of small terrestrial mammal communities in forested areas corresponding to different levels of anthropization, and to evaluate the variability of this diversity over time, between seasons and years.

Project description

Title: BioRodDis: Managing BIOdiversity in forests and urban green spaces - Dilution and amplification effects on RODent microbiomes and rodent-borne DISeases

Personnel: Coordinator: Charbonnel Nathalie

Study area description: BioRodDis includes occurrence of small terrestrial mammals from forests and urban parks in five countries: Belgium, France, Germany, Ireland and Poland.

Design description: BioRodDis project aims at elucidating the interlinkages between small mammal biodiversity and diseases at local and European scales using standardized assessments of biodiversity and disease risks. In particular, the dilution/amplification effect is assessed by integrating new key research directions, i.e. host microbiome and multiple pathogen diversity levels on one hand, seasonal and multi-annual dynamics on the other hand, including climate change scenarios, and interactions with socioeconomic contexts. More information is provided in the website: https://www6.inrae.fr/biodiversa-bioroddis.

Funding: This project is funded through the 2018-2019 BiodivERsA joint call for research proposals, under the BiodivERsA3 ERA-Net COFUND programme, and with the funding organisations ANR (France), DFG (Germany), EPA (Ireland), FWO (Belgium), NCN (Poland).

Sampling methods

Study extent: This study includes six sampling sites (2 forest reserves, 2 public forests, 2 urban parks) in Eastern France (see Figs 1, 2). The current dataset extends from February 2020 to June 2022.

Sampling description: Small mammals were live trapped. Six to ten lines of 20 live-traps (INRA) with about 3 m interval were set up so that each sampling locality consisted of a few km^2 area (see Table 1, Fig. 3). Traps were baited with sunflower seeds, carrots and sardine. Each trap was geolocated. The traps were checked daily, early in the morning. Trapping session per locality lasted at least three nights, except when abundances were too low and new trap lines had to be set up. Moreover, because we encountered difficulties in trapping rats and mice in urban parks, traps were set in particular places where animals had been detected, and they were removed after 10 to 11 nights (see details in Suppl. material 1). Note that for ethical reason, animals were released when we reached 35 individuals of a given species for a given locality and session. Also note that rare shrews were released for all sessions except autumn 2020 and spring 2021, to limit our impact on these populations.

Quality control: All captured animals were determined to species level using morphological criteria in the field, or using molecular methods when necessary (CO1 sequencing for *Microtus* species and shrews, Pagès et al. 2010, or DNA fingerprinting for *Apodemus* species, Bugarski-Stanojević et al. 2013, Suppl. material 2). Animal dissections and measurements were performed according to the protocols described in Herbreteau et al. (2011). Capture data are registered in the CBGP small mammal database (BPM, http://bpm-cbgp.science); associated biological samples (organs, blood, parasites ...) are included in the CBGP reference collection of small mammals https://doi.org/10.15454/WWNUPO.

Step description:

Fieldwork: The different steps of the fieldwork are detailed in Fig. 4 and in the 'sampling description' section above. All information related to traps and captures is recorded on paper sheets and/or on digital tablets using the KoBo software. These results are described in Suppl. material 1.

Animal dissection: On the day of capture, animals are anesthetized using isofluorane and euthanized by cervical dislocation, as recommended by Mills et al. (1995). Morphological measures are taken, among which mass and head-body, tail and hind foot length. Species identification is recorded based on this morphological information. In case of doubt, only the genus is noted. Sex is recorded and sexual maturity is inferred considering testes length and position (abdominal or descended into the scrotal sac), and seminal vesicle development (visible or not) for males, or vaginal opening, nipples (visible or not), pregnancy and uterus size (very thin or thick) for females. Ectoparasites (ticks and fleas) are collected and stored in ethanol 96°. Macroparasites detected in the cavity are recorded (e.g. cestodes on the liver). This protocol is described in Herbreteau et al. (2011). All information related to individual dissections is recorded on paper sheets and on an MS Excel file. Several samples are collected from each animal, for further mammal genetics and parasitological (bacteria, viruses, macroparasites, protozoa) analyses. The heart is removed and stored in PBS at -20°C. The lungs, rectum and a piece of liver are collected and stored in RNA shield solution (one day at 4° then -20°C). The spleen, the digestive tract, the ears, the left hind foot and a piece of tail are collected and stored in 96% ethanol. Faeces and a piece of lungs are collected and stored at -20°. All these samples have a unique identifier and datamatrix, and are recorded in the CBGP small mammal database (BPM, http://bpm-cbgp.science; https://doi.org/10.15454/WWNUPO).

