



UPMC
SORBONNE UNIVERSITÉS

 **île de France**



**École Pratique
des Hautes Études**




OFFICE POUR LES INSECTES
ET LEUR ENVIRONNEMENT

HOW DO PEOPLE SEE BIODIVERSITY?

USING A DIGITAL IDENTIFICATION KEY FOR
A CITIZEN SCIENCE PROJECT

Mathilde DELAUNAY

Institut de Systématique, Evolution, Biodiversité (ISYEB)
UMR 7205 CNRS MNHN UPMC EPHE
Muséum national d'Histoire naturelle, Paris
mathilde.delaunay@mnhn.fr

*Inaugural Digital Data in Biodiversity Research Conference – Ann Arbor
6th June 2017*

**People are increasingly
disconnected from nature**

**In Europe and
the USA, most
people live in
cities**



**People (including
children) are less and
less in interaction
with “places of
nature”**

Nowadays: biodiversity crisis and global environmental issues
A need for action and **involving people**

HOW DO PEOPLE SEE BIODIVERSITY AND NATURE?

Citizen science programs

Increase of the citizen science programs in the last 30 years

Involving people in collecting data to assess big **environmental issues**, like biodiversity conservation.

Reconnect people with nature



Great systems for studying citizen's perception of biodiversity

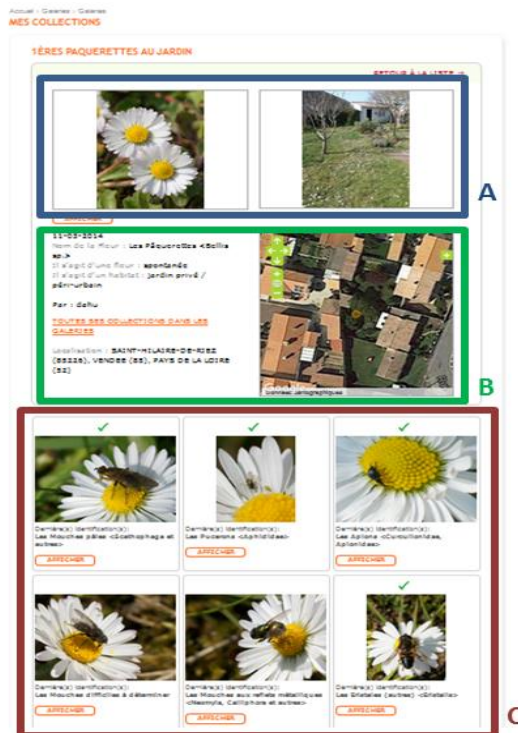
Answering the question "How do people see biodiversity?" by studying a French citizen science program about insects

Spipoll

= Suivi Photographique des Insectes POLLinisateurs

Since 2010

Standardized protocol : 20 min, 1 flower species,
pictures of all the insects landing on flowers
1 300 "Spipolliens", 22 000 collections, 200 000 pictures



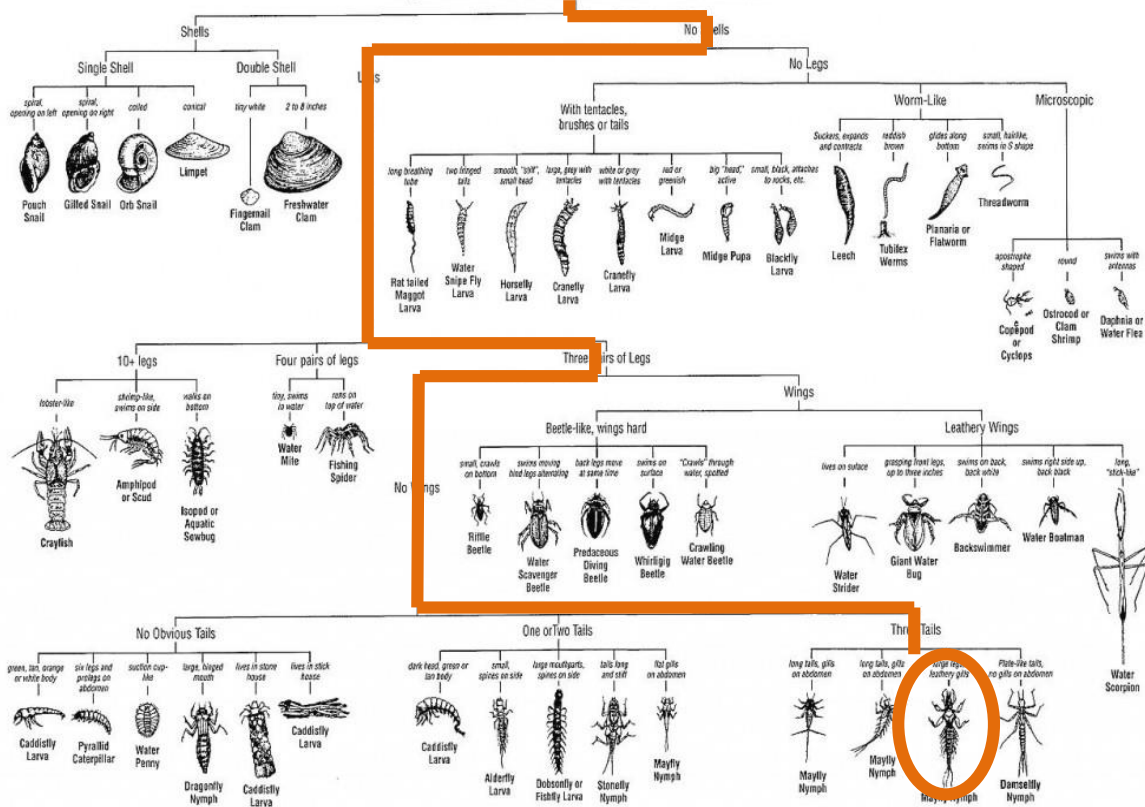
Give a name to the insects present on the pictures → identification key

Accuracy for scientific data
Ease of use for all user types

Feedback → **improvement** of the tool

Single-access identification keys

Key to Macroinvertebrate Life in the River



Limits:

- Imposed unique identification path for a given taxon
- User must know the “answer” for every single step
- Fixed keys: cannot follow the pace of knowledge improvements
- For one type of public

Developed by University of Wisconsin-Extension in cooperation with the Wisconsin Department of Natural Resources. May be reproduced for educational, non-profit purposes. For information contact UWEX Environmental Resources Center 608/262-0020.

