



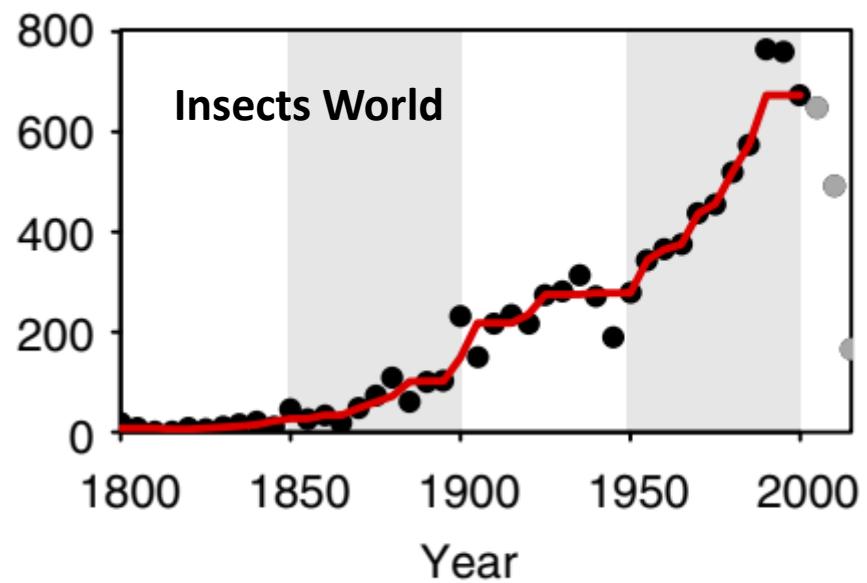
Towards a reference collection for the EURL “insects and mites”

A tool to harmonize NRLs

AG CBGP/plateau collection

20th January 2022 – Montpellier (France)

The challenge ...



ARTICLE

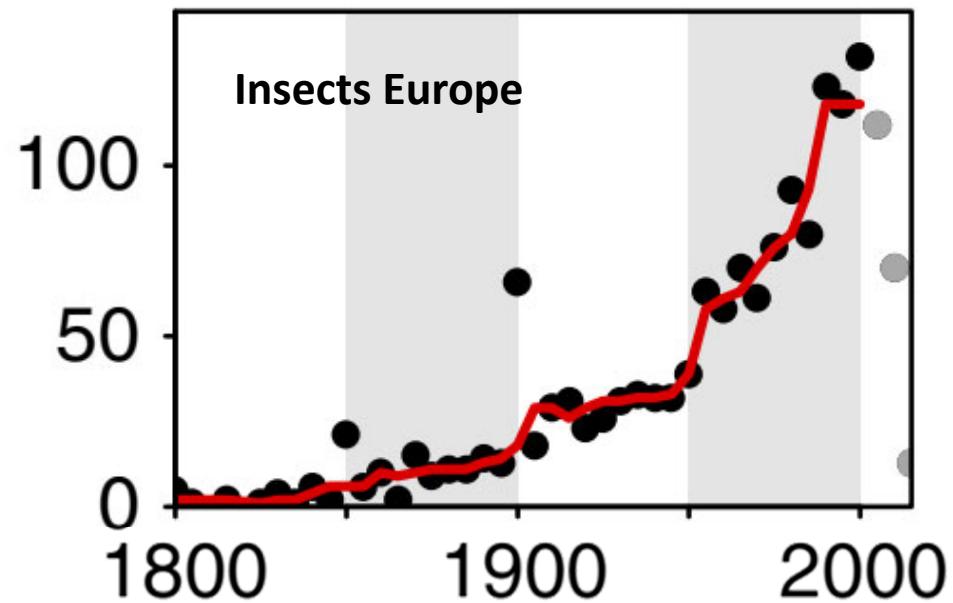
Received 16 Feb 2016 | Accepted 28 Dec 2016 | Published 15 Feb 2017