Lastly, all waste products were eliminated using the official incinertious process, that is a safe way of destroying hazardous potentially infectious waste, protectin both human and the environment.

The different steps of the dissection are detailed in Fig. 5.

Ethical statements: Animal capture and handling have been conducted according to the French and European regulations on care and protection of laboratory animals (French Law 2001-486 issued on June 6, 2001 and Directive 2010/63/EU issued on September 22, 2010). The CBGP laboratory has approval (D-34-169-003) from the Departmental Direction of Population Protection (DDPP, Hérault, France), and from the regional ethical committee (Comite d'Ethique pour l'Expérimentation Animale Languedoc Roussillon), for the sampling of rodents and the storage and use of their tissues.

Molecular analyses: The specific identification of *Microtus* species and shrews was performed using CO1 sequencing, following Pagès et al. (2010). The specific identification of *Apodemus* species was determined using DNA fingerprinting (AP-PCR) following Bugarski-Stanojević et al. (2013).

Geographic coverage

Description: The data were collected in six forested areas in Eastern France, within three administrative departments (Rhône, Ain, Jura).

Coordinates: 44.84 and 48.633 Latitude; 2.021 and 7.734 Longitude.

Taxonomic coverage

Taxa included:

Rank	Scientific Name	Common Name
species	*Apodemus flavicollis*	yellow-necked mouse
species	*Apodemus sylvaticus*	woodmouse
species	*Crocidura russula*	greater white toothed shrew
species	*Crocidura leucodon*	bicoloured shrew
species	*Glis glis*	edible dormouse
species	*Microtus agrestis*	short-tailed field vole
species	*Microtus subterraneus*	European pine *vole*
species	*Mus musculus*	house mouse
species	*Myodes glareolus*	bank vole
species	*Neomys fodiens*	Eurasian water shrew
species	*Rattus norvegicus*	brown rat
species	*Sorex araneus*	common Eurasian shrew
species	*Sorex coronatus*	crowned shrew
species	*Sorex minutus*	Eurasian pygmy shrew
species	*Microtus arvalis*	Common vole

Temporal coverage

Notes: 2020-02-25 through 2022-06-03

Collection data

Collection name: CBGP small mammal database (BPM, http://bpm-cbgp.science)

Collection identifier: https://doi.org/10.15454/WWNUPO

Usage licence

Usage licence: Creative Commons Public Domain Waiver (CC-Zero)

Data resources

Data package title: Small terrestrial mammals (Rodentia, Soricomorpha) along a gradient of forest anthropisation (reserves, managed forests, urban parks) in France

Resource link: https://doi.org/10.15468/bn8zz7

Alternative identifiers: https://www.gbif.org/dataset/688ff587-af92-4f7b-82b5-3ee565afa025

Number of data sets: 1

Data set name: Occurrence of small terrestrial mammals (Rodentia, Soricomorpha) along a gradient of forest anthropisation (reserves, managed forests, urban parks) in France