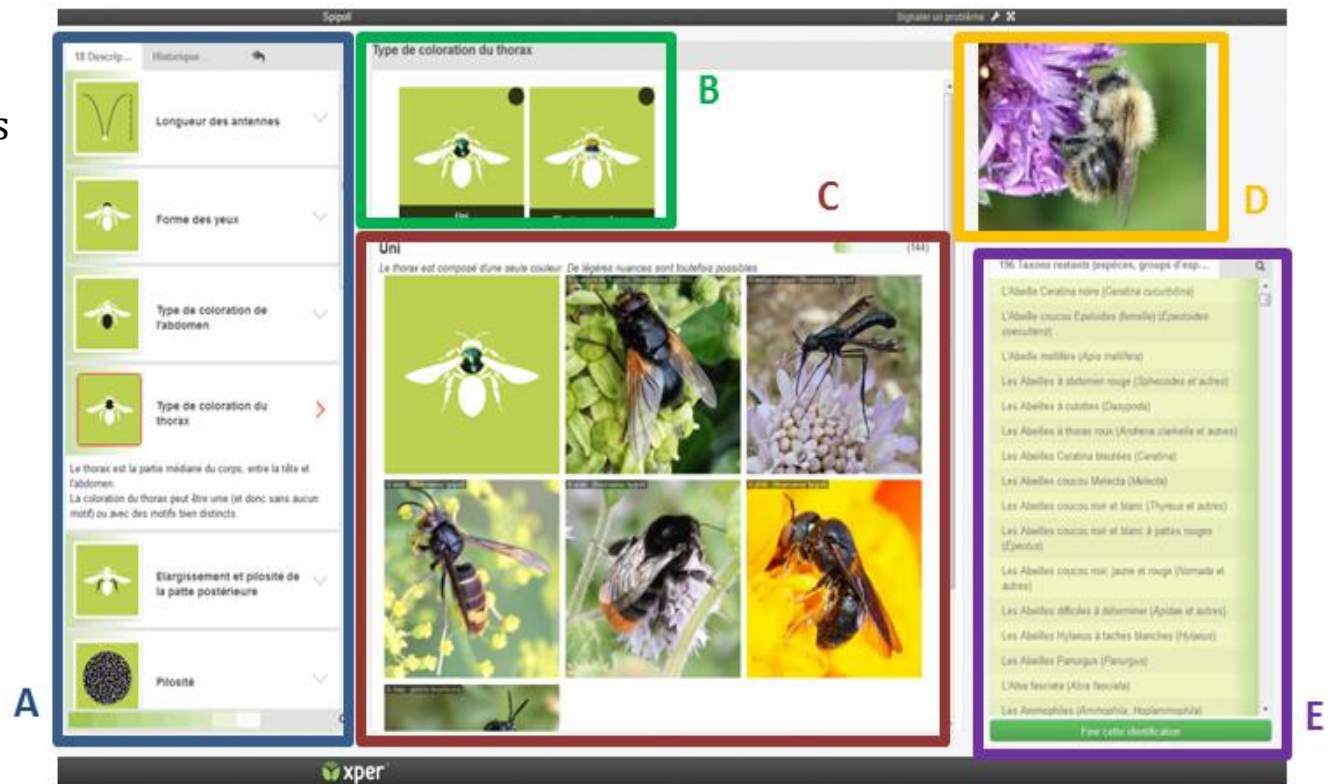
Identification key for Spipoll

Digital, accessible on the web
No pathway imposed (multi-access key)



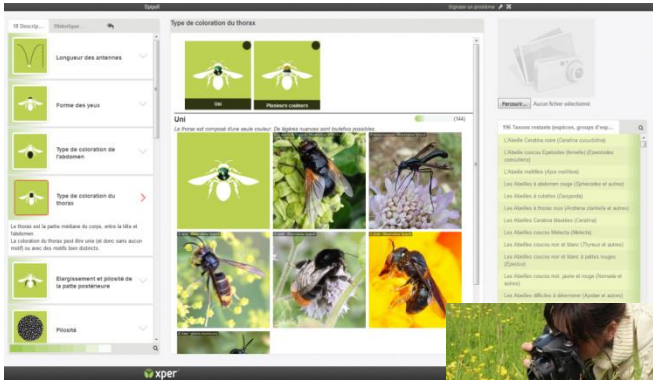
✓ Allows doubts

630 taxa
85 descriptors
318 descriptor states



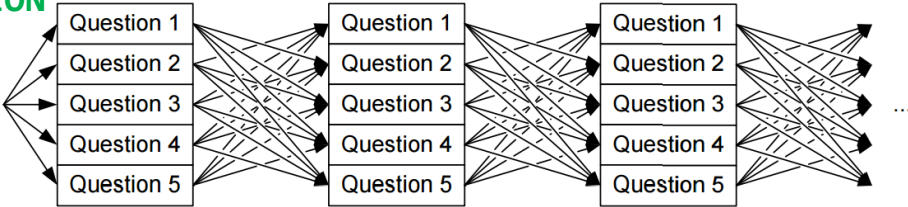
Xperience system

Since September 2015: **identification pathways recorded** in a database



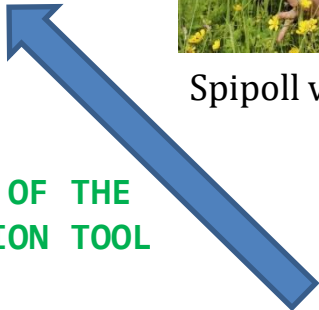
Spipoll volunteer

IDENTIFICATION PATH
RECORDING



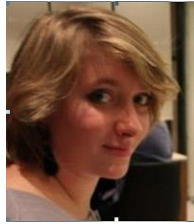
Xperience database

IMPROVEMENT OF THE IDENTIFICATION TOOL



Researchers and Spipoll managers

MODIFICATIONS



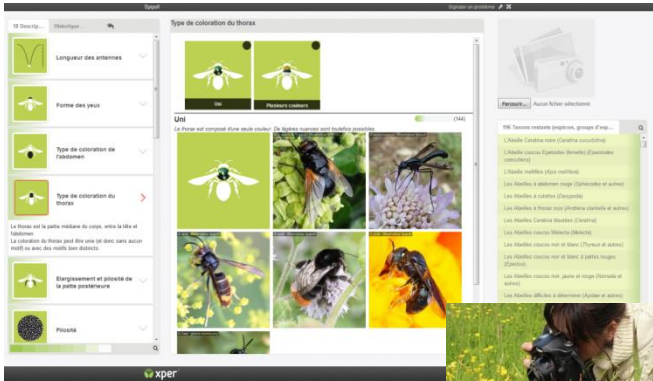
Researchers

ANALYZING

Understanding how people use the key

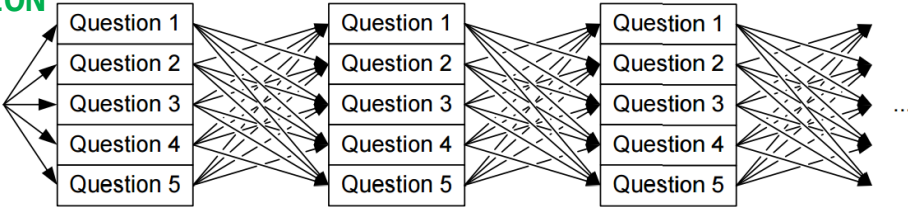
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Spipoll volunteer

