Influenza Infectious Disease Ontology (Influenza-IDO)

IDO Conference - December 9, 2010

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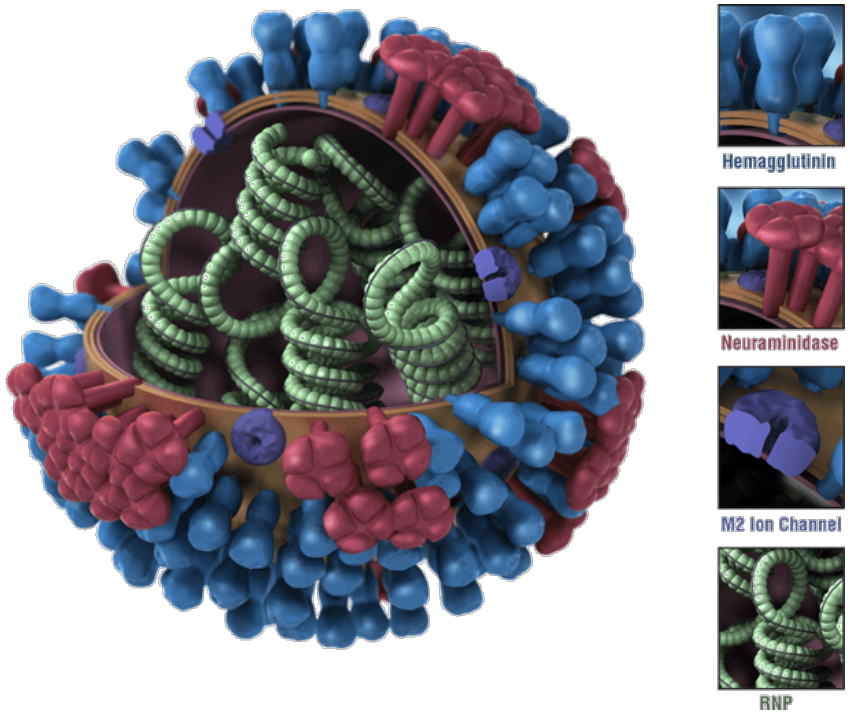
Influenza-IDO

- Influenza-IDO
- Present Needs / Potential Benefits

Influenza Virus

- Single stranded, negative sense RNA virus
- 8 RNA Segments
- 11 Proteins
- Epidemics
- Pandemics



Influenza-IDO Authors

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Influenza-IDO
Domain Requirements

- Influenza ontology is an extension of IDO

- Host and Pathogen:
  - Anatomy (Host and pathogen)
  - Taxonomy (Host and pathogen)
- Biological Material
- Infectious Disease / Clinical
- Laboratory Experiments
- Surveillance (outside of IDO)
  - Disease transmission and specimen collection

Influenza–IDO V0.9

- Includes (Thanks to OntoBee!):
  - No. of terms (including imported) – 1160
  - No. of terms (excluding imported) – 315
  - Terms shared by BO & FLU: 587

- PURL:
  - http://purl.obolibrary.org/obo/flu/dev/flu.owl
  - http://purl.obolibrary.org/obo/flu.owl

Example Influenza-IDO Terms

- Surveillance (Avian)
  - Wild / Domestic
  - Migratory / non-migratory
- Virus Experimental Infection Event
  - Route of delivery
  - Amount delivered (Volume)
  - Amount delivered (Titer)
  - Passage time period
- Host Anatomy / Age
  - Cloaca
  - Oral/Pharyngeal
  - Hatch year
  - Adult
- Sequence Changes (Analysis)
  - Virus sequence residue type
  - Virus sequence residue number
  - Virus specimen source residue
  - Post passage residue

