Development of the Amphibian Anatomical Ontology

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Community-identified need (ATOL)

- Highly variable group
- Several model species
- Diverse lexicons

Challenge

Ontology that accommodates diversity, definitions, literature, phylogenetic character codings, and images

…and include the domain expert community

…and maintain interoperability with other ontologies

…and do it in a reasonable amount of time

AmphibAnat

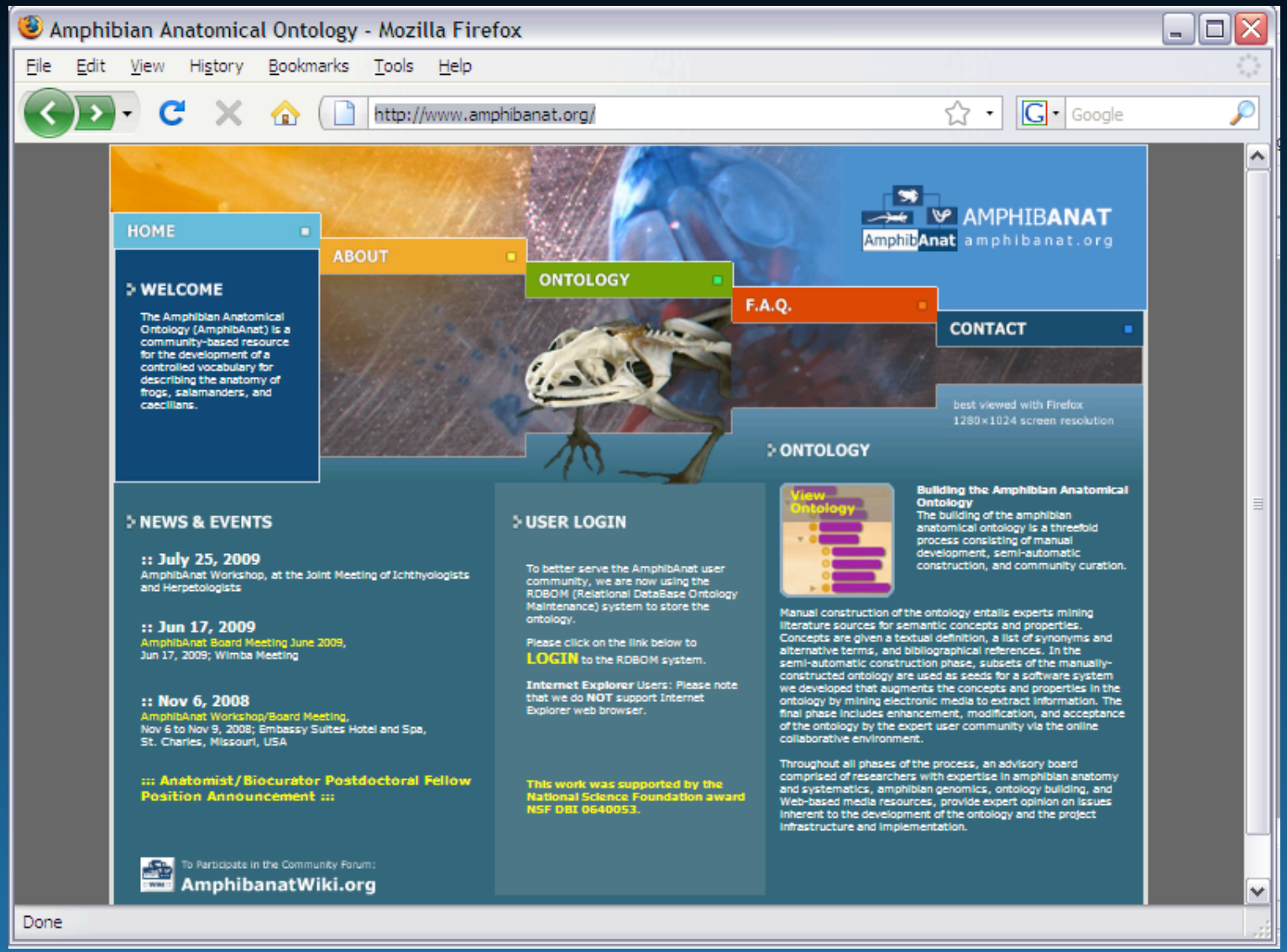
Combine existing tools/methods with new approaches