IDENTIFICATION PATH
RECORDING



Xperience database



Researchers
ANALYZING



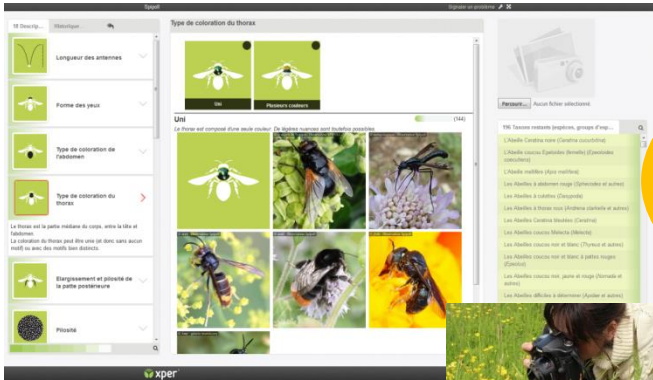
Researchers and
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MODIFICATIONS

IMPROVEMENT OF THE IDENTIFICATION TOOL

Understanding how people use the key

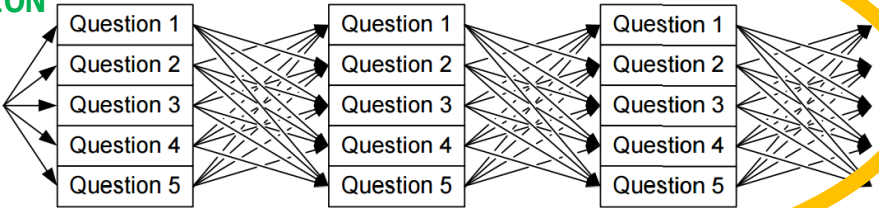
Xperience system

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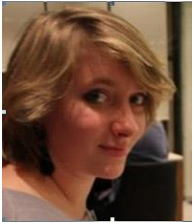


Spipoll volunteer

IDENTIFICATION PATH RECORDING



Xperience database



Researchers **ANALYZING**

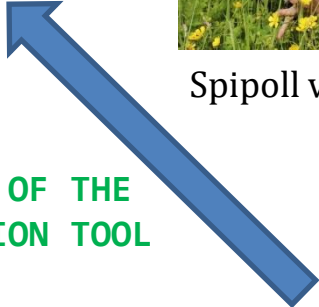


Researchers and Spipoll managers **MODIFICATIONS**

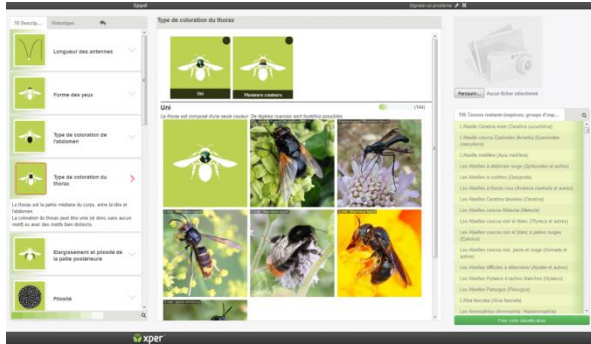


Understanding how people use the key

IMPROVEMENT OF THE IDENTIFICATION TOOL



Xper³ key database



SDDmanager



Current version

20170503-145539.xperience.sdd.xml
Wed, 03 May 2017 14:55:39

Load New

Choisissez un fichier: Aucun fichier choisi

load the new file as current SDD

Archive

File	Date
20170503-145539.xperience.sdd.xml	Wed, 03 May 2017 14:55:39



phpMyAdmin

record

record

Nouvelle table

localhost xperience_sppoll_1916916151212 record

Afficher Structure SQL Rechercher Insérer Exporter Importer Opérations Suivi

Affichage des lignes 0 - 29 (~6 360 total) Traitement en 0.0007 sec

```
SELECT * FROM 'record' LIMIT 0, 30
```

Profilage [En ligne] [Modifier] [Expliquer SQL] [Créer source PHP] [Actualiser]

Page n°: 1

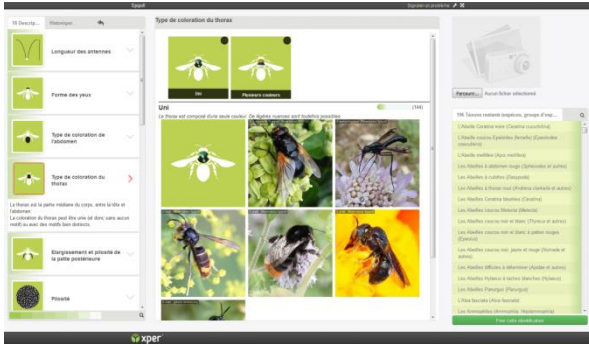
Afficher: 30 ligne(s) à partir de la ligne n° 30 en mode horizontal et répéter les en-têtes à chaque groupe de 100