Download URL: https://www.gbif.org/dataset/688ff587-af92-4f7b-82b5-3ee565afa025

Data format: Darwin Core

Data format version: 1.5

Description: The dataset contains occurrences of small terrestrial mammals (Rodentia and Soricomorpha) trapped in forested areas in Eastern France (administrative departments: Rhône, Ain, Jura) (Charbonnel et al. 2022). The sampling sites correspond to different degrees of anthropization. Forests included in biological reserves are the less anthropized sites, then public forests and urban parks experience higher levels of anthropization. Data were collected during spring and autumn 2020 (three to four sampling sites), 2021 (six sampling sites) and 2022 (four sampling sites). These variations in the number of sites between years were due to lockdown restrictions in 2020, or to the legal authorization to trap around biological reserves granted in 2021 only. The capture of animals was carried out in various types of forests (pine, deciduous, mixed), and in different habitats within urban parks (wooded areas, buildings, hay storage yards, riverside vegetation, restaurants, playground for kids, botanical garden, landfills…). Captures were realised using live traps that were set on the ground for one to 11 nights. During this study period, 1593 small mammals were trapped and identified. They belong to 15 species, among which there are nine species of rodents (Muridae, Cricetidae, Gliridae) and six species of shrews (Soricidae). An overview of the captures per species and locality is available in Table 2. Small mammals were weighted (gram) and measured (cm): both body length and tail length. Sexual characteristics were also recorded. This dataset aims to better understand the relationship between small terrestrial mammal biodiversity and health in the context of global change, and in particular of forest anthropization. It is part of the European Biodiversa BioRodDis project (https://www6.inrae.fr/biodiversa-bioroddis). Here we present the data gathered in France. The dataset will enable to describe the diversity of small terrestrial mammal communities in forested areas corresponding to different levels of anthropization, and to evaluate the variability of this diversity over time, between seasons and between years.

Column label	Column description
occurrenceID	An identifier for the occurrence (as opposed to a particular digital record of the occurrence). In the absence of a persistent global unique identifier, construct one from a combination of identifiers in the record that will most closely make the occurrenceID globally unique.
scientificName	The full scientific name, with authorship and date information, if known. Whenforming part of an Identification, this should be the name in the lowest leveltaxonomic rank that can be determined. This term should not contain identificationqualifications, which should instead be supplied in the IdentificationQualifier term.
sex	The sex of the biological individual(s) represented in the Occurrence.
eventDate	The date-time or interval during which an Event occurred. For occurrences, this is the date-time when the event was recorded. Not suitable for a time in a geological context. A variable ("YYYY-MM-DD")
measurementType	The nature of the measurement, fact, characteristic, or assertion.
measurementValue	The value of the measurement, fact, characteristic, or assertion.
measurementUnit	The units associated with the measurementValue.
countryCode	The standard code for the country in which the Location occurs.
country	The name of the country or major administrative unit in which the Location occurs.
locationID	An identifier for the set of location information (data associated with dcterms:Location). May be a global unique identifier or an identifier specific to the data set.
locality	The specific description of the place.
decimalLatitude	The geographic latitude (in decimal degrees, using the spatial reference system given in geodeticDatum) of the geographic center of a Location. Positive values are north of the Equator, negative values are south of it. Legal values lie between -90 and 90, inclusive.
decimalLongitude	The geographic longitude (in decimal degrees, using the spatial reference system given in geodeticDatum) of the geographic center of a Location. Positive values are east of the Greenwich Meridian, negative values are west of it. Legal values lie between -180 and 180, inclusive.
recordedBy	A person, group, or organization responsible for recording the original Occurrence.
basisOfRecord	The type of the individual record

individualCount	Quantity of a species occurrence, e.g. the number of individuals
samplingProtocol	Specify how the "Occurrence" records were obtained
taxonRank	The taxonomic rank of the supplied scientific name
kingdom	The full scientific name specifying the kingdom that the occurrence's scientific name is classified under
phylum	The full scientific name specifying the phylum that the occurrence's scientific name is classified under
class	The full scientific name specifying the class that the occurrence's scientific name is classified under
order	The full scientific name specifying the order that the occurrence's scientific name is classified under
family	The full scientific name specifying the family that the occurrence's scientific name is classified under
geodeticDatum	The coordinate system and set of reference points upon which the geographic coordinates are based
coordinateUncertaintyInMeters	The horizontal distance from the given decimalLatitude and decimalLongitude in meters, describing the smallest circle containing the whole of the Location

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Author contributions

Julien Pradel - small mammal sampling, species identification, georeferencing, data preparation, manuscript editing

Marie Bouilloud - small mammal sampling, species molecular identification, data preparation

