THE BARCODING FACILITY FOR ORGANISMS AND TISSUES OF POLICY CONCERN (BOPCO) & THE JOINT EXPERIMENTAL MOLECULAR UNIT (JEMU)

SOPHIE GOMBEER, ANN VANDERHEYDEN, KENNY MEGANCK, NATHALIE SMITZ,
CARL VANGESTEL, GONTRAN SONET, MASSIMILIANO VIRGILIO, NELE MULLENS, THIERRY BACKELJAU AND MARC DE MEYER

LIFEWATCH MEETING @ CIBIO-INBIO

26-28 FEBRUARY 2020, PORTUGAL

ORGANISATION & AFFILIATIONS

- Jointly run by the Royal Belgian Institute of Natural Sciences (RBINS) and the Royal Museum for Central Africa (RMCA)
- BopCo = Belgian Federal in-kind contribution to LifeWatch

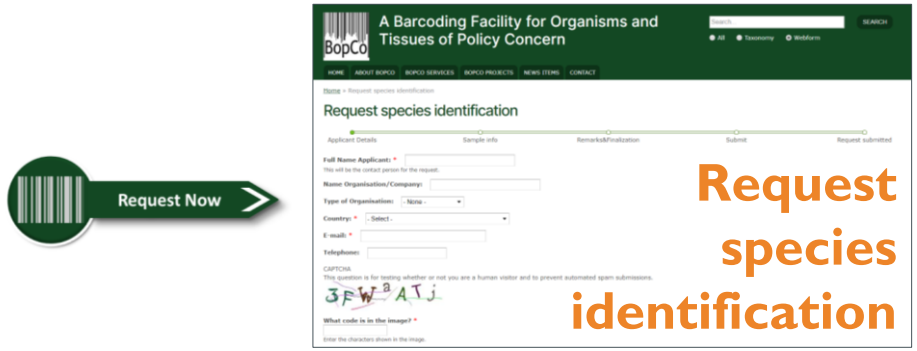
	RBINS	RMCA
BopCo		
JEMU		
Coordinators		

A BARCODING FACILITY FOR ORGANISMS & TISSUES OF POLICY CONCERN

- Aim: Supplying identifications of policy concern organisms and derived products
- Objective: Provide access to knowledge (taxonomic expertise) and infrastructure (laboratory) necessary to identify biological samples of policy concern
- For whom: All stakeholders who deal with biological materials of policy concern and who need an accurate identification
- How: Using 'traditional' morphological characteristics and/or DNA-based identification technology
- Conditions: Compliance with BopCo scope & Costs may be charged

A BARCODING FACILITY FOR ORGANISMS & TISSUES OF POLICY CONCERN

HTTP://BOPCO.MYSPECIES.INFO/

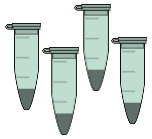


Request species identification

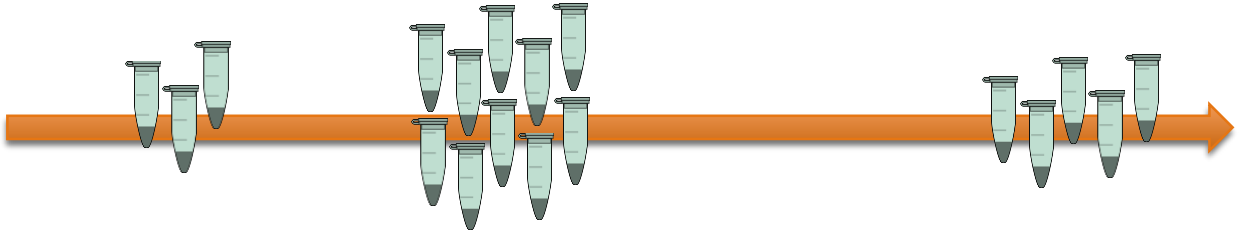
Information folder

IDENTIFICATION REQUESTS AND PROJECTS

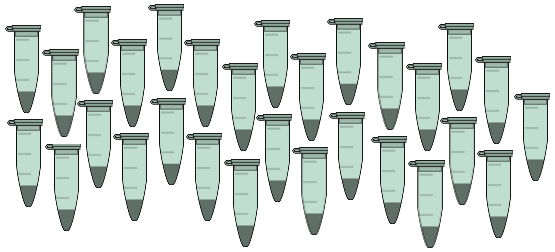
- Punctual identification requests



- Recurrent identification requests



- Identification projects & filling the gaps

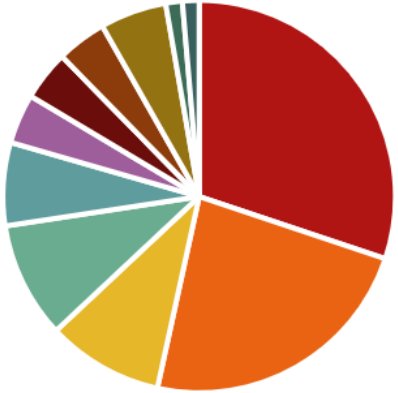


PUNCTUAL IDENTIFICATION REQUESTS UNTIL JANUARY 2020 (REQUESTS = 68)