Trier sur l'index: Aucune

	ID	TAXONVALIDATED	SDDVERSION	SESSIONID	DESCRIPTION	USERTAXA	updateTime
<input type="checkbox"/>	7	-1	20150907-153557.xperience.sdd.xml	1916916151212-v56ep0mo2b19gm08rf13l2pmi6_144161781...	1:13;	17;	NULL
<input type="checkbox"/>	8	-1	20150907-153557.xperience.sdd.xml	1916916151212-jf0d6fhaes1nmms0hr6477i6_144346711...	1:14;	43;	NULL
<input type="checkbox"/>	9	-1	20150907-153557.xperience.sdd.xml	1916916151212-jf0d6fhaes1nmms0hr6477i6_144346747...	1:14;	43;	NULL
<input type="checkbox"/>	10	-1	20150907-153557.xperience.sdd.xml	1916916151212-jf0d6fhaes1nmms0hr6477i6_144346728...	1:14;	43;	NULL
<input type="checkbox"/>	11	-1	20150907-153557.xperience.sdd.xml	1916916151212-SQSSqSa	1:14;36:141;29:122;22:90;	10;	NULL
<input type="checkbox"/>	12	454	20150907-153557.xperience.sdd.xml	1916916151212-03h129a264ihj1eg4ql630pf6_144405287...	1:16;71:281;80:305;78:299;74:287;77:296;79:302;	454;	NULL
<input type="checkbox"/>	13	63	20150907-153557.xperience.sdd.xml	1916916151212-03h129a264ihj1eg4ql630pf6_144405324...	1:16;39:148;71:281;79:302;77:298;72:283;73:286;74:...	60;	NULL
<input type="checkbox"/>	14	-1	20150907-153557.xperience.sdd.xml	1916916151212-03h129a264ihj1eg4ql630pf6_144405352...	1:14;	67;	NULL
<input type="checkbox"/>	15	-1	20150907-153557.xperience.sdd.xml	1916916151212-pfrmqz2k407uc09fmm0tkv0b4_144405370...	1:16;	60;65;	NULL
<input type="checkbox"/>	16	-1	20150907-153557.xperience.sdd.xml	1916916151212-pfrmqz2k407uc09fmm0tkv0b4_144406181...	1:16;	60;65;	NULL
<input type="checkbox"/>	17	-1	20150907-153557.xperience.sdd.xml	1916916151212-03h129a264ihj1eg4ql630pf6_144413664...	1:14;29:121;22:90;24:97;25:103;16:65;21:83;	60;65;	NULL
<input type="checkbox"/>	18	-1	20150907-153557.xperience.sdd.xml	1916916151212-03h129a264ihj1eg4ql630pf6_144413698...	1:12:13:14:15:16:17:0:9;	60;65;	NULL
<input type="checkbox"/>	19	-1	20150907-153557.xperience.sdd.xml	1916916151212-03h129a264ihj1eg4ql630pf6_144413708...	1:14:16:65;17:67;	60;65;	NULL
<input type="checkbox"/>	20	-1	20150907-153557.xperience.sdd.xml	1916916151212-03h129a264ihj1eg4ql630pf6_144413708...	1:14:16:65;17:67;	60;65;	NULL

Xperience database

Xper³ key database



SDDmanager



Current version

20170503-145539.xperience.sdd.xml
Wed, 03 May 2017 14:55:39

Load New

Choisissez un fichier: Aucun fichier choisi

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phpMyAdmin

localhost xperience_sppoll_1916916151212 record

Afficher Structure SQL Rechercher Insérer Exporter Importer Opérations Suivi

Affichage des lignes 0 - 29 (~6 360 total) Traitement en 0.0007 sec

```
SELECT * FROM 'record' LIMIT 0, 30
```

Page n°: 1

Afficher: 30 ligne(s) à partir de la ligne n° 30 en mode horizontal et répéter les en-têtes à chaque groupe de 100

ID	TAXONVALIDATED	SDDVERSION	SESSIONID	DESCRIPTION	USERTAXA	updateTime
7	-1	20150907-153557.xperience.sdd.xml	1916916151212-y56c0mz7M9sm08d3l2omj6_144161781	1:13;	17;	NULL
				1:14;36:141;29:122;22:90;	10;	
				1:16;71:281;80:305;78:299;74:287;77:296;79:302;	454;	
				1:16;39:148;71:281;79:302;77:298;72:283;73:286;74:...	60;	

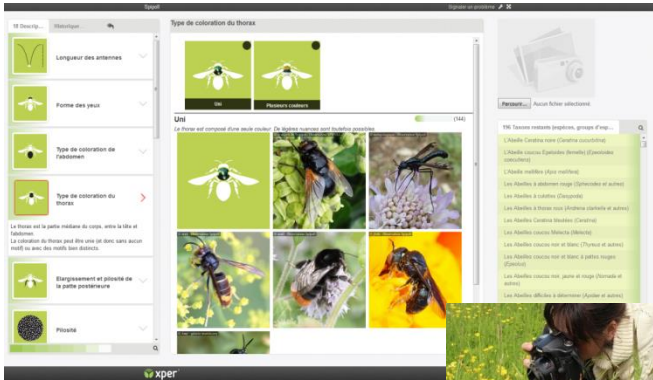
Taxon identifiers

1 path, 7 steps

Xperience database

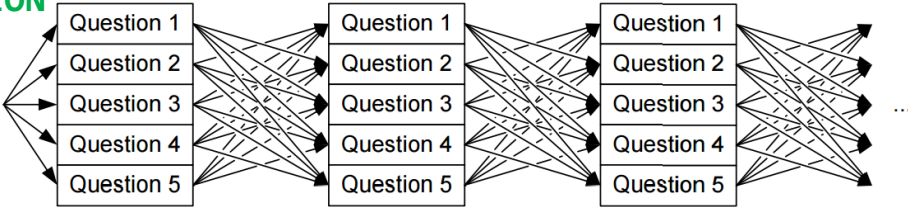
Xperience system

Since September 2015: **identification pathways recorded** in a database



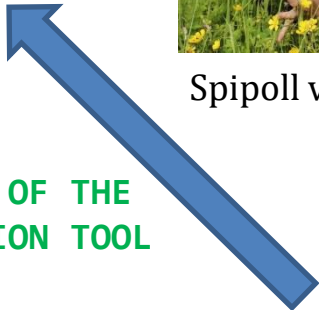
Spipoll volunteer

IDENTIFICATION PATH
RECORDING



Xperience database

IMPROVEMENT OF THE IDENTIFICATION TOOL



Researchers and Spipoll managers

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Understanding how people use the key