Anne Loiseau - small mammal sampling, species molecular identification

Sylvain Piry - small mammal sampling, species identification, georeferencing, data preparation

Maxime Galan - small mammal sampling

Emmanuelle Artige - small mammal sampling

Guillaume Castel - small mammal sampling

Julien Ferrero - small mammal sampling

Romain Gallet - small mammal sampling

Geoffrey Thuel - small mammal sampling

Nathalie Vieira - small mammal sampling

Nathalie Charbonnel - small mammal sampling, species identification, georeferencing, data preparation, manuscript editing

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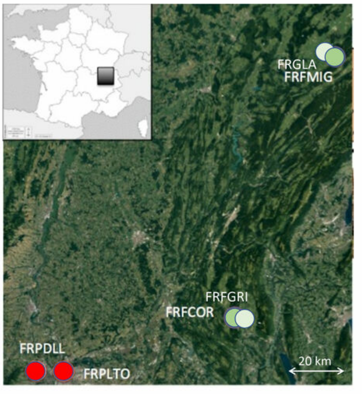

Figure 1.

General map of the studied areas and their position in France. Localities are indicated by circles, red circles = urban parks; green circles = managed forests; light green circles = protected forests. FRPLTO: Lyon, Parc de la Tête d'Or; FRPDLL: Marcy l'étoile, Domaine Lacroix Laval; FRFCOR: Cormaranche en Bugey; FRFGRI: Arvière, La Griffe au diable; FRFMIG: Mignovillard; FRFGLA: Esserval-Tartre, La Glacière.

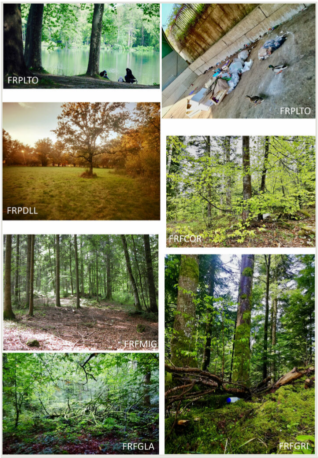

Figure 2.

Pictures of some of the trapping lines within each locality. FRPLTO: Lyon, Parc de la Tête d’Or; FRPDLL: Marcy l'étoile, Domaine Lacroix Laval; FRFCOR: Cormaranche en Bugey; FRFGRI: Arvière, La Griffe au diable; FRFMIG: Mignovillard; FRFGLA: Esserval-Tartre, La Glacière

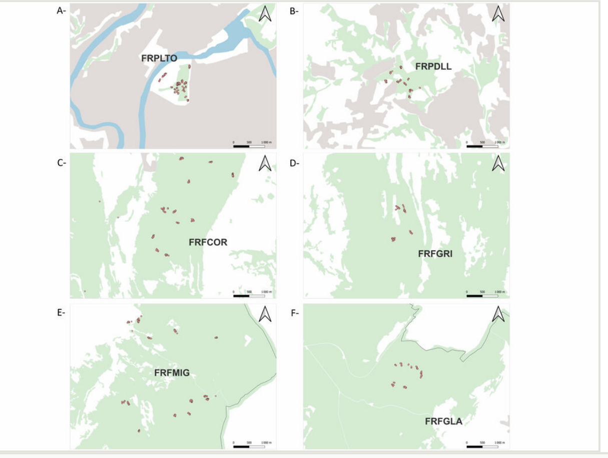

Figure 3.

Maps of the trapping lines (red points) represented at a local scale for each of the following localities: A- FRPLTO: Lyon, Parc de la Tête d'Or; B- FRPDLL: Marcy l'étoile, Domaine Lacroix Laval; C- FRFCOR: Cormaranche en Bugey; D- FRFGRI: Arvière, La Griffe au diable; E- FRFMIG: Mignovillard; F- FRFGLA: Esserval-Tartre, La Glacière. The landscape around the trapping lines is represented by different colours corresponding to water bodies (blue; corine land cover 5), Forest and semi natural areas (green, Forest database), artifical areas (grey; corine land cover 1), or other land cover classes (white).