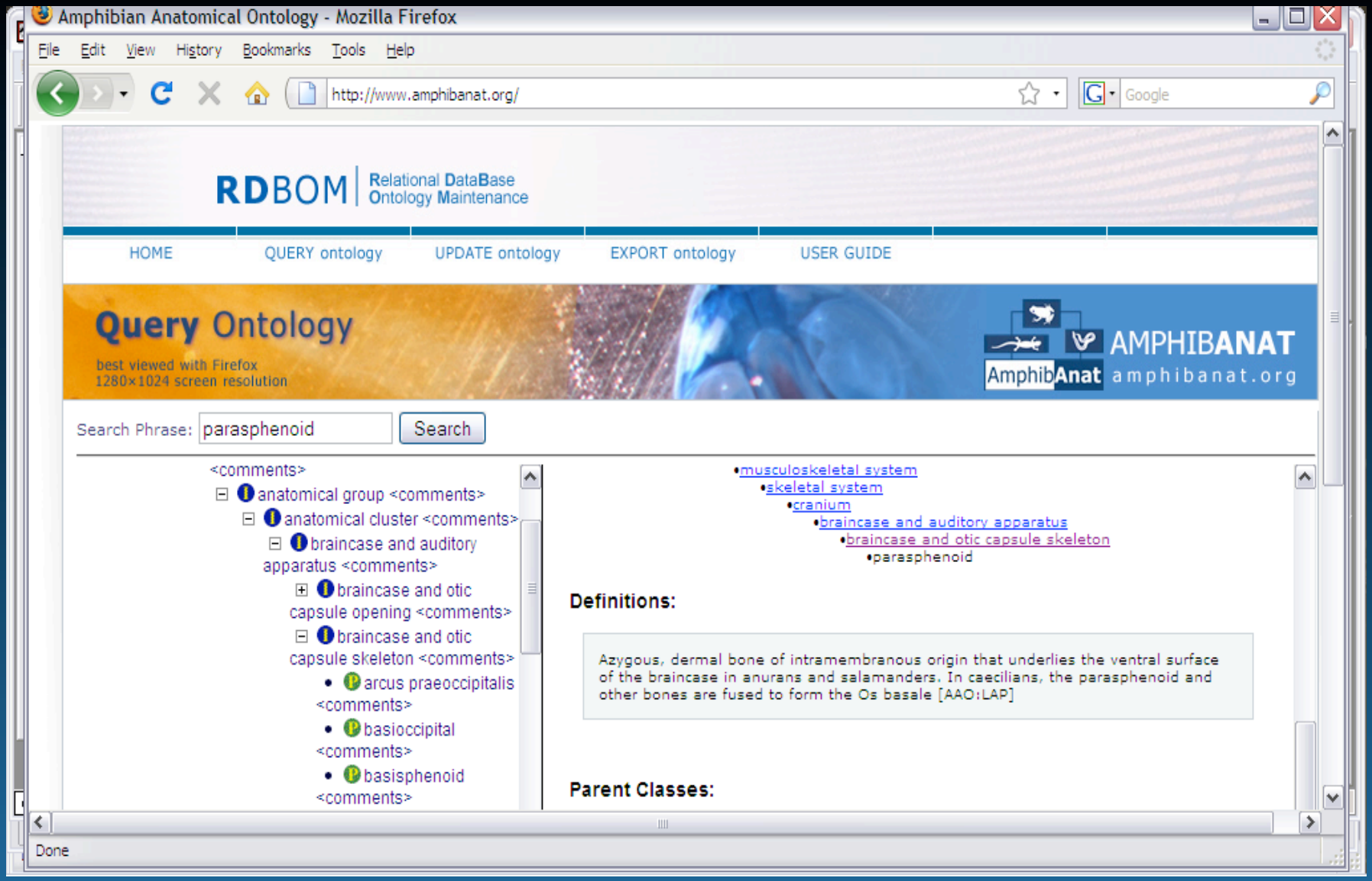
1. Ontology maintenance system
2. Web-based community curation
3. Semi-automated approach

1. Ontology maintenance

- Web-based access/collaboration
- One-stop shop
- Query and update functions
  - concurrent, authorized access
  - node based permissions
- Import/export exchange formats
  - OBO, OWL