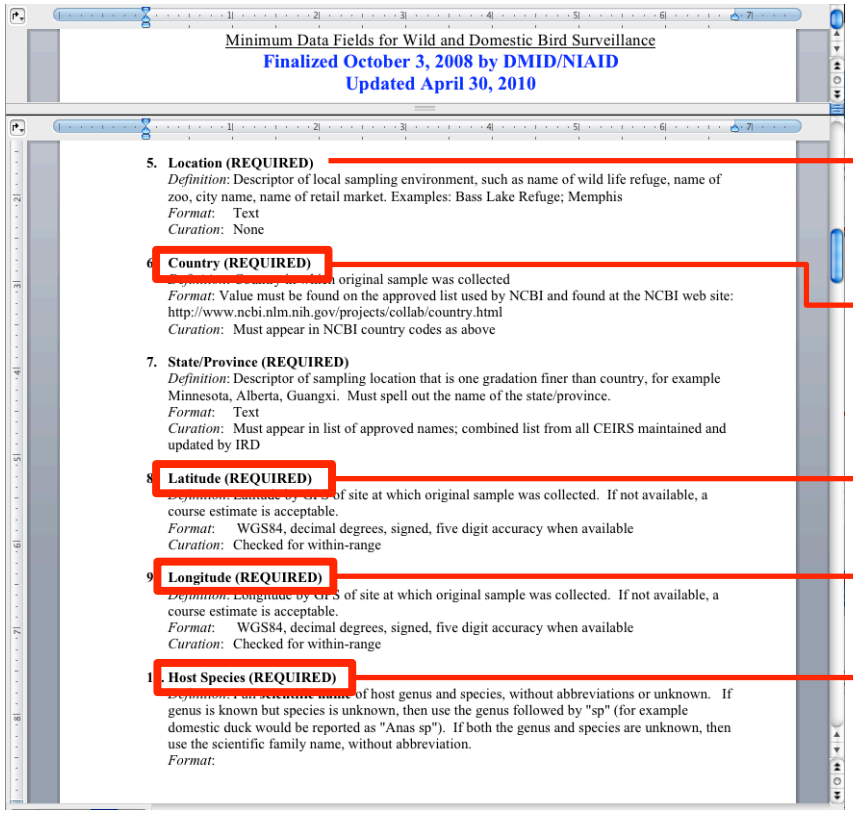
PRESENT NEEDS / POTENTIAL BENEFITS

CEIRS & Minimum Information Data Standards

- Center for Excellence in Influenza Research and Surveillance (CEIRS)
- Minimum Information Data Standards
  - Facilitate submission of data to IRD
  - Facilitate query, visualization and analysis
  - Separate document for each type of data
    - Avian surveillance (finalized)
    - Non-human mammalian surveillance (finalized)
    - Virus isolate data (finalized)
    - Phenotype
    - Human surveillance
    - Passage experiment

Animal Surveillance Search

CEIRS MDS



Minimum Data Fields for Wild and Domestic Bird Surveillance
Finalized October 3, 2008 by DMID/NIAID
Updated April 30, 2010

5. **Location (REQUIRED)**
Definition: Descriptor of local sampling environment, such as name of wild life refuge, name of zoo, city name, name of retail market. Examples: Bass Lake Refuge; Memphis
Format: Text
Curation: None

6. **Country (REQUIRED)**
Definition: Country in which original sample was collected
Format: Value must be found on the approved list used by NCBI and found at the NCBI web site: http://www.ncbi.nlm.nih.gov/projects/collab/country.html
Curation: Must appear in NCBI country codes as above

7. **State/Province (REQUIRED)**
Definition: Descriptor of sampling location that is one gradation finer than country, for example Minnesota, Alberta, Guangxi. Must spell out the name of the state/province.
Format: Text
Curation: Must appear in list of approved names; combined list from all CEIRS maintained and updated by IRD

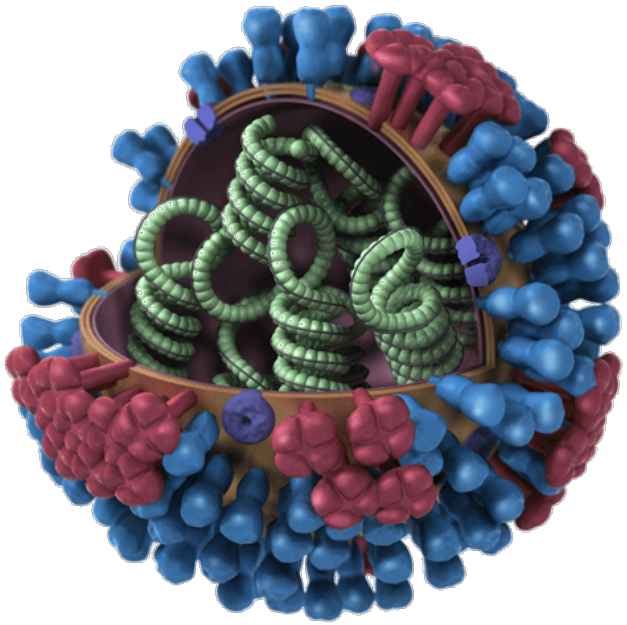
8. **Latitude (REQUIRED)**
Definition: Latitude by GPS of site at which original sample was collected. If not available, a course estimate is acceptable.
Format: WGS84, decimal degrees, signed, five digit accuracy when available
Curation: Checked for within-range

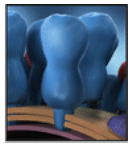
9. **Longitude (REQUIRED)**
Definition: Longitude by GPS of site at which original sample was collected. If not available, a course estimate is acceptable.
Format: WGS84, decimal degrees, signed, five digit accuracy when available
Curation: Checked for within-range

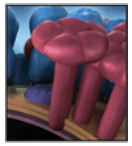
10. **Host Species (REQUIRED)**
Definition: Full scientific name of host genus and species, without abbreviations or unknown. If genus is known but species is unknown, then use the genus followed by "sp" (for example domestic duck would be reported as "Anas sp"). If both the genus and species are unknown, then use the scientific family name, without abbreviation.
Format:

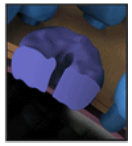
IRD Implementation

Subtype (H1N1)

