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IBIOM
Istituto di Biomembrane, Bioenergetica e Biotecnologie Molecolari

RECAS

# Biomolecular Thematic Centre: Recent Advances and Future Perspectives

***Bachir Balech***

***LifeWatch Annual Conference***

*Rome, June 25-27 2018*

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# Bio-Molecular Tools and Databases

## Achievements

- ✓ DNA multiple alignment: ***MSA-PAD 2.0*** (upgraded)
- ✓ Meta-barcoding data taxonomic assignment: ***BioMaS*** (upgraded)
- ✓ Curated and specialized ITS1 database: ***ITSoneDB*** (upgraded)

## Perspectives

- ✓ DNA barcode markers retrieval tool for plants and animals
  - ❑ ***coxI*** (mitochondrial)
  - ❑ ***rbcL, matK, trnH-psbA*** (chloroplastic)

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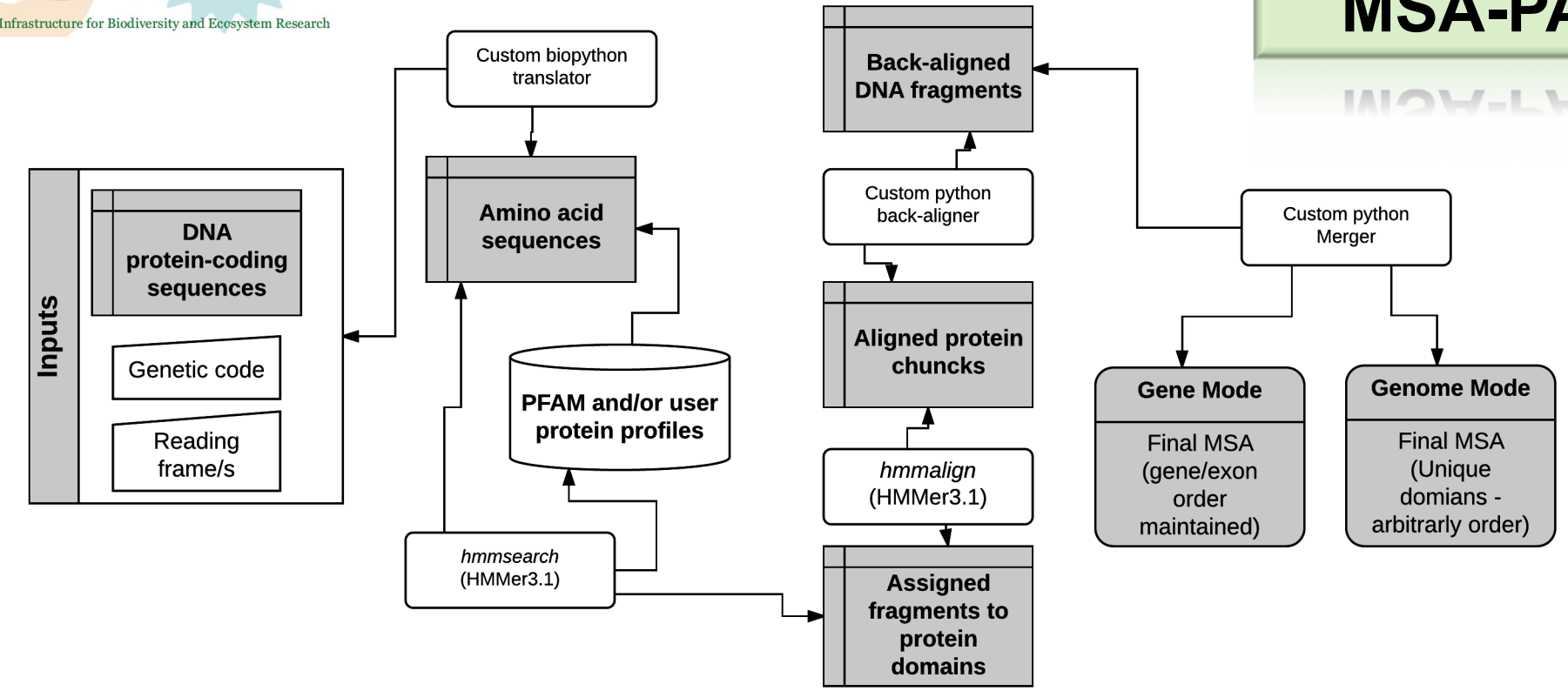
# MSA-PAD 2.0




- MSA-PAD aligns DNA sequences encoding either for single or multiple protein domains
- It uses PFAM or user-defined protein profiles to guide DNA alignments
- Available at ReCaS data center (http://recasgateway.ba.infn.it/) and LifeWatch Italy portal (http://www.servicecentrelifewatch.eu/msapad)


Balech, B., *et al.* (2018) DNA Multiple Sequence Alignment Guided by Protein Domains: The MSA-PAD 2.0 Method, *Methods in molecular biology*, **1746**, 173-180.