www.amphibanat.org




Amphibian Anatomical Ontology - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://www.amphibanat.org/
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RDBOM Relational DataBase Ontology Maintenance
HOME
QUERY ontology
UPDATE ontology
EXPORT ontology
USER GUIDE
Query Ontology
best viewed with Firefox
1280×1024 screen resolution
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Search Phrase: parasphenoid
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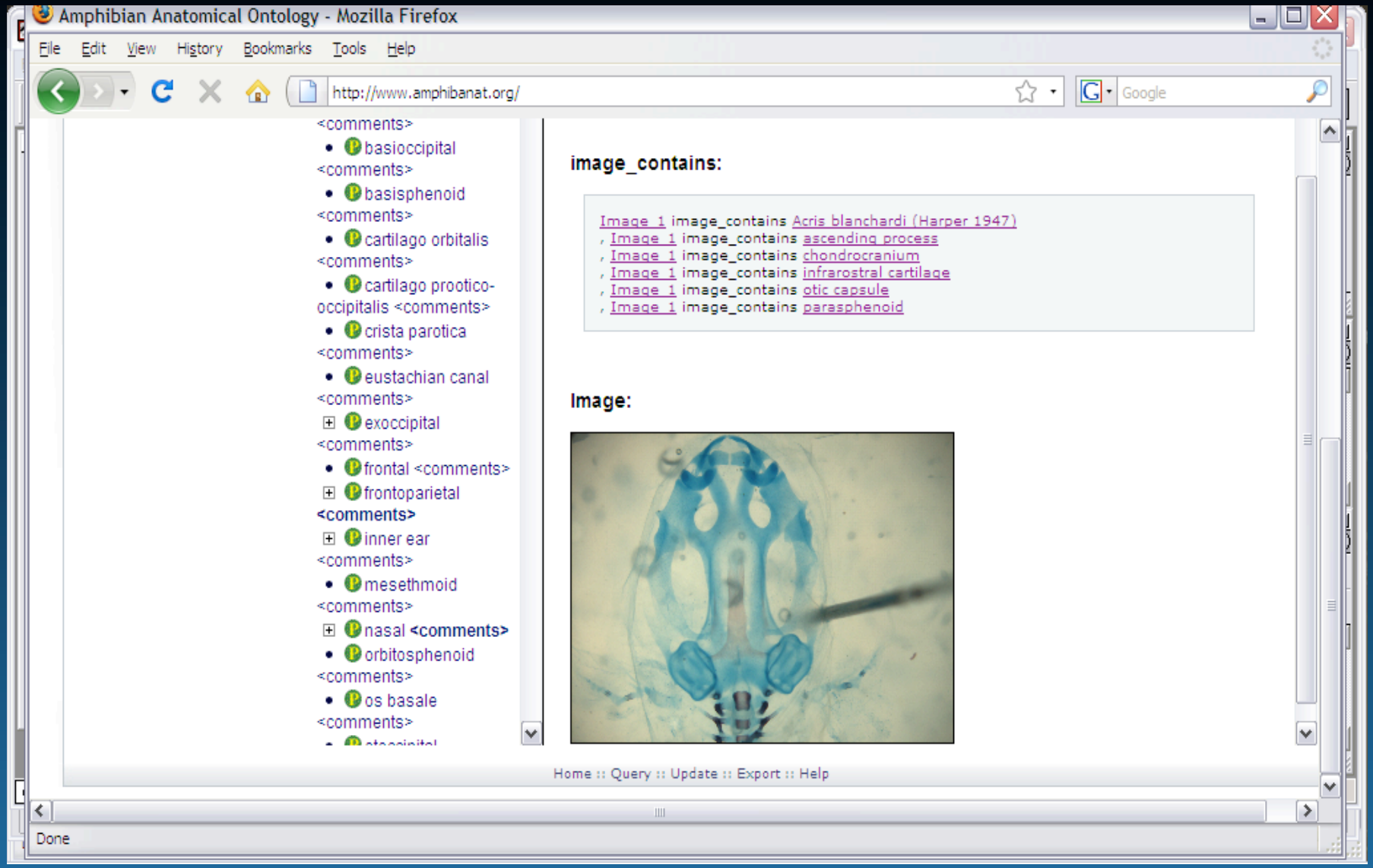
<comments>
anatomical group <comments>
anatomical cluster <comments>
braincase and auditory apparatus <comments>
braincase and otic capsule opening <comments>
braincase and otic capsule skeleton <comments>
arcus praeoccipitalis <comments>
basioccipital <comments>
basisphenoid <comments>
musculoskeletal system
skeletal system
cranium