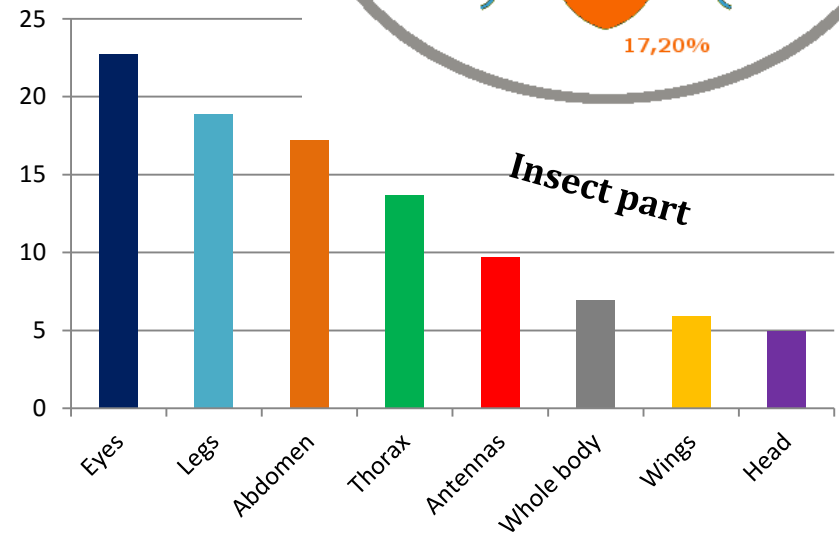
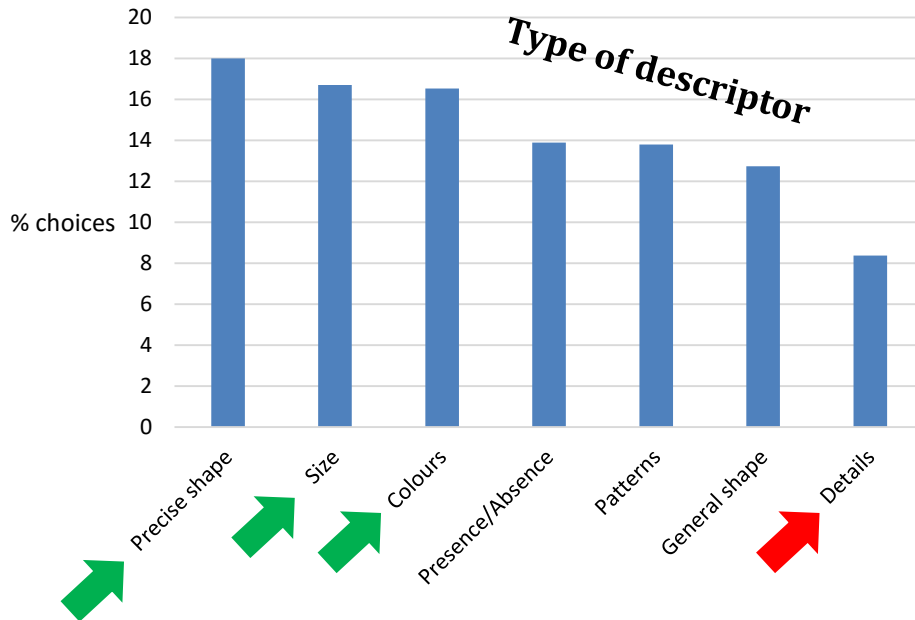


General results

Data from September 2015 to May 2016 (9 months)

1979 pathways, 10 561 "choices"