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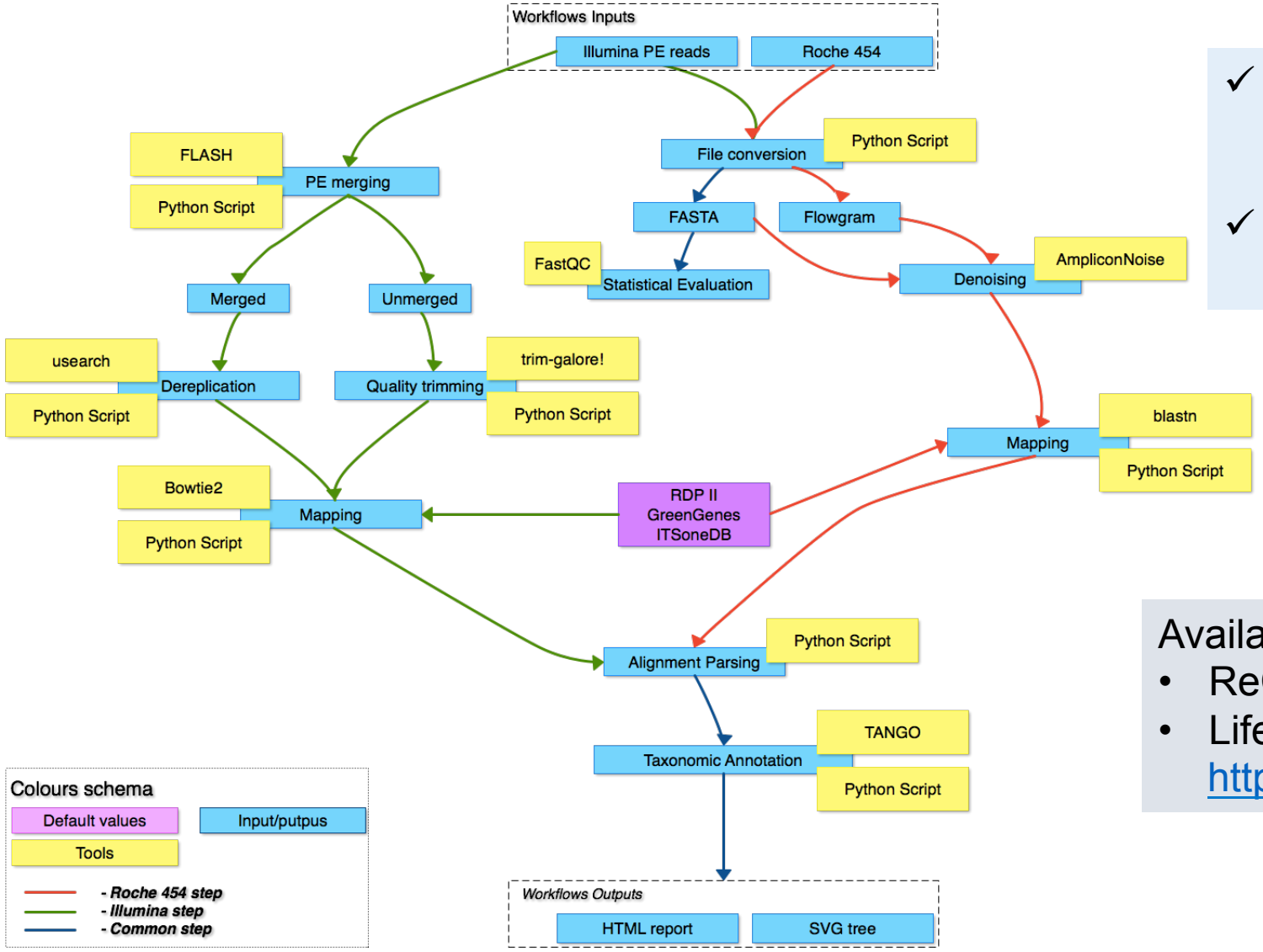
# BioMaS




- ✓ Bioinformatic analysis of Metagenomic AmpliconS
- ✓ Deals with Illumina and 454 NGS meta-barcoding data

Available at:

- ReCaS datacenter (http://recasgateway.ba.infn.it/)
- LifeWatch Italy portal ( http://www.servicecentrelifewatch.eu/biomas)

Fosso, B., *et al.* (2015) BioMaS: a modular pipeline for Bioinformatic analysis of Metagenomic AmpliconS, *BMC bioinformatics*, **16**, 203.