braincase and auditory apparatus
braincase and otic capsule skeleton
parasphenoid
Definitions:
Azygous, dermal bone of intramembranous origin that underlies the ventral surface of the braincase in anurans and salamanders. In caecilians, the parasphenoid and other bones are fused to form the Os basale [AAO:LAP]
Parent Classes:
Done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orbitosphenoid <comments>
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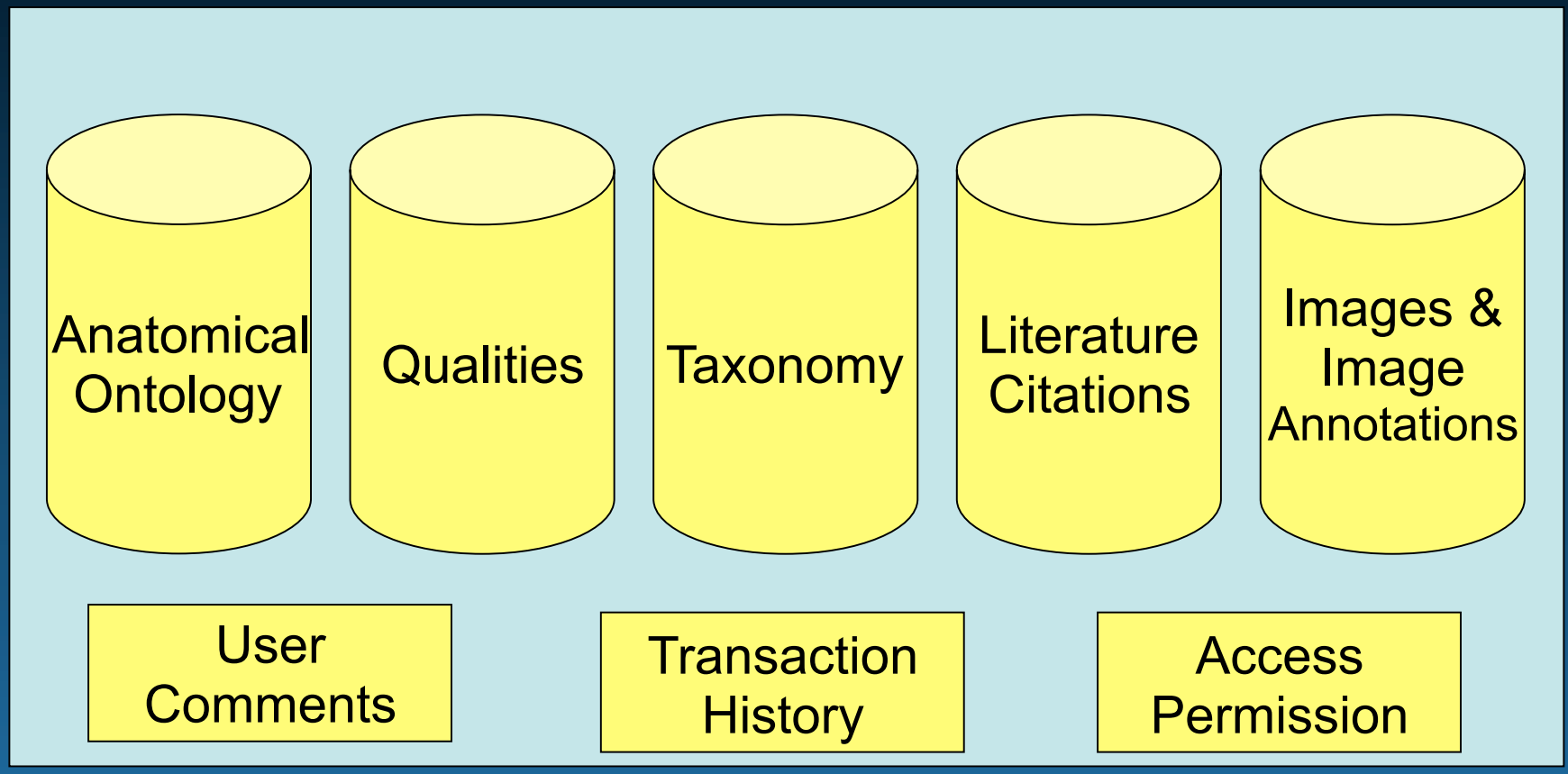
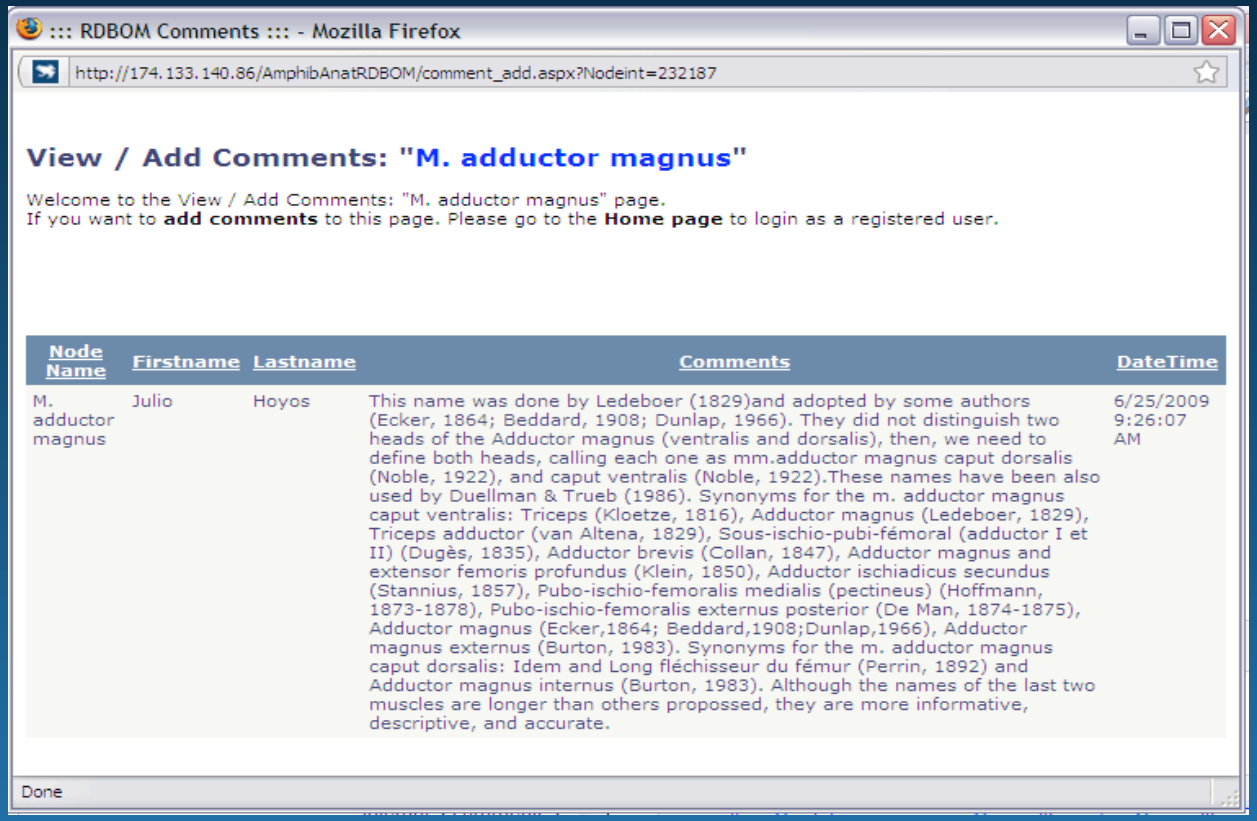
image_contains:
Image 1 image_contains Acris blanchardi (Harper 1947)
, Image 1 image_contains ascending process
, Image 1 image_contains chondrocranium
, Image 1 image_contains infrarostral cartilage
, Image 1 image_contains otic capsule
, Image 1 image_contains parasphenoid
Image:
Home :: Query :: Update :: Export :: Help
Done