Figure 4.

Pictures illustrating the different steps leading to trapping and individual information. A- Preparation of traps (bait, cotton, trap number); B- A trap sets in a forest; C- Trap sets in a urban park; D- Trap checking in the morning (masks and gloves are important to protect animals and humans from zoonotic agents); E- Capture information recorded on a digital tablet (this picture was taken during the lockdown, what explains the mask); F- Traps having captured small mammals (they were replaced by empty baited traps); G- A trap containing a rat (*Rattus norvegicus*); H- A dormitory trap containing a woodmouse (*Apodemus sylvaticus*) that is released; I- Disinfection of traps (masks and gloves are important to protect humans from zoonotic agents).

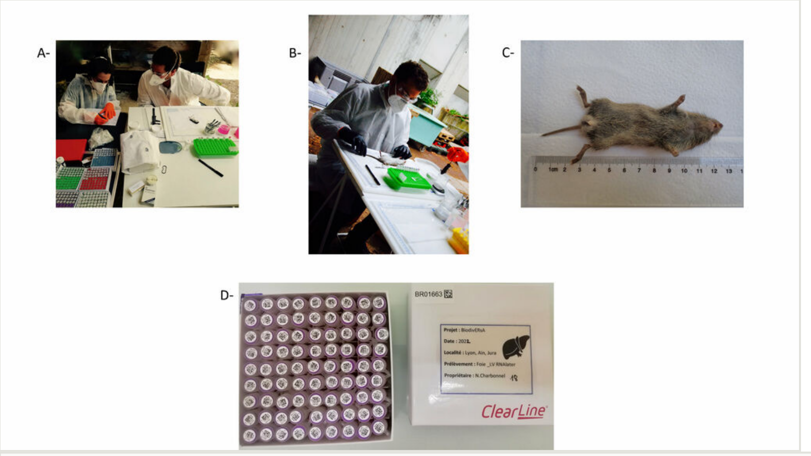

Figure 5.

Pictures illustrating the different steps during small mammal dissection. Masks (FFP2), gloves and glasses protect the experimenter that manipulates and dissects the animals. **A-** All tubes are prepared in advanced with unique identifier and datamatrix. One colour is dedicated to each sample. Morphological information are recorded on a paper sheet. Dissection instruments are disinfected between each animal. **B-** The experimenter is preparing the animal (here a brown rat *Rattus norvegicus*) for the dissection. **C-** A male common vole (*Microtus arvalis*). **D-** Tues corresponding to liver samples, with unique identifiers and datamatrices, stored in a clearly identified box (unique identifier and datamatrix).

Table 1.

List of sampling sites including locality (and locationID), coordinates (latitude and longitude of the centroid of the area covered by the traps), the trapping line ID and the landscape type.

Locality	LocationID	Centroid_x	Centroid_y
Lyon, Parc de la Tête d'Or	FRPLTO	4.85554195	45.77817576
Marcy l'etoile, Domaine Lacroix Laval	FRPDLL	4.72146918	45.78982081
Cormaranche en Bugey	FRFCOR	5.62549550	45.93477080
Arviere, La Griffe au diable	FRFGRI	5.75865886	45.93370736
Mignovillard	FRFMIG	6.16343853	46.76358715
Esserval-Tartre, La Glacière	FRFGLA	6.02525045	46.84288358

Table 2.

Occurrence (number of individuals) of the small mammal species trapped in the different localities surveyed. FRPLTO: Lyon, Parc de la Tête d'Or; FRPDLL: Marcy l'étoile, Domaine Lacroix Laval; FRFCOR: Cormaranche en Bugey; FRFGRI: Arvière, La Griffe au diable; FRFMIG: Mignovillard; FRFGLA: Esserval-Tartre, La Glacière. The total number of individuals trapped is also indicated for each locality and for each species.

