Source Materials: Standards, exchange, dissemination, and integration

James Macklin
Agriculture and Agri-Food Canada



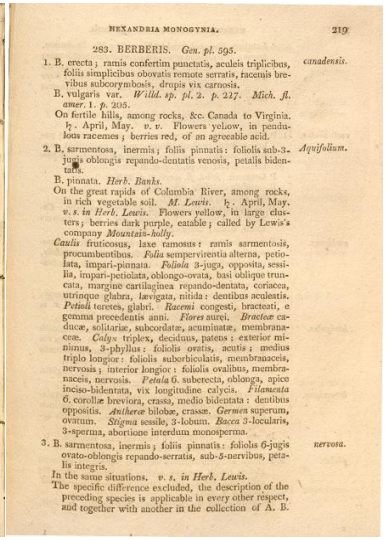

Government of Canada
Gouvernement du Canada
Canada

Relevant Standards Bodies

- Generic: International Standards Organization (ISO)
- Metadata: Dublin Core Metadata Initiative
- Places/Events: Open Geospatial Consortium (OGC)
- Biodiversity Domain: Biodiversity Information Standards (TDWG)
- Libraries and Archives: National Information Standards Organization (NISO)
- Internet: World Wide Web Consortium (W3C)

Expeditions on the Web

- The pieces are in place for an excellent virtual experience of the Lewis and Clark expedition.
  - University of Nebraska Lincoln has the journals on-line
  - Wikipedia has 70 pages in the category “Lewis and Clark Expedition”, including List of species described by the Lewis and Clark Expedition
  - JSTOR Global Plants gives us links to the type specimens
  - BHL gives us access to William Pursh's Flora Americae Septentrionalis which has the descriptions of the plants and in some cases colour illustrations of them that match the specimens...



HEXANDRIA MONOGYNIA. 219

283. BERBERIS. *Gen. pl. 595.*

1. B. erecta; ramis confertim punctatis, aculeis triplicibus, foliis simplicibus obovatis remote serratis, racemis brevibus subcorymbosis, drupis vix carnosis. *canadensis.*
B. vulgaris var. *Willd. sp. pl. 2. p. 217. Mich. fl. amer. 1. p. 205.*
On fertile hills, among rocks, &c. Canada to Virginia. ♄. April, May. *v. v.* Flowers yellow, in pendulous racemes; berries red, of an agreeable acid.