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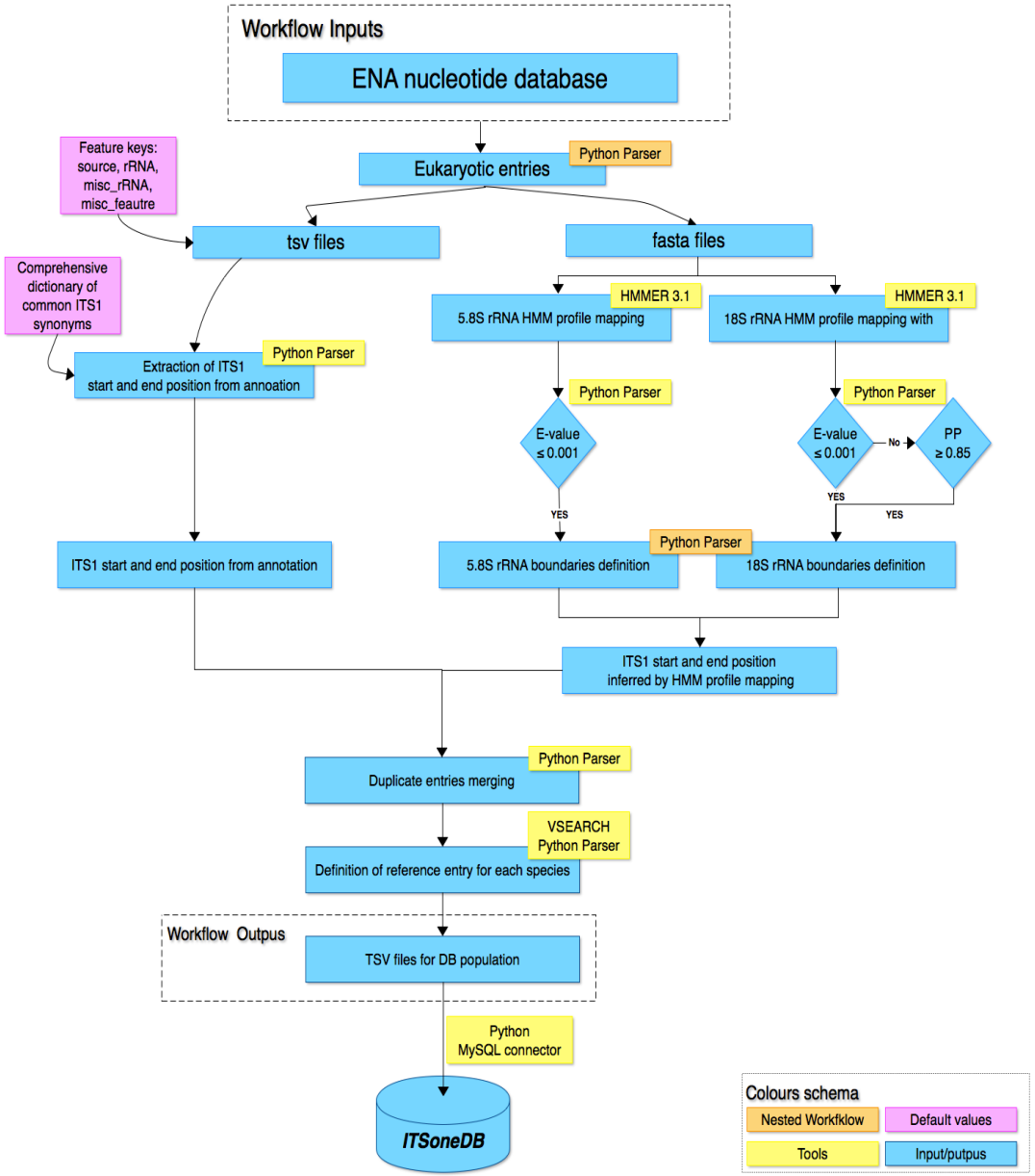
# ITSoneDB