Preference in choices



Clear preference for certain descriptor categories

Most represented insect orders in the Spipoll database

Coleoptera



Spipoll © jfcth

Diptera



Spipoll © calin01

Hemiptera



Spipoll © greg9498

Hymenoptera



Spipoll © MichelMarly

Lepidoptera

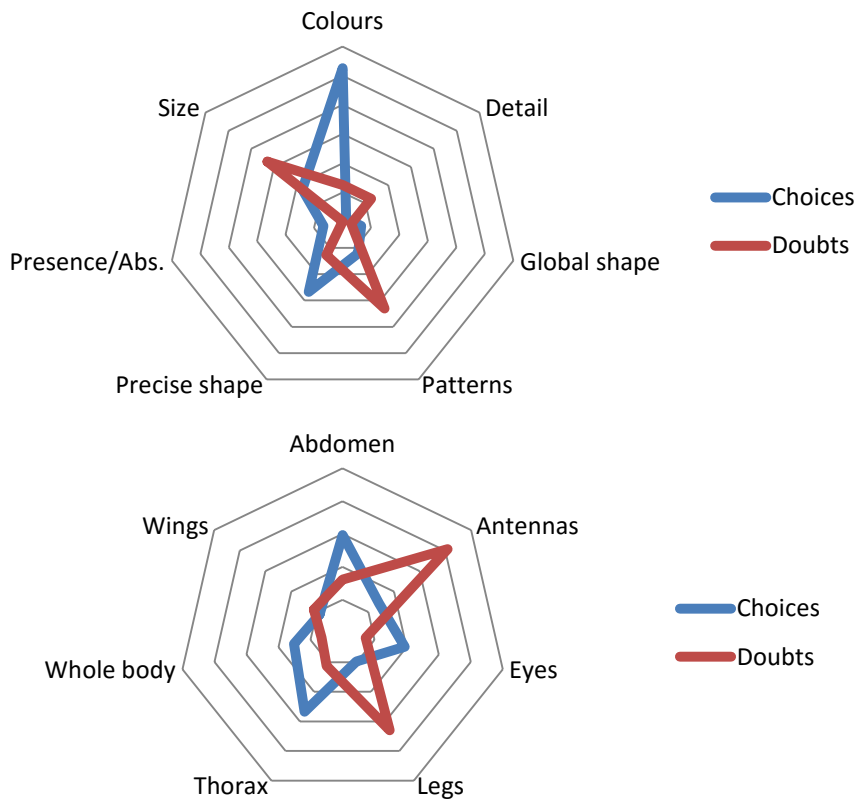


Spipoll © calin01

Results: Hymenoptera & Diptera

Hymenoptera

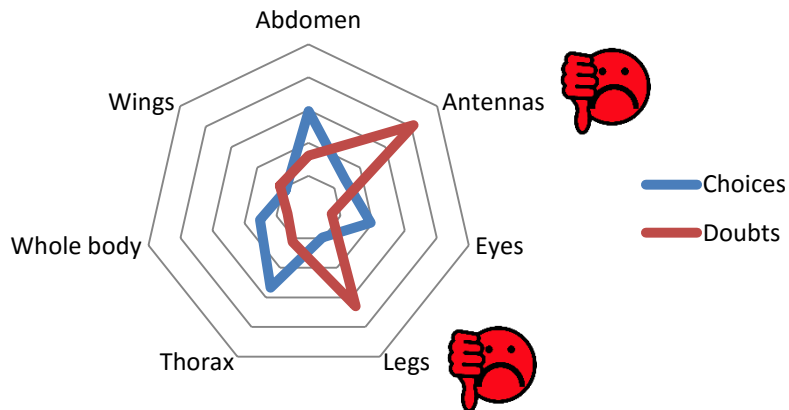
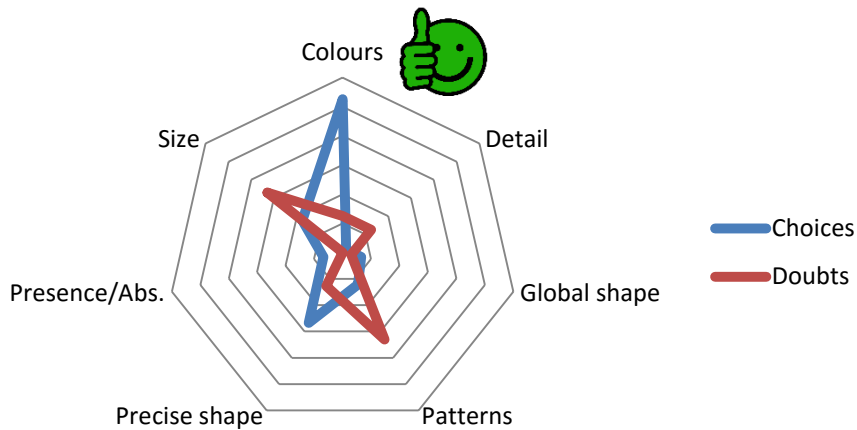
186 pathways, 1371 “choices”



Results: Hymenoptera & Diptera

Hymenoptera

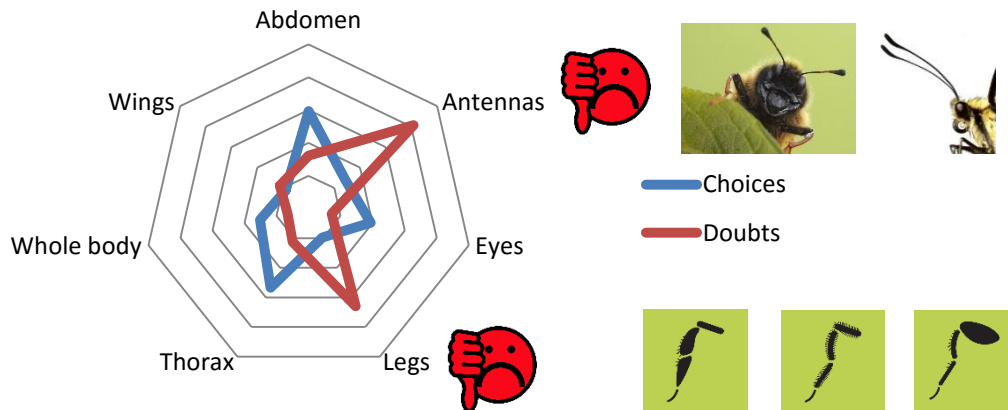
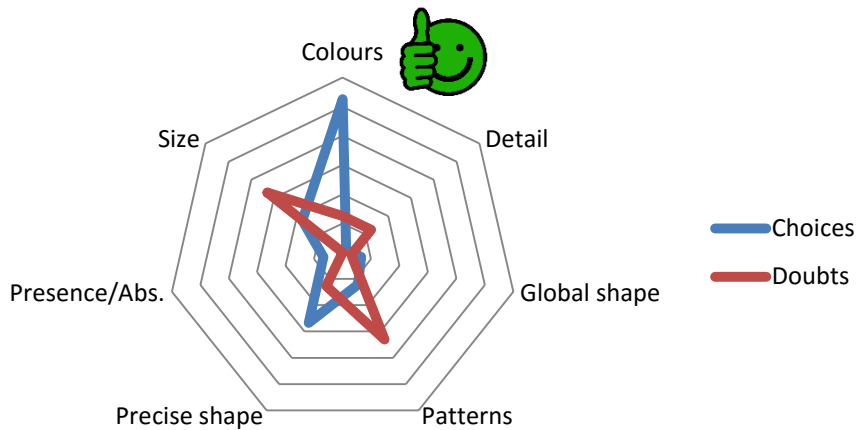
186 pathways, 1371 "choices"



Results: Hymenoptera & Diptera

Hymenoptera

186 pathways, 1371 "choices"



"Antenna length"
20.57% doubts

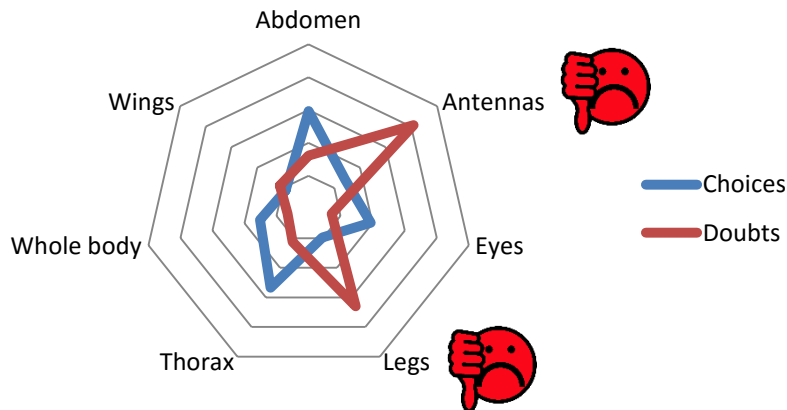
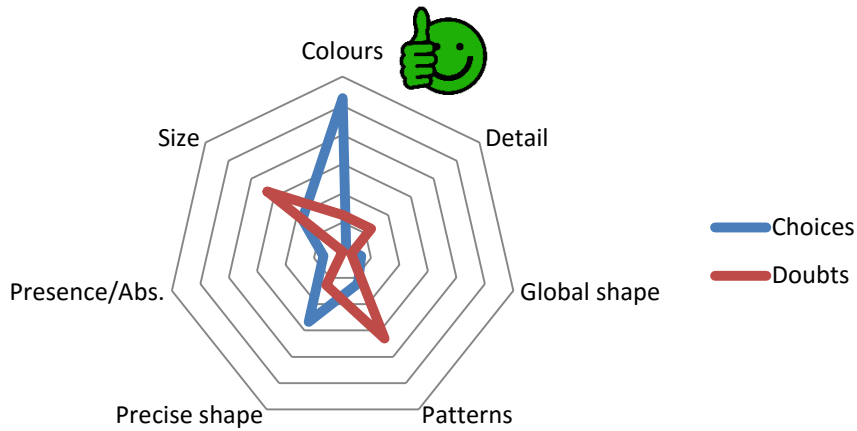
(Mean: 8.16% doubts)