Policy Concern

- Pest species
- Agricultural pest
- Protected species
- Exotic species
- Public health
- Food safety
- Museum validation
- Biodiversity

Taxon Diversity



- Diptera
- Other Insecta
- Mammalia
- Mollusca
- Arachnida
- Aves
- Plantae
- Reptilia
- Other invertebrates
- Fungi
- Pisces

Stakeholders

- Government
- Research Institute
- University
- Company
- Private person
- Museum
- Small business

Outcome

- DNA-based ID
- Morphology-based ID
- Morphology-based + DNA-based ID
- Literature-based information
- Referral to an external expert

RECURRENT IDENTIFICATION REQUESTS EXAMPLES

- ID of bird strikes for the Belgian Air Force

- ID of mosquitoes for the Belgian Army

- Monitoring of exotic mosquitoes for a nation-wide project in collaboration with the Institute of Tropical Medicine

IDENTIFICATION PROJECTS & FILLING THE GAPS EXAMPLES

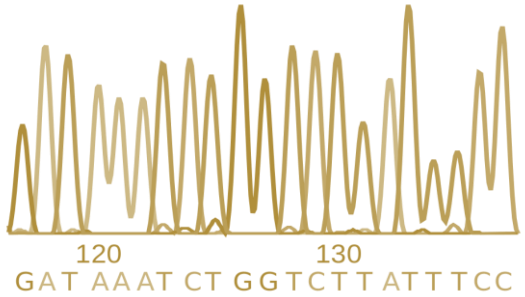
- Evaluation of publicly available DNA sequence data to reliably identify IAS of Union concern → One factsheet per species available on BopCo website
- Building barcode database of forensically important rove beetles with the National Institute of Criminalistics and Criminology

- Identifying snail and slug species which act as vectors for cardio-pulmonary parasites in collaboration with Greek and German universities
- DNA barcoding of selected samples of (African) fruit flies of agricultural importance

BOPCO SEQUENCE OUTPUT

- Sanger sequencing of ≠ marker regions:

COI, 16S rRNA, NADH4, 28S, EF1-alpha, wg, LW Rh, ITS, cytb, rbcL, matK, trnH-psbA, COII, …



- Generated sequences:
  - Deposition in GenBank
  - Voucher specimen barcodes

NCBI
National Center for Biotechnology Information

BOLD SYSTEMS

- Other technologies → technical support from JEMU

SCIENTIFIC SCOPE

JEMU

supporting scientific investigation in

- molecular systematics
- phylogeny, phylogeography
- DNA barcoding & species delimitation
- population/evolutionary genomics

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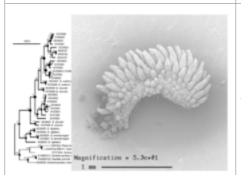
→ Collaborative research projects

Last publications

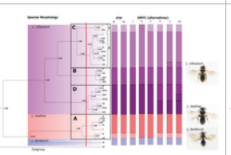
Scientific publication:

Impact of sample preservation and manipulation on insect gut microbiome profiling. A test case with fruit flies (Diptera, Tephritidae), M. De Cock, M. Virgilio, P. Vandamme, A. Augustinos, K. Bourtzis, A. Willems, M. De Meyer, 2019, Frontiers in Microbiology, 10 (Dec. 2019).



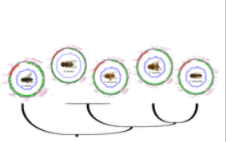
Scientific publication:

Phylogenetic analysis of the *Baikalodrilus* species flock (Annelida: Clitellata: Naididae), an endemic genus to Lake Baikal (Russia), P. Martin, G. Sonet, N. Smitz & T. Backeljau, 2019, Zoological Journal of the Linnean Society, 187(4): 987–1015 (Nov. 2019).



Scientific publication:

Integrative taxonomy resuscitates two species in the *Lasioglossum villosulum* complex (Kirby, 1802) (Hymenoptera: Apoidea: Halictidae), A. Pauly, G. Noël, G. Sonet, D.G. Notton, J.L. Boevé, 2019, European Journal of Taxonomy, 541 (Sept. 2019).