Modularity

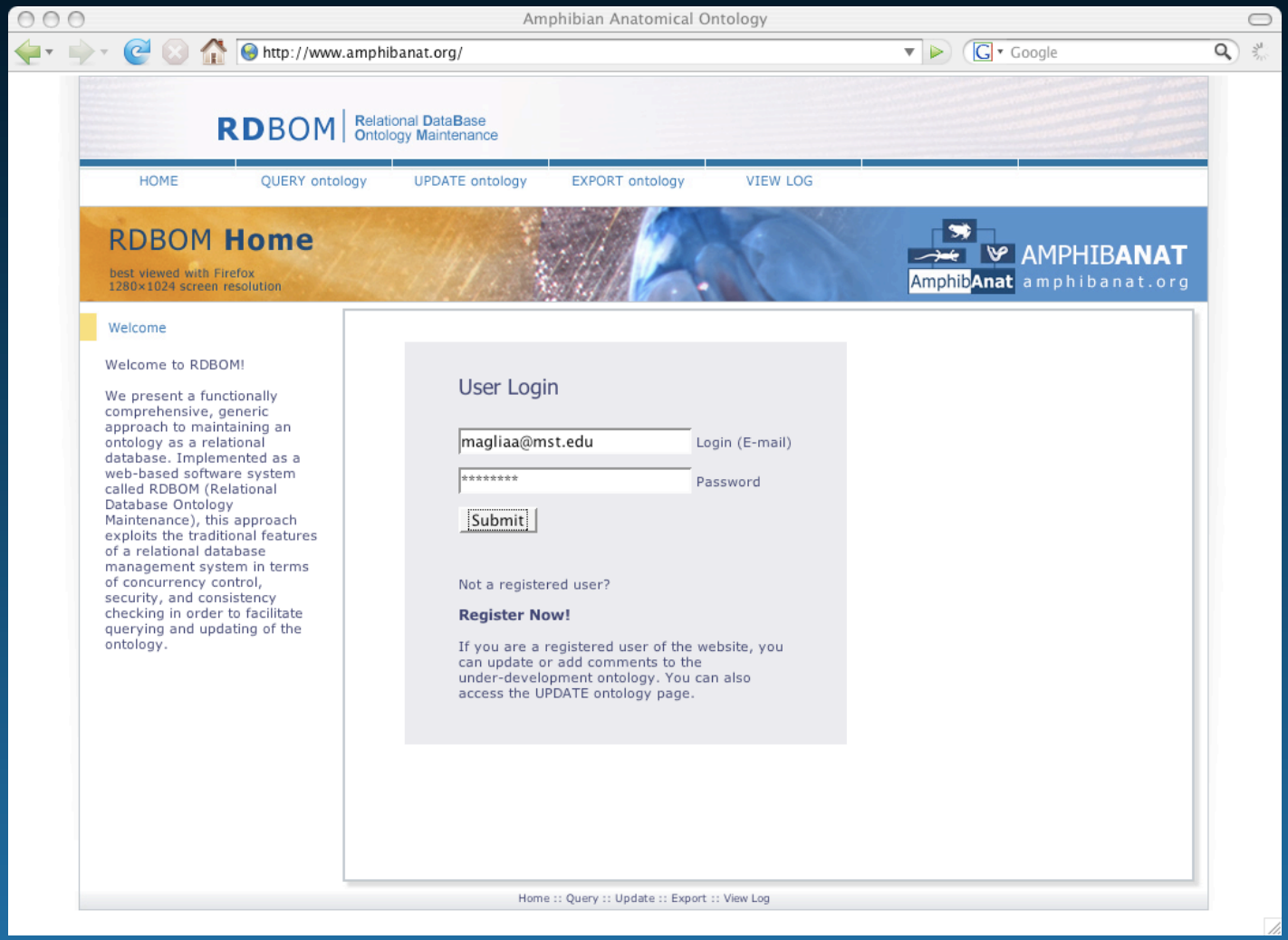

Anatomical Ontology
Qualities
Taxonomy
Literature Citations
Images & Image Annotations
User Comments