- A comprehensive collection of eukaryotic ribosomal RNA Internal Transcribed Spacer 1 (ITS1) sequences
- A dictionary of common ITS1 synonyms was used to select the entries where ITS1 annotations were specifically present in **ENA** entries features tables
- Hidden Markov Model (**HMM**) profiles of ITS1 flanking (18S and 5.8S rRNA genes) are mapped on all the eukaryotic sequences (using HMMER) in order to validate and, eventually, refine boundaries location of this region

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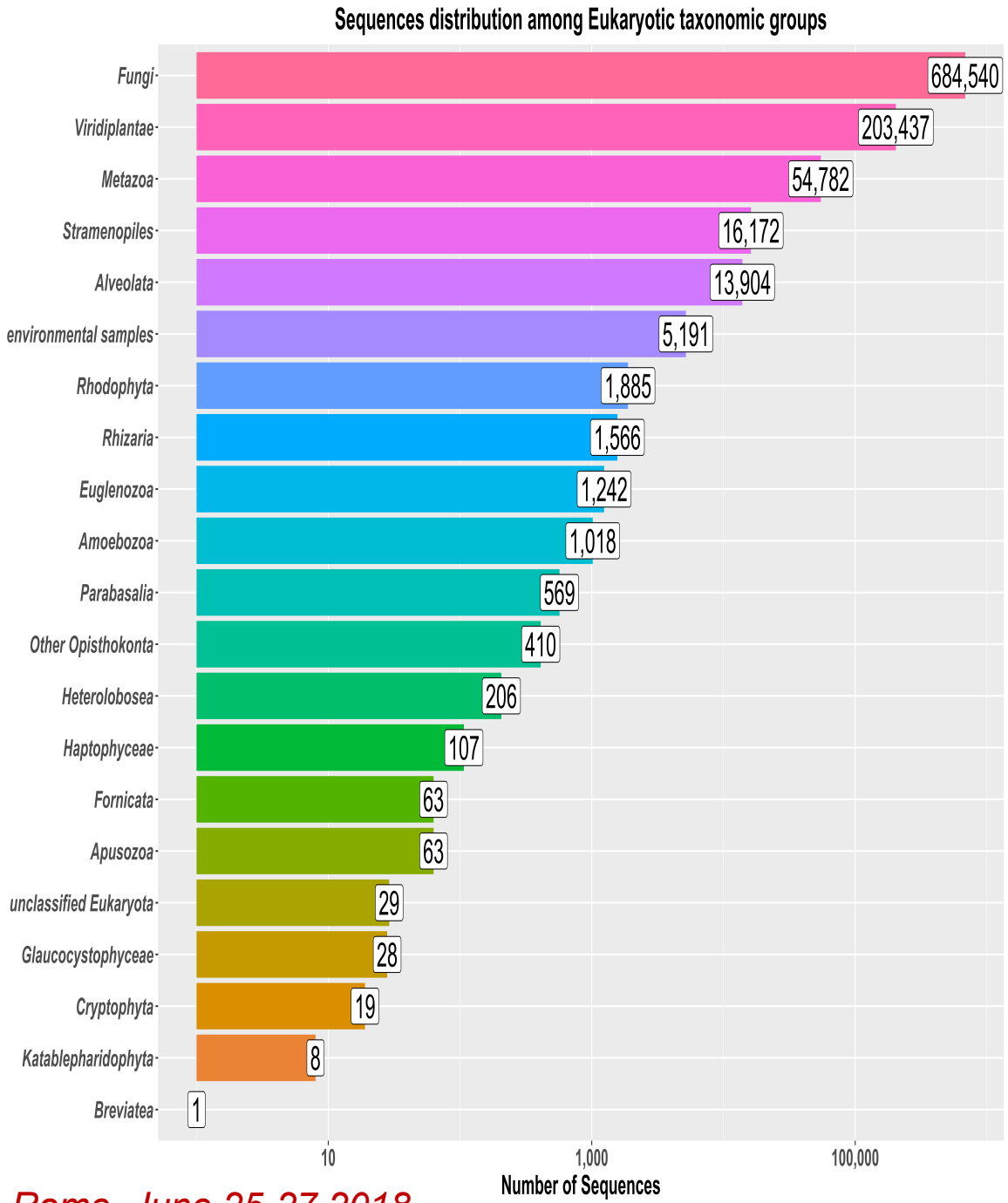
# ITSoneDB contents

Availability: http://itsonedb.cloud.ba.infn.it/




Santamaria, M., *et al.* (2018) ITSoneDB: a comprehensive collection of eukaryotic ribosomal RNA Internal Transcribed Spacer 1 (ITS1) sequences, *Nucleic acids research*, **46**, D127-D132.