DOI: 10.1038/ncomms14435 OPEN

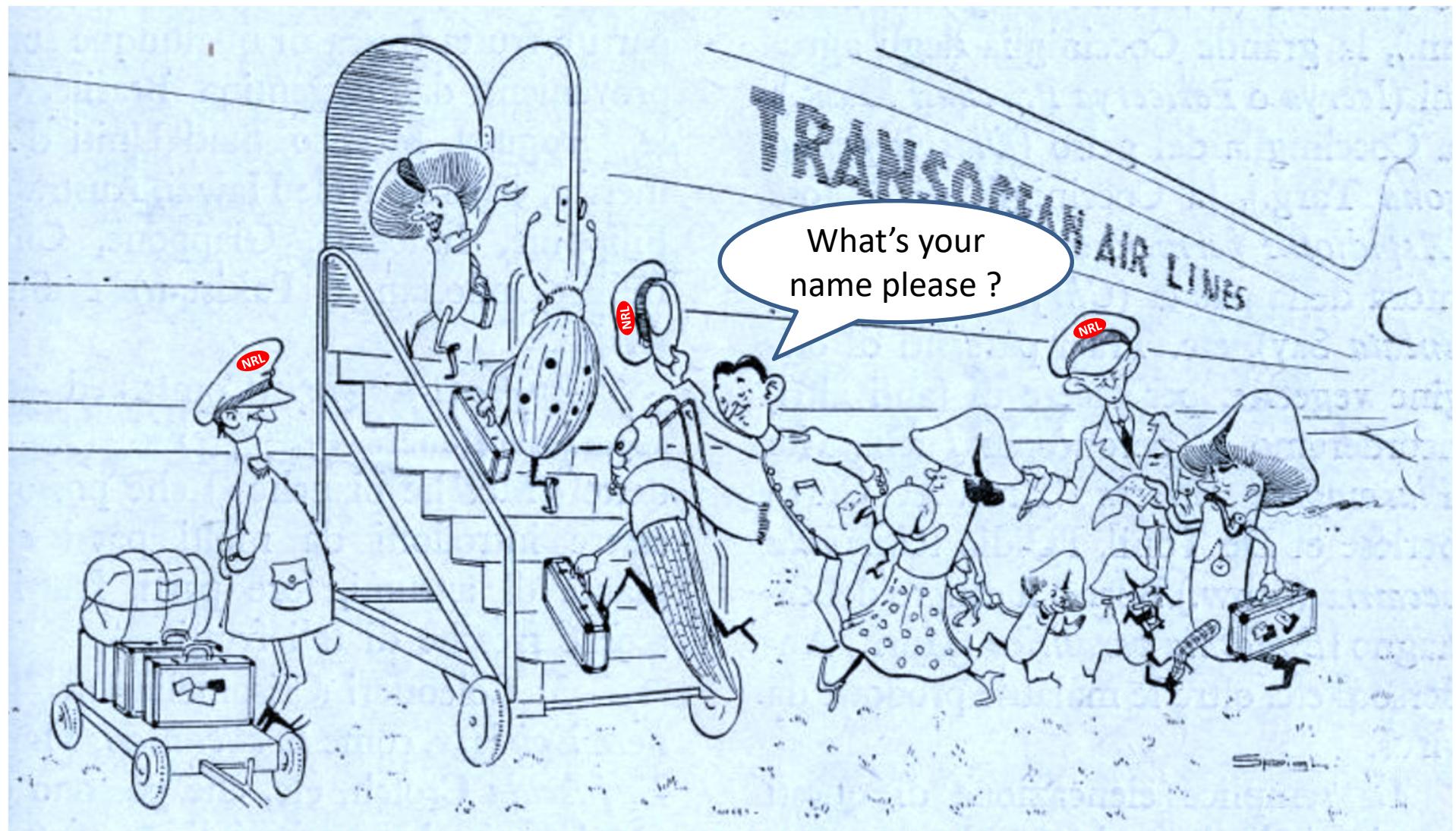
No saturation in the accumulation of alien species worldwide

Hanno Seebens et al.[#]

Global trend of established insect invasive species



At forefront of pest identification: NRLs



NRL : National Reference Laboratory

European Union:

27 countries... 25 NRLs !