Transaction History
Access Permission

2. Community curation

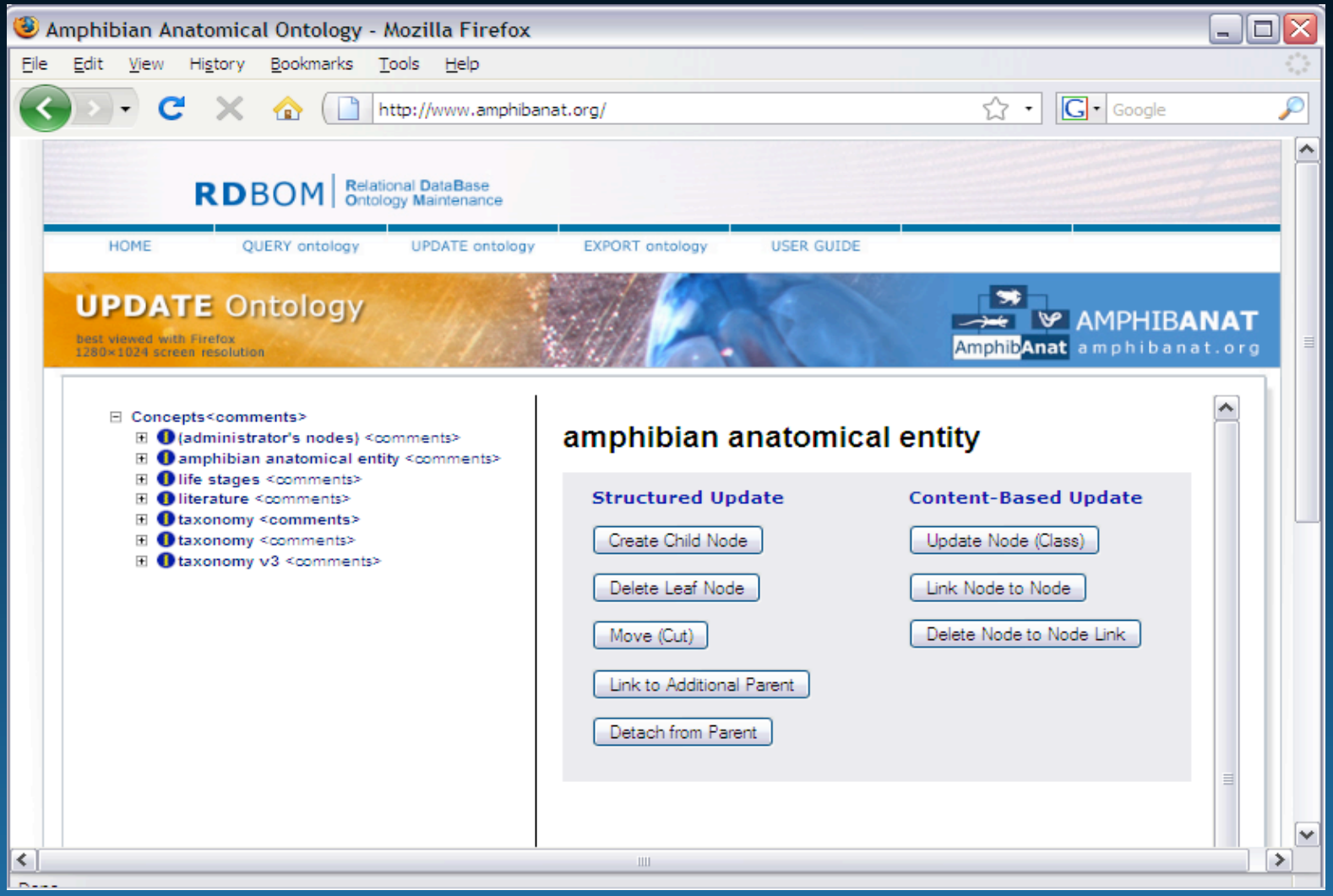
- User commenting by node
- “Super-user” node-based curation