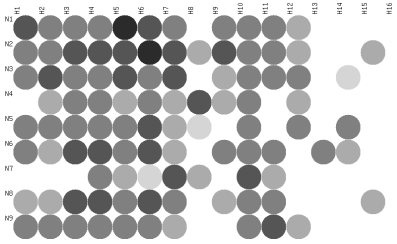




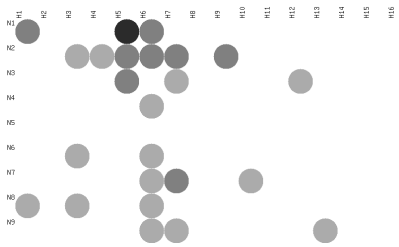




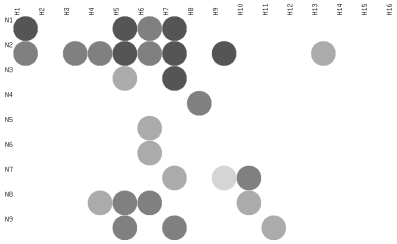
Duck



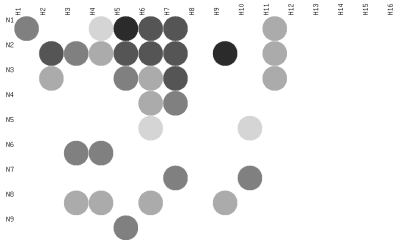
Goose



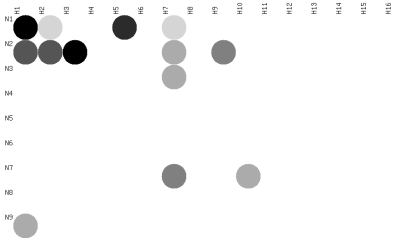
Turkey



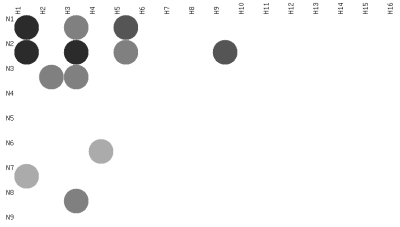
Chicken



Human



Swine



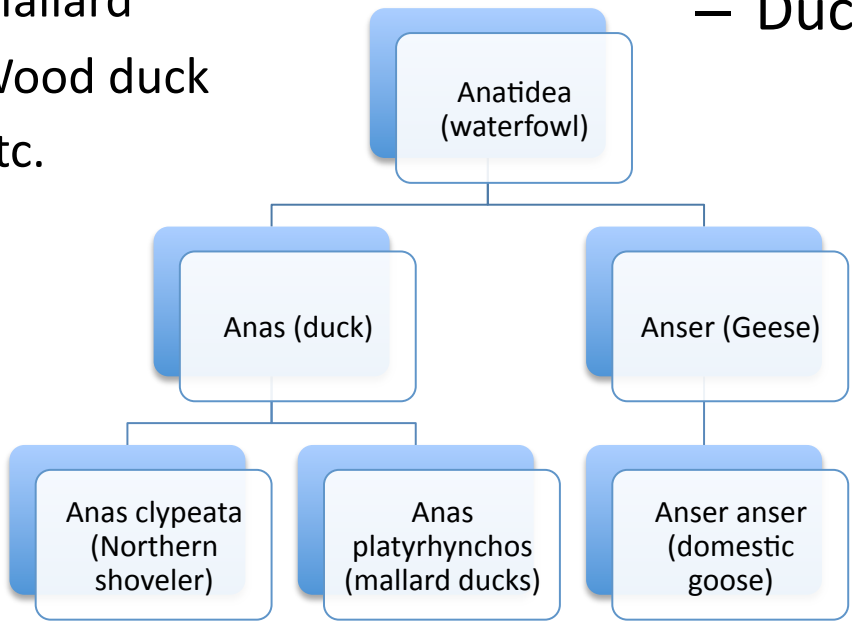
Ontology Enabled Research: Precise Search & Analysis

- Without ontologies:
  - Search for “duck”: 6681
  - Host searches:
    - Include non-relevant data
    - Exclude relevant data
- False positives:
  - Ruddy shelduck
  - Australian shelduck
- False negatives:
  - Mallard: 5236
  - Dk: 95

- With ontologies:
  - Search for “duck” will:
    - include all duck species
    - NOT include non-duck species
  - Cleaner data means cleaner statistics

Ontology Enabled Research: Quick Searches Across Species

- Without ontologies:
  - Search for each species independently:
    - Shovller
    - Mallard
    - Wood duck
    - Etc.
- With ontologies:
  - Search by order, family, genus and get all species below.
  - Duck, NOT goose



Location

- Current location
  - Local location
  - Country
  - State/Province
  - Latitude
  - Longitude
- Use of Gaz

- Challenges
  - US by state
  - US by city
  - Infectious disease to not respect geopolitical boundaries
  - Regions / Continents

Q & A