- UK left in 2020, Ireland mandate for Ulster
- Denmark mandate for Sweden
- Nobody answers in Malta



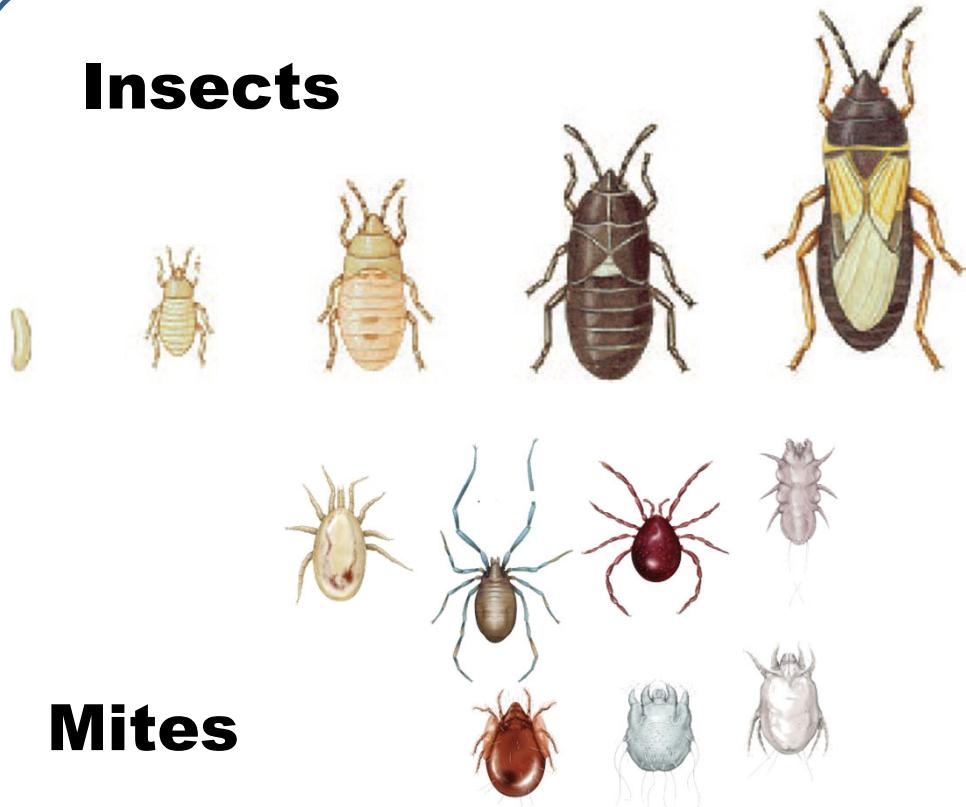
France

Anses-LSV « Insectes et plantes invasive »

- Two NRL mandates since 2009 :
- « Insects, mites & auxiliaries »
- « Invasive plants »

NRLs field of competence

Insects



Mites



Not all arthropods !

NRLs missions

Main missions

- official analyses
- development, validation & optimization of methods
- involvement in associated researches

Object: regulated insects & mites (EU 2016/2072 & 2019/1702)

- 275 regulated non-quarantine (**RNQO**) pest/plant couples
- 151 quarantine organisms (**QO**, 80 insects)
- of which 16 insects are **Priority QO**



Which regulation?

	Annex II A	Annex II B	Annex III	Annex IV	Total
Acarida	2			5	7
Coleoptera	35	4	10	4	53
Diptera	25		3	2	30
Hemiptera	19	3	2	10	34
Hymenoptera			3		3
Lepidoptera	16		3	1	20
Thysanoptera	4				4
	101	7	21	22	151

Priority List →

	Annex II A	Annex II B	Total
Coleoptera	5	3	8
Diptera	4		4
Hemiptera	1		1
Lepidoptera	3		3
	13	3	16

The challenge of identifying insects

Scenarios that slip through the cracks

- Risk of entry directly related to risk of misidentification
- 25 NRLs = 25 different teams, methods, material...
- ... = 25 cumulative risks!

Here comes EURL

- European Union Reference Laboratory
- Main mission: to coordinate and harmonise NRLs action
- Mandate to Anses + Ages (2019)



How is the EURL organized?

Who are we?

Designated under the Commission
Implementing Regulation (EU) 2019/530 of 27
March 2019

A consortium between:

- Entomology and Invasive Plants Unit of ANSES Plant Health Laboratory (Montpellier, France) -> Morphology
- Institute for Sustainable Plant Production of AGES (Vienna, Austria) -> Genetics



Who are we?