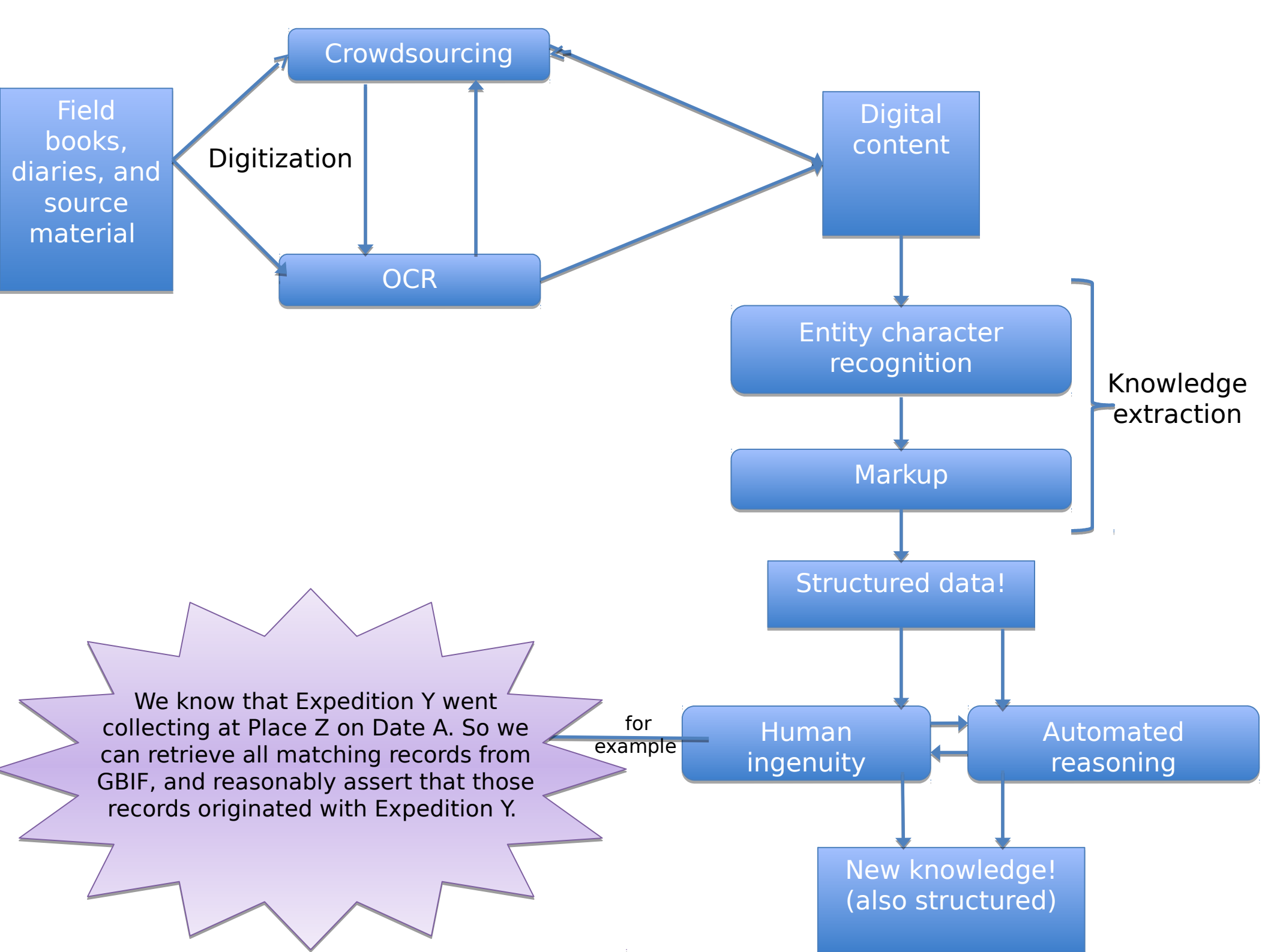
2. B. sarmentosa, inermis; foliis pinnatis: foliolis sub-3-jugis oblongis repando-dentatis venosis, petalis bidentatis. *Aquifolium.*
B. pinnata. *Herb. Banks.*
On the great rapids of Columbia River, among rocks, in rich vegetable soil. *M. Lewis.* ♄. April, May. *v. s. in Herb. Lewis.* Flowers yellow, in large clusters; berries dark purple, eatable; called by Lewis's company *Mountain-holly.*
Caulis fruticosus, laxe ramosus: ramis sarmentosis, procumbentibus. *Folia* sempervirentia alterna, petiolata, impari-pinnata. *Foliola* 3-juga, opposita, sessilia, impari-periolata, oblongo-ovata, basi obliqui truncata, margine cartilaginea repando-dentata, coriacea, utrinque glabra, lævigata, nitida: dentibus aculeatis. *Petioli* teretes, glabri. *Racemi* congesti, bracteati, e gemma precedentis anni. *Flores* aurei. *Bracteæ* caducæ, solitariæ, subcordatæ, acuminatæ, membranaceæ. *Calyx* triplex, deciduus, patens: exterior minimus, 3-phyllus: foliolis ovatis, acutis; medius triplo longior: foliolis suborbiculatis, membranaceis, nervosis; interior longior: foliolis ovalibus, membranaceis, nervosis. *Petala* 6. suberecta, oblonga, apice inciso-bidentata, vix longitudine calycis. *Filamenta* 6. corollæ breviora, crassa, media bidentata: dentibus oppositis. *Antheræ* bilobæ, crassæ. *Germen* superum, ovatum. *Stigma* sessile, 3-lobum. *Bacca* 3-locularis, 3-sperma, abortione interdum monosperma.