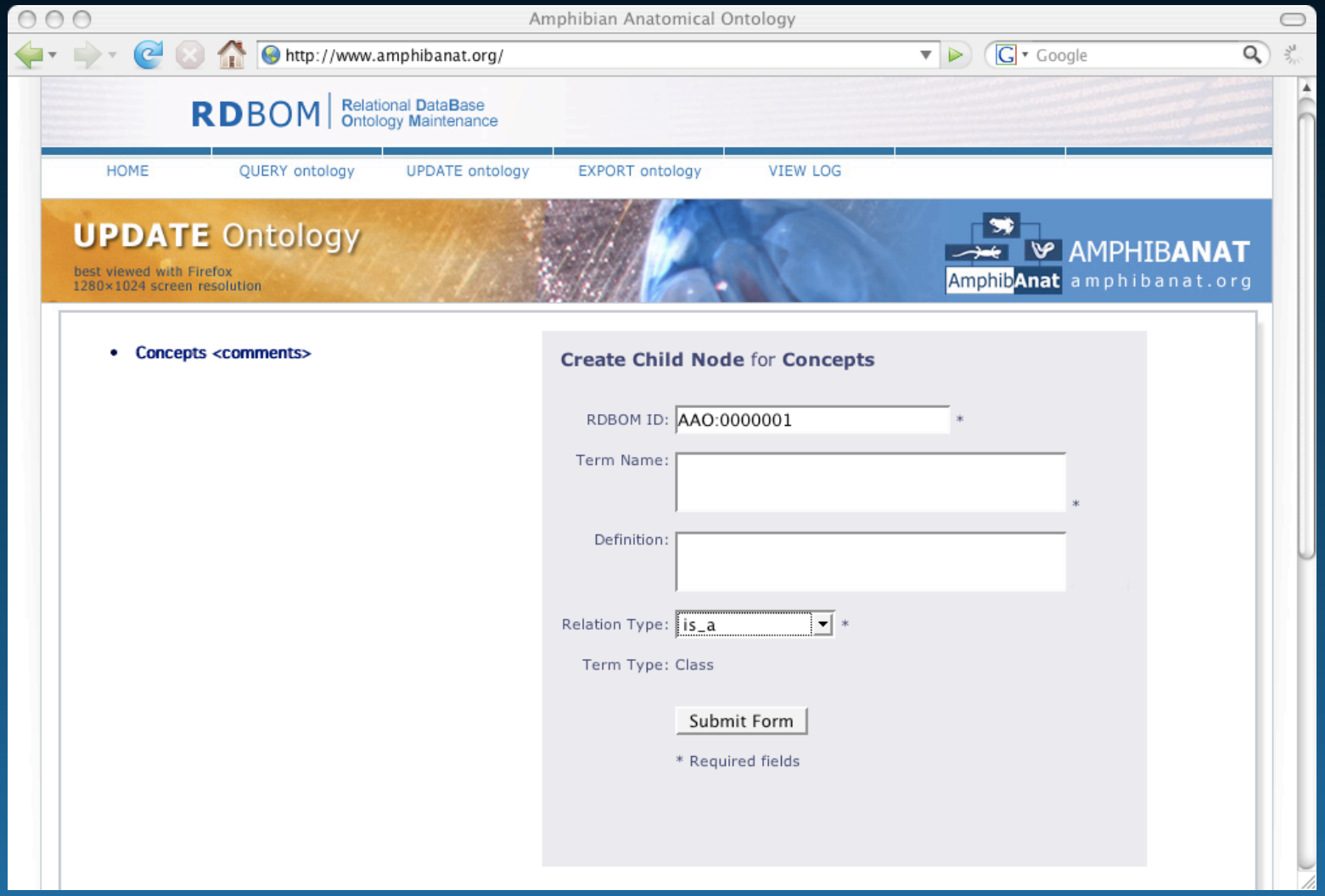
Privilege assignment



“Super-user” functions

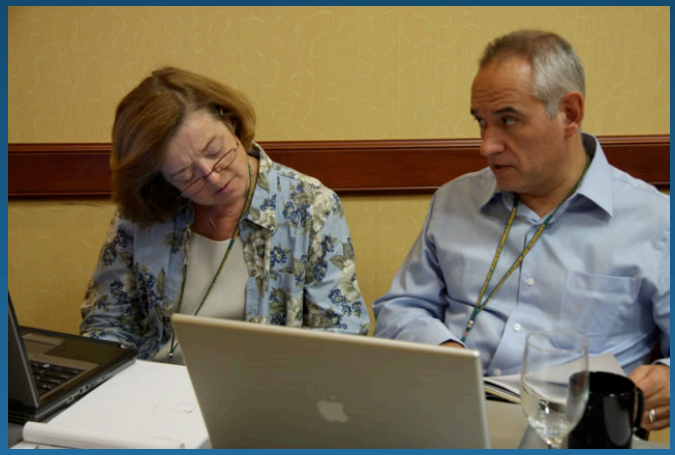


Simple interface



Web-based community curation

- Inclusion of experts
- Forum for argumentation
- Community ownership
- Unites diverse groups toward common goal