Philippe Reynaud
EURL Head



Raphaëlle Mouttet
Deputy head
(EURL-Anses)



Helga Reisenzein
Deputy head
(EURL-Ages)

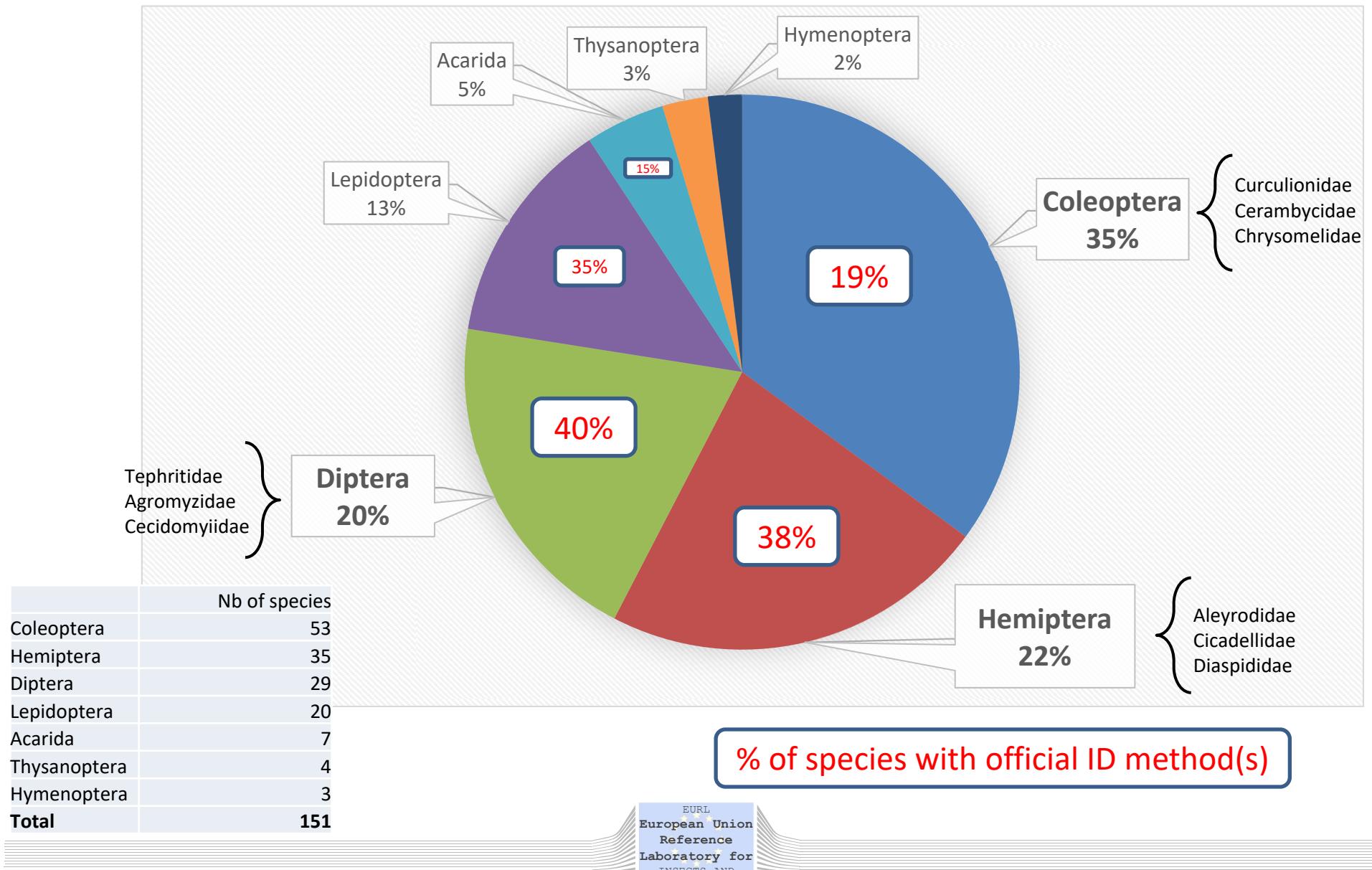
Which criteria for an EURL?