Scientific publication:

First mitochondrial genomes of five hoverfly species of the genus *Eristalinus* (Diptera: Syrphidae), Gontran Sonet, Yannick De Smet, Min Tang, Massimiliano Virgilio, Andrew D. Young, Jeffrey H. Skevington, Ximo Mengual, Thierry Backeljau, Shanlin Liu, Xin Zhou, Marc De Meyer & Kurt Jordaens. 2019. Genome, 2019; 62(10): 677-687 (Jul. 2019).

http://jemu.myspecies.info/

SCIENTIFIC SCOPE

JEMU

supporting scientific investigation in

- molecular systematics
- phylogeny, phylogeography
- DNA barcoding & species delimitation
- population/evolutionary genomics

→ Collaborative research projects

→ Evaluation of new NGS protocols

SCIENTIFIC SCOPE

JEMU

supporting scientific investigation in

- molecular systematics
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→ Collaborative research projects

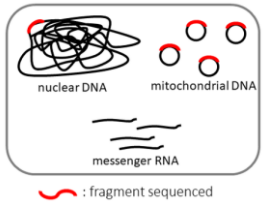
→ Evaluation of new NGS protocols

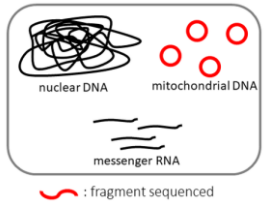
→ Education and training

SEQUENCING DATA & BIOINFORMATICS

JEMU

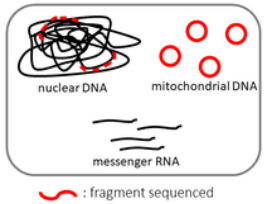
Targeted Amplicon Sequencing

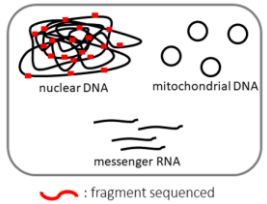




Mitogenomics

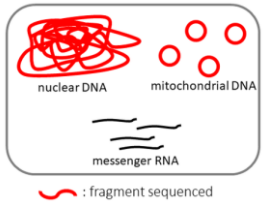
Genome Skimming

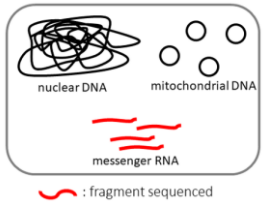




RAD-Seq, ddRAD, HyRAD

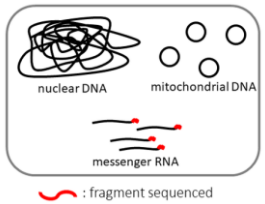
Whole Genome Resequencing





RNA-Seq

QuantSeq



SEQUENCING DATA & BIOINFORMATICS

JEMU

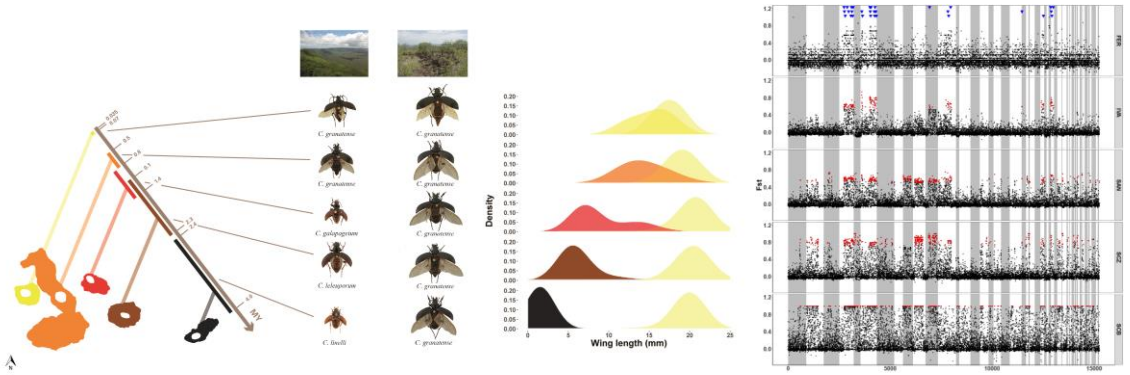
High Performance Computing infrastructure of UGhent