3. Semi-automated approach

1. Manually construct subset ontology
2. Community input
3. Develop information extraction (IE) tools
4. Seed with few concepts
5. Benchmark, modify, repeat

IE tools

1. Spider queries web
2. Collects relevant documents
3. Extracts info/builds ontology
   - pattern-based
   - statistical natural language processing algorithms
   - identify/weight most important elements

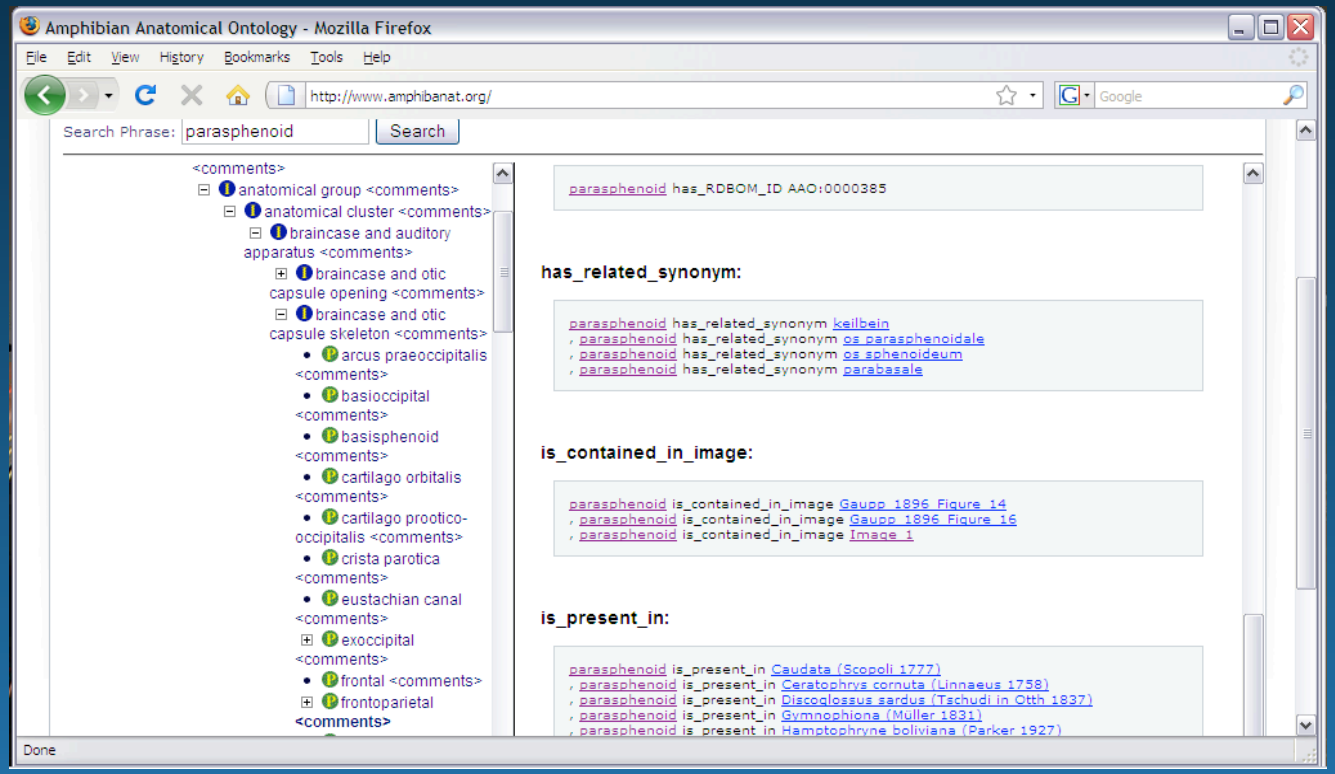
Early IE results

- 5 concepts to spider
- 600 docs returned → 96 relevant → 60 final
- Extract terms
- Compare to manual
  - 960 vs. 623 terms
  - iteration accuracy: avg. 77.5% (up to 88%)

Luong, H et al. *In review.* Int J Adv Life Sci

IE future

- Build backbone of ontology
- Create links between terms



Summary

- Combine existing tools and novel approaches
- RDBOM: diverse data/functionality and interoperability
- Semi-automated approach: reduced effort
- Community-based curation: ownership, expertise

Acknowledgements

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