Eligibility/exclusion criteria

- EN/ISO 17025
- Impartial, free from any conflict
- Staff
- Infrastructure, equipment and products
- Knowledge of international standards and practices
- Able to face emergency situations
- Biosecurity standards



Regulated insects: which groups are involved?



Priority List and availability of methods

Method ?

Order	Family	Name	EU	No	Yes
Coleoptera	Buprestidae	<i>Agrilus anxius</i>	Annex II A	●	
Coleoptera	Buprestidae	<i>Agrilus planipennis</i>	Annex II A	●	
Coleoptera	Cerambycidae	<i>Anoplophora chinensis</i>	Annex II B		●
Coleoptera	Cerambycidae	<i>Anoplophora glabripennis</i>	Annex II A		●
Coleoptera	Cerambycidae	<i>Aromia bungii</i>	Annex II B	●	
Coleoptera	Curculionidae	<i>Anthonomus eugenii</i>	Annex II A	●	
Coleoptera	Curculionidae	<i>Conotrachelus nenuphar</i>	Annex II A		●
Coleoptera	Rutelidae	<i>Popillia japonica</i>	Annex II B		●
Diptera	Tephritidae	<i>Anastrepha ludens</i>	Annex II A		●
Diptera	Tephritidae	<i>Bactrocera dorsalis</i>	Annex II A		●
Diptera	Tephritidae	<i>Bactrocera zonata</i>	Annex II A		●
Diptera	Tephritidae	<i>Rhagoletis pomonella</i>	Annex II A	●	
Hemiptera	Triozidae	<i>Bactericera cockerelli</i>	Annex II A	●	
Lepidoptera	Lasiocampidae	<i>Dendrolimus sibiricus</i>	Annex II A	●	
Lepidoptera	Noctuidae	<i>Spodoptera frugiperda</i>	Annex II A		●
Lepidoptera	Tortricidae	<i>Thaumatotibia leucotreta</i>	Annex II A		●
Total				7	9

The challenge of identifying insects

Too many bugs so little time!

Between 2 millions and 30 millions of arthropods species

(Erwin, T. L. 1983. Tropical forest canopies: the last biotic frontier. Bulletin of the Entomological Society of America, Volume 29: 14-19)

Tiny size (microscopic insects and mites that require complex slide mountings and powerful microscopes)

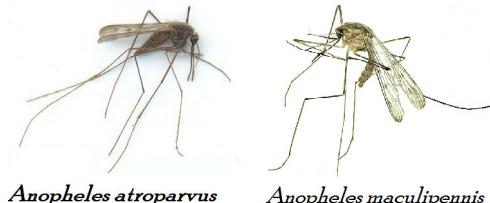


Intra-specific variation



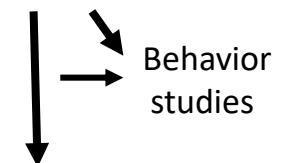
Philaenus spumarius

Sibling (cryptic) species

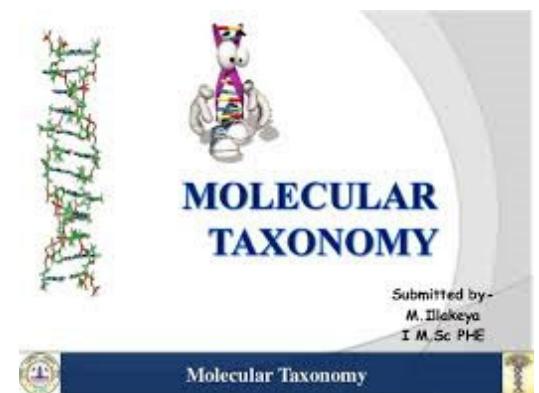


Anopheles atroparvus

Anopheles maculipennis



Behavior
studies



Molecular Taxonomy

A consequence

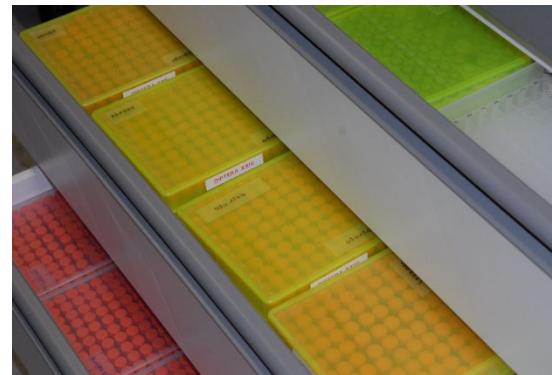
We need vouchers !