"Posterior leg width"
16.49% doubts

Results: Hymenoptera & Diptera

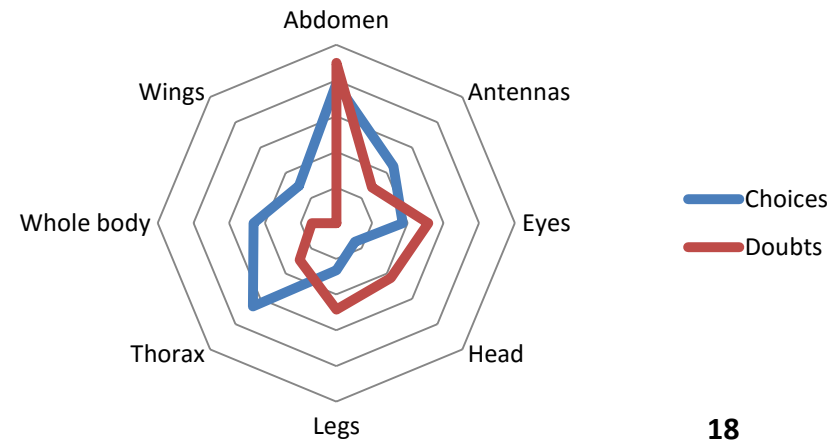
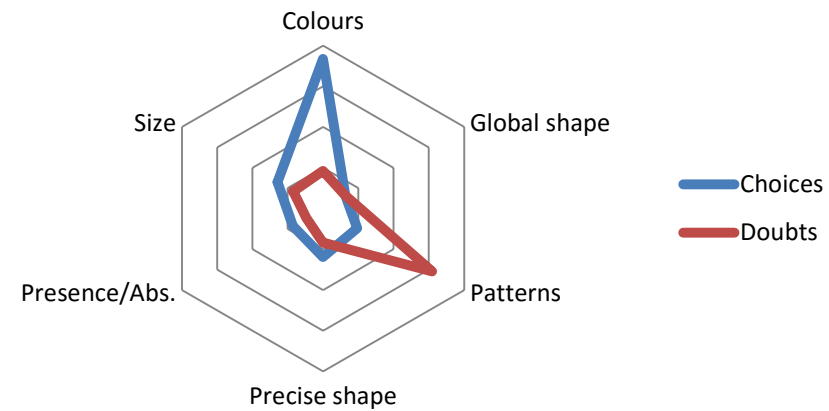
Hymenoptera

186 pathways, 1371 "choices"



Diptera

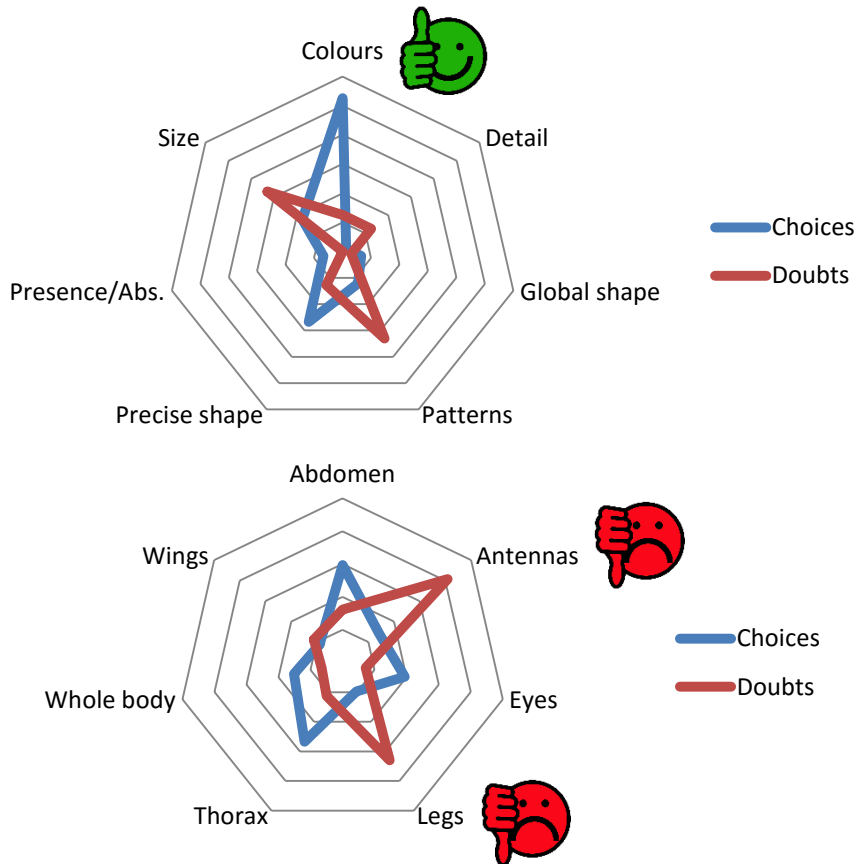
136 pathways, 870 "choices"