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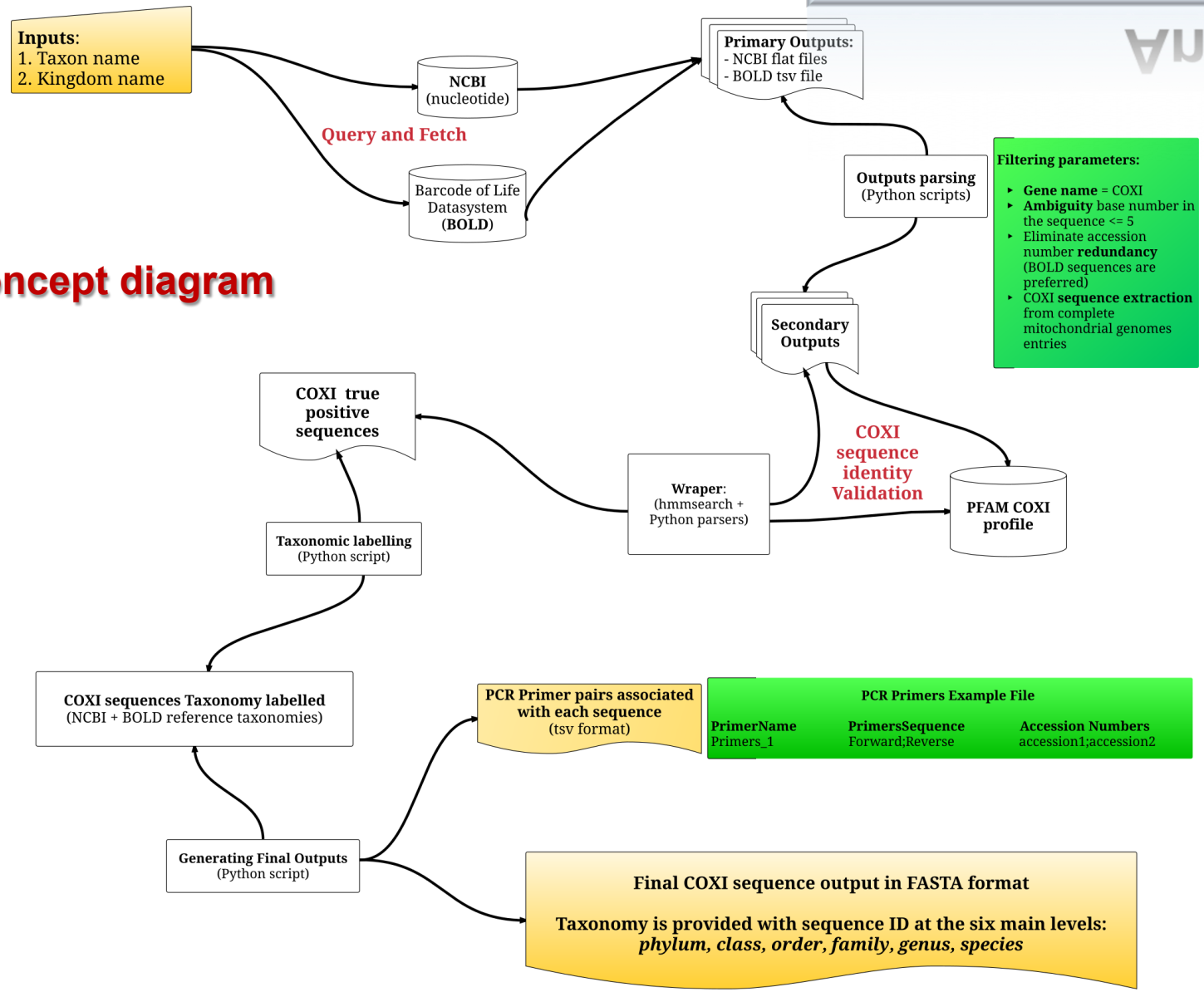
# DNA Barcode Markers Retrieval: Animals & Plants

## Concept diagram




## Molecular markers

- ❑ Animals: ***COXI***
- ❑ Plants: ***rbcL, matK, trnH-psbA***

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# Globis-B: Species Interaction Workshop

*LW annual conf. Rome, June 25-27 2018*

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# Contributions

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## Stazione Zoologica A.D.

- Prof. Adriana Zingone