We need vouchers...



- For certified morphological & molecular ID
- For pre-testing and validation of ID methods
- For inter-lab Proficiency Tests (ISO 17043)
- For loans to NRLs

Hence, we need a collection...



- With dry-mounted, EtOH and slides vouchers...
- ... and the associated DNA



Hence, we need a database !



Founding Partners:



To be developed on Specify 7

- specifically designed for collection management
- open source
- external housing with technical support
- on trial at AGES for barcodes management
- used by numerous Museums & universities
- easy loan editing & tracking system

...with specific taxonomic tree

The screenshot shows a taxonomic tree visualization interface. On the left, there's a sidebar with various menu items like 'Welcome', 'Data', 'Trees' (which is selected), 'Reports', 'Interactions', 'Statistics', 'Query', 'Workbench', 'BatchEdit', 'Plugins', and 'Attachments'. A search bar at the top right contains the text 'Cotonopsis'. The main area displays a hierarchical tree structure across eight columns:

Life	Kingdom	Phylum	Class	Order	Family	Genus	Species
▼ Life	▼ Animalia	► Acanthocephala ▼ Arthropoda	► Crustacea ▼ Insecta	► Blattodea ► Diptera ► Hymenoptera ► Mecoptera ▼ Odonata	▼ Aeshnidae	► Aeshna (0, 66) ▼ Anax (2, 18)	amazili Burmeister, 1839 azurea Charpentier, 1825 bacchus Hagen, 1867 bangweuluensis Kimmins, 1955 chloromelas Ris, 1911 concolor Brauer, 1865 ► congoiatus Fraser, 1953 dorsalis Burmeister, 1839 dubius Lacroix, 1921 formosus Vander Linden, 1820 ► fumosus Hagen, 1867 georgius Selys, 1872 gibbosulus Rambur, 1842 goliath Selys, 1872 goliatus Fraser, 1922 guttatus Burmeister, 1839 immaculifrons Rambur, 1842 ► Imperator Leach, 1815 (12) Indicus Liefink, 1942 junius Drury, 1773 longipes Hagen, 1861 lunatus Kolenati, 1856 macrachlani Foerster, 1898 maculatus Rambur, 1842 maculatus Rambur, 1842

The tree structure starts with 'Life' at the top, which branches into 'Animalia', 'Acanthocephala', and 'Arthropoda'. 'Arthropoda' further branches into 'Crustacea' and 'Insecta'. 'Insecta' branches into 'Blattodea', 'Diptera', 'Hymenoptera', 'Mecoptera', and 'Odonata'. 'Odonata' branches into 'Aeshnidae', which then branches into 'Aeshna' and 'Anax'. The 'Aeshna' branch has 66 entries, and the 'Anax' branch has 18 entries. The interface also includes a 'Taxontree' section with a bulleted list:

- manually & via lists entered
 - in accordance with taxonomic experts
- extandable & changeable

...with specific data for each object

Collection Object

IDs

CO Collection Object
Tax Taxon
Agt Agent
Geo Geography
Loc Locality
CI Collecting Information
Sto Storage
Con Container

Determination

Collecting



Info: Doubleclick on or hover over text for more information on field.

ABOL-Catalog #: 83

Process ID (Bold):

Museum ID (Bold): NOaS1-2019_Odo0083

Coll. Code (Bold): NOaS1-2019

Cataloger: Fischer, Iris

Connection to another Collectionobject:

Sample ID (Bold): NOaS1-2019_Odo0083

Field ID (Bold): Odo0083

Institution Storing (Bold): Naturhistorisches Museum, Wien

Catalogued Date: 08/01/2018

Determinations

Taxon: Anax imperator Qualifier: Current

Preferred Taxon: Anax imperator Addendum:

Identification Method: morphological

Determination Key:

Determined Date: 19/06/2017 Type Status:

determined by: Fischer, Iris

Taxonomy Notes:

Determination Citations

Reference Work:

Remarks:

Grid ▾

1 of 2

Collecting Information

Method: net Event Time:

Start Date: 19/06/2017 End Date:

Collection Event ID: Sampling Protocol:

Locality: NHM_LE-Libellen_2017-2019_Wienerwald_W03; Wien; 48.2144430000, 16.2201640000

Habitat:

Collecting Notes:

Collectors i

Last Name	First Name	Remarks
Fischer	Iris	

Preparations i

Prep Type	Tissue Descriptor	Prepared By	Sample Lab-Number	Is On Loan	Number of Items	Storage	Institution	Storage Location	Notes	Preparation Attachments
1 of 1										

Welcome New Collection Object Query Query Results Collection Object Workbench Plugins

Invertebrata 1_NHM_Libellen omacek2

...with specific attachments as well

Preparations
(pinned; tissue; DNA)

Life & Host

Attachment
(Photos, reconstruction
etc.)

DNA

Preparations

Prep Type	Tissue Descriptor	Prepared By	Sample Lab-Number	Is On Loan	Number of items	Storage	Institution	Storage Location	Notes	Preparation Attachments
DNA Sam...	Leg	Sittenthaler...		No						
EtOH	Leg	Fischer, Iris	8	No	2					
EtOH	complete	Fischer, Iris		No						

Col Obj Attribute

Sex: male Reproduction: sexual Life Stage: adult

Associated Taxa: Associated Specimens:

Host-Sex: Host-Life-Stage:

Host-Organ: Host-Specification:

Voucher Status: Vouchered Registered Collection

Extra Info: External URLs:

Notes:

Collection Object Attachments



NOaS1-2019_Odo0083_Anax imperator_dorsal_mod

DNA Sequence

go to: DNA 0

So far, still on Excel

EURL European Union Reference Laboratory for INSECTS AND

File Home Insertion Mise en page Formules Données Révision Affichage Dites-nous ce que vous voulez faire... ROUSSE Pascal Partager

Couper Copier Reproduire la mise en forme Presse-papiers Police Alignement Nombre Style

Calibri 11 A A Renvoyer à la ligne automatiquement Standard Mise en forme conditionnelle Mettre sous forme de tableau Normal Insatisfaisant Neutre Satisfaisant Insérer Supprimer Format Effacer Trier et Rechercher et filtrez sélectionner

A1269

Data to be stored on each accession/information to be held per specimen

		Specimen scientific name (Taxon)	Specimen scientific name (Genus)	Specimen scientific name (Family)	Specimen scientific name (Order)	Authors of the current scientific name	Year of publication of scientific name	Specimen developmental stage	Quant.	Sex	Geographic source of specimen (at least to country or region of origin) for quarantine pests unknown or not applicable	geographic place of isolation of specimen (especially import consignments); locality	Source such as host plant, host plant part, host plant material, substrate or other source (e.g. commodity, trap) from which specimen was collected; enter unknown or not applicable	Host plant taxon name (incl. variety if needed); for quarantine pests unknown or not applicable	Date (at least year) of sampling	Sampler/collector (name)	Sampler/collector (organisation)	Determinator (name)	Deter
in reference collection morphological* - Level1	required	required	required	required	required	required	required	required			optional (if available)		required	required	optional (if available)	optional (if available)	required	required	
in reference collection morphological* - Level 2	required	required	required	required	required	required	required	required			optional (if available)		required	required	optional (if available)	optional (if available)	required	required	
in working collection morphological* - Level 3	required	required	required	required	optional	optional	required				optional (if available)		required	required	n.a.	n.a.	required	required	required
235 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
236 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
237 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
238 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
239 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
240 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
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242 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
243 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
244 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
245 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Acer saccharinum	n.a.	trunk in iron cage	spring 2018	Andrea Taddei	SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai
246 Level 2	Anoplophora glabripennis	Anoplophora	Cerambycidae	Coleoptera	(Motschulsky)	1854	adult	1			Trescore Balneario (BG), Italy	Pheromone trap	n.a.	n.a.	10/07/2018	Simone Sala	ERSAF - SFR Lombardia	Raphaëlle Mouttet	ANS Ento Invai

A 3-levels collection

Level 1: identification by recognized specialists

Levels 2-3 : EURL staff



- **Limited number** of specimens/DNA for each priority QO
Possibly other species, regulated or not, for comparison
Associated with **barcodes & HD pictures**
Not available to NRLs, analysis under accreditation
- Supplementary material for priority QO and others
Available for loan to NRLs or other laboratories
Some representatives with barcode
- QO, close species, any other useful species
Main purpose: **PT, training, method validation**

A bilocated collection



To be continued...