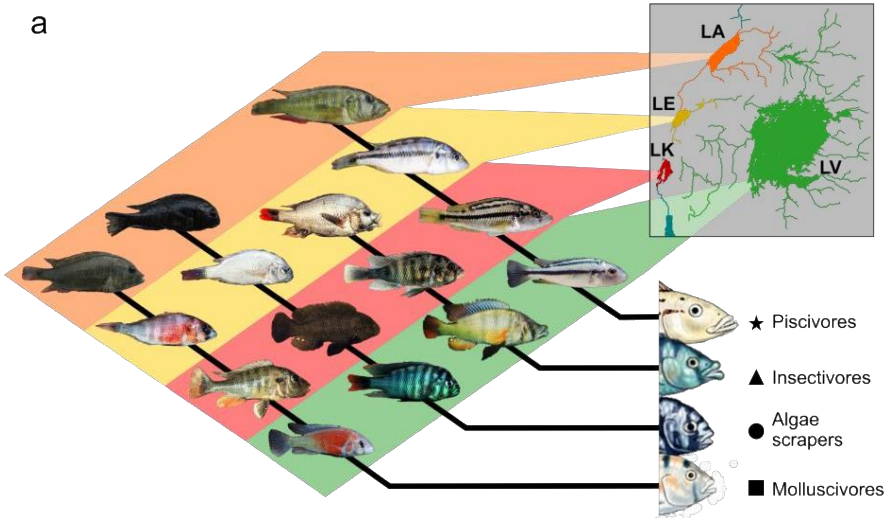
Partner of the Flemish Supercomputer Center (VSC)

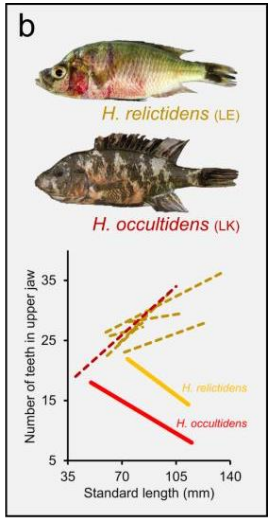
PROJECT EXAMPLES

JEMU

Molecular mechanisms underlying parallel adaptive radiations



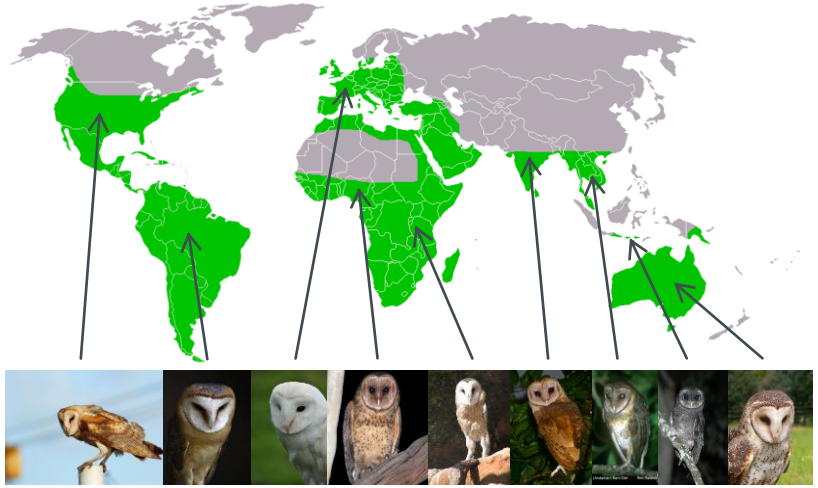


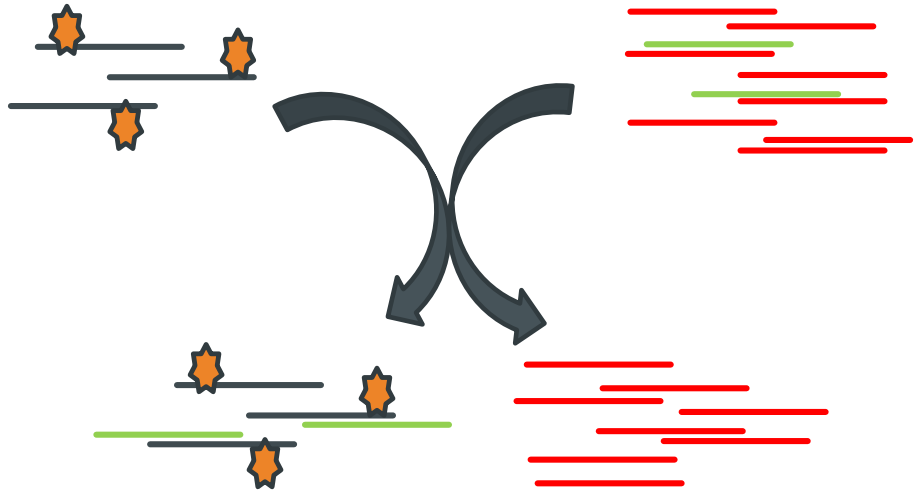


PROJECT EXAMPLES

JEMU

Hybridization signatures between native and non-native barn owls





Non-target DNA (bacteria, human, …)
Target DNA
Bait DNA