Small mammal species			**LocalityID**				**Total number of individuals**
	FRPLTO	**FRPDLL**	**FRFCOR**	**FRFGRI**	**FRFMIG**	**FRFGLA**	
Apodemus sp.	0	0	0	0	1	0	1
Soricomorpha	0	1	0	0	1	0	2
Apodemus flavicollis	0	38	118	51	89	33	329
Apodemus sylvaticus	177	108	55	17	43	11	411
Crocidura leucodon	0	0	13	0	17	0	30
Crocidura russula	83	15	0	0	0	0	98
Glis glis	0	0	8	0	9	0	17
Microtus agrestis	0	0	2	1	1	0	4
Microtus arvalis	29	1	0	1	0	0	31
Microtus subterraneus	0	0	0	1	3	0	4
Mus musculus	89	1	0	0	0	0	90
Myodes glareolus	0	77	134	61	138	52	462
Neomys fodiens	0	0	2	0	0	1	3
Rattus norvegicus	91	0	0	0	0	0	91
Sorex araneus	0	0	0	0	3	0	3
Sorex coronatus	0	0	2	4	7	2	15
Sorex minutus	0	0	0	0	2	0	2
Total number of individuals	469	241	334	136	314	99	1593
Total number of species detected	5	6	8	7	10	5	15

Supplementary materials

Suppl. material 1: Detailed information gathered during the field sessions.

Authors: Julien Pradel, Marie Bouilloud, Anne Loiseau, Sylvain Piry, Maxime Galan, Emmanuelle Artige, Guillaume Castel, Julien Ferrero, Romain Gallet, Geoffrey Thuel, Nathalie Vieira, Nathalie Charbonnel
Data type: Trapping results
Brief description: This Supplementary table details the information gathered during the field sessions. It includes details about the lines and traps set during each field session and for each locality, as well as the results of the trapping detailed for each trap checking. Results can be 'empty open': the trap is open, there is no small mammal in the trap; 'empty closed': for technical issues, the trap is empty and closed, so that it could not have trapped anything; 'not found': the trap is no more where it has been set (it might have been stolen or moved by large animals for example). We also provide information on the trap checking, with the preliminary identification of the animal trapped, whether the animal was dead in the trap or released... Note that 67 occurrenceID entries in the occurrence table have no corresponding occurrenceID in this file. This is because these individuals are rats and mice that were trapped by the zoo managers, then frozen and given to us.
Caption : Locality is the specific description of the place; locationID is an identifier for the set of location information (data associated with dcterms:Location); field-sessionID is an identifier for the session of trapping; Trap-settingDate is the date during which traps were set ("YYYY-MM-DD"); Trap-lineID is an identifier for the trap lines; Trap-checkingDate is the date when traps were checked ("YYYY-MM-DD"); Trap-checking-number is the number of a particular trap checking for a given field-sessionID; TrapID is an identifier for the traps, for a given locality and a given field-sessionID; decimalLatitude is the geographic latitude (in decimal degrees, using the spatial reference system given in geodeticDatum) of the trap; decimalLongitude is the geographic longitude (in decimal degrees, using the spatial reference system given in geodeticDatum) of the trap; geodeticDatum is the coordinate system and set of reference points upon which the geographic coordinates are based; coordinateUncertaintyInMeters is the horizontal distance from the given decimalLatitude and decimalLongitude in meters, describing the smallest circle containing the whole of the Location; trapping-result is the result of a given trap checking; FieldObservation includes comments relative to the trap checked (species trapped, individual found alive, dead in the trap, animal released or not…); dissectionDate is the date during which the animal were dissected ("YYYY-MM-DD"); occurrenceID is an identifier for the Occurrence (as opposed to a particular digital record of the occurrence). In the absence of a persistent global unique identifier, construct one from a combination of identifiers in the record that will most closely make the occurrenceID globally unique. This is the same occurrenceID as in the dataset published here and in GBIF.
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Suppl. material 2: AP-PCR protocol adapted from Bugarski-Stanojevic et al. 2013 for molecular identification of *Apodemus* species

Authors: Loiseau, A.
Data type: Protocol
Brief description: AP-PCR protocol adapted from Bugarski-Stanojevic et al. 2013 for molecular identification of *Apodemus* species
Download file (803.02 kb)