EURL European Union Reference Laboratory for INSECTS AND MITES

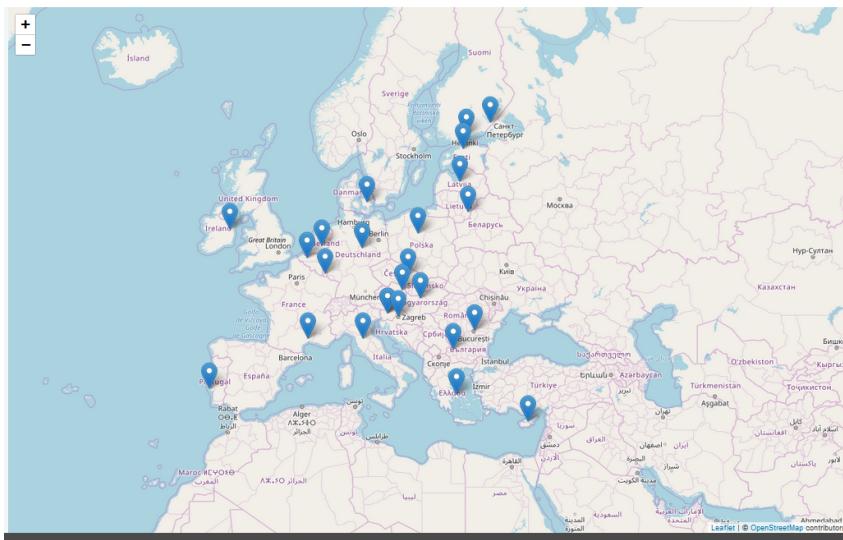
anses Investiger évaluer protéger

AGES Identify

HOME PRESENTATION EURL ACTIVITIES DOCUMENTS NRLS WORKPLACE CONTACT US

NRLS NETWORK

Find here location and contact persons for the National Reference Laboratories of the European Union



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European Union Reference Laboratory for INSECTS AND MITES

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AGES Identifying, evaluating, protecting

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NEWS

OPENING OF THE EURL FOR INSECTS AND MITES WEBSITE

For decades, invasions of alien species into a new territory have invariably altered the balance of natural ecosystems and have had serious repercussions on areas of economic and social importance. National Plant Health Services first goal is to prevent the introduction and spread on the EU territory of potential harmful species, putting in place official measures immediately after the discovery of the pest within their borders. Therefore...

All the news >

WELCOME TO THE WEBSITE OF THE EUROPEAN UNION REFERENCE LABORATORY FOR INSECTS AND MITES

The European Council and the Commission have designated EU Reference Laboratories (EURLs) with the aim to ensure high-quality, uniform testing in the EU and to support Commission activities on risk management and risk assessment in the area of laboratory analysis.

The consortium between ANSES (France) and AGES (Austria) is designated as the European Union Reference Laboratory for the identification of regulated insect and mite species under COMMISSION IMPLEMENTING REGULATION (EU) 2019/530 of 27 March 2019.

consortium presentation

The French Agency for Food, Environmental and Occupational Health & Safety (ANSES) was created on 1 July 2010. It is an administrative public establishment under the authority of the French Ministries of Health, Agriculture, the Environment, Labour and Consumer Affairs. ANSES undertakes monitoring, expert assessment, research and technical activities in a broad range of topics that encompass human health, animal health and well-being, and environmental health. www.anses.fr AGES The Austrian Agency for Health and Consumer Protection (AGES) is the national reference laboratory for the identification of regulated insect and mite species in Austria. AGES is a public authority of the Federal Ministry of Health (BMG).

<https://eurl-insects-mites.anses.fr>

Thanks for your attention !