Results: Hymenoptera & Diptera

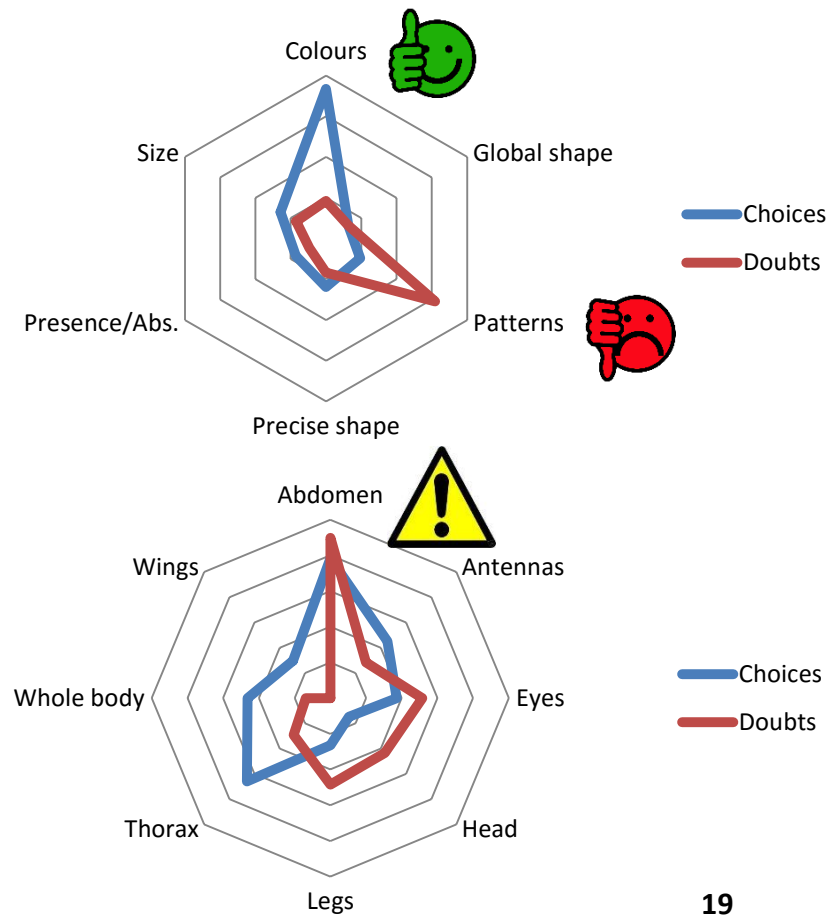
Hymenoptera

186 pathways, 1371 "choices"



Diptera

136 pathways, 870 "choices"

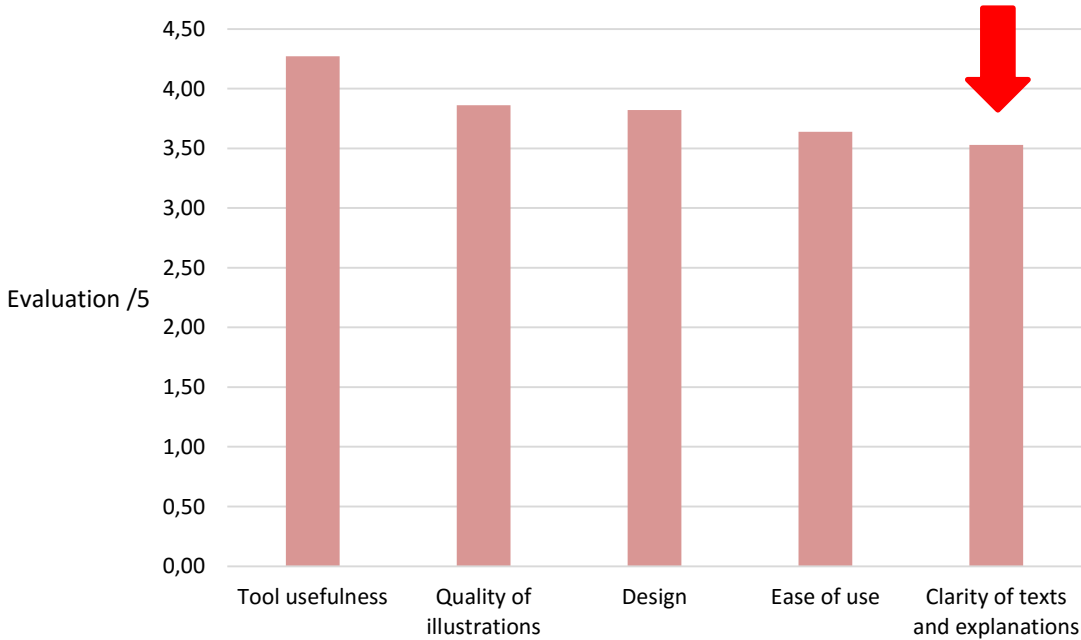


Discussion

Some insect morphological parts are perceived more easily than others by people.



People are sensitive to the quality and precision of descriptor states. Some are difficult to describe and illustrate well in identification keys.



← 165 respondents

~20% final identification mistakes!

To improve identification tools, it is crucial to know people's facilities and difficulties.

What's next?

For the improvement of the identification key:

Advices and notes will be added to the Spipoll identification key

Focus on the most chosen descriptors or those that lead to the highest doubt rates

Possibility to **weight** the descriptors

Xperience:

Test of the system on **Xper3 keys for aquatic insects**

Provide the *Xperience* system for all Xper³ key makers

The screenshot shows the Xper3 web interface for identifying Stoneflies (Plecoptera) of Paris. The page title is "Stoneflies (Insecta: Plecoptera) of Paris...". The user is Mathilde Delaunay (mathilde.delaunay1@gmail.com). The interface includes a navigation bar with "Items", "Modèle descriptif", "Description", "Identification", and "Outils". The main content area is divided into "14 Descripteurs" and "Historique (0)". Three descriptors are visible:

- Position of sub- or post-genital plate**: The sub- or post-genital plate is located at the genitalia level, it is a stemite extension. Sometimes it is not there. The sub- or post-genital plate is never located at the 10th segment level. Be careful not to confuse it with the sub-anal plate.
- Length of tarsal segments**: The tarsal segments are the leg terminal parts, next to the tibia. Here we look at the relative length of the different tarsal articles.
- Number of articles in cerci**: Cerci are appendages attached to the last abdominal segment. They are composed of one or several articles.

On the right side, there is a list of "20 Taxons restants" (Among 20):

- Zwicknia bifrons
- Zwicknia bifrons
- Leuctra geniculata
- Leuctra nigra
- Leuctra nigra
- Nemoura cinerea cinerea
- Nemoura cinerea cinerea
- Nemurella pictetis
- Nemurella pictetis
- Isogenus nubecula
- Isogenus nubecula
- Isoperla grammatica
- Isoperla grammatica
- Brachyptera nsi
- Brachyptera nsi
- Taeniopteryx nebulosa
- Taeniopteryx nebulosa
- Taeniopteryx schoenemundi
- Taeniopteryx schoenemundi

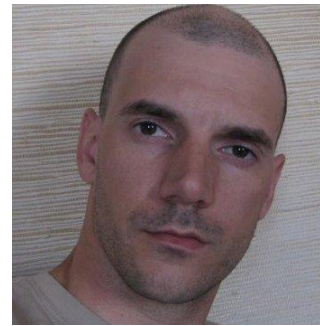
Acknowledgements



Romain Nattier (MNHN)



Régine Vignes-Lebbe
(MNHN/UPMC)



Sylvain Bouquin
(MNHN/UPMC)



Samuel Jolivet (OPIE)



<http://spipoll.org>

mdelaunay@mnhn.fr

<http://xper3.fr>

*Free
100% online
Collaborative*

*Thank you for
your attention!*