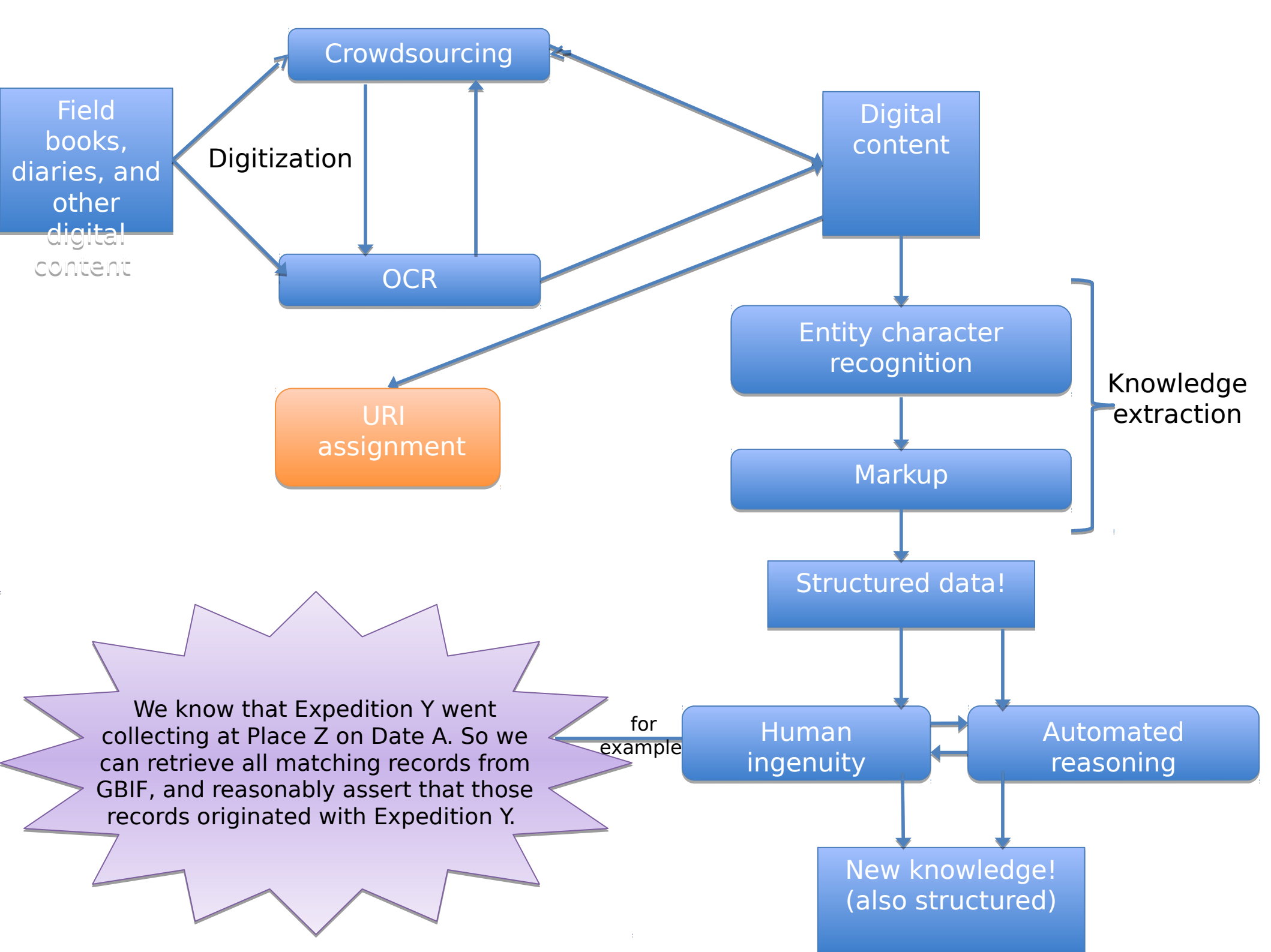
3. B. sarmentosa, inermis; foliis pinnatis: foliolis 6-jugis ovato-oblongis repando-serratis, sub-5-nervibus, petalis integris. *nervosa.*
In the same situations. *v. s. in Herb. Lewis.*
The specific difference excluded, the description of the preceding species is applicable in every other respect, and together with another in the collection of A. B.

Expeditions on the Web

Challenge 1: Expedite the process of doing for other expeditions what's already been done for Lewis and Clark.

Challenge 2: Make appropriate use of identifiers and semantics to enable automatically integrating data from multiple sources – Wikipedia, JSTOR, BHL, and beyond.


Crowdsourcing
Field books, diaries, and source material
Digitization
OCR
Digital content
Entity character recognition
Markup
Knowledge extraction
Structured data!
We know that Expedition Y went collecting at Place Z on Date A. So we can retrieve all matching records from GBIF, and reasonably assert that those records originated with Expedition Y.
for example
Human ingenuity
Automated reasoning
New knowledge! (also structured)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Identifiers

- We assign URIs to both concepts and things.

- http://purl.org/dc/terms/subject (abbreviated dcterms:subject) is the identifier for the Dublin Core *subject* property. It allows us to specify the topic of a resource.

- http://arctos.database.museum/guid/MVZ:Mamm:165861
  is the identifier for … something. We don't really know until we look it up.

Collections Database

MUSEUM OF VERTEBRATE ZOOLOGY

MVZ Mammals 165861

Ctenomys sociabilis

Estancia Fortin Chacabuco, 3 km S and 2 km W Cerro Puntudo, Depto. Los Lagos
South America, Argentina, Neuquen
16 Nov 1983

skull; study skin; skeleton

[Report Bad Data]
MVZ Collections

Ctenomys sociabilis
Animalia Chordata Mammalia Rodentia Ctenomyidae Ctenomys sociabilis Pearson and Christie, 1985
Identified by Oliver P. Pearson on 1999-01-27
Nature of ID: type specimen

Ctenomys sociabilis
sensu Pearson 1985
Identified by Oliver P. Pearson on 1985
Nature of ID: type specimen
Remarks: ID from citation in Pearson 1985.

Citations
holotype of Ctenomys sociabilis, page 338 in Pearson 1985

Determination Type: accepted place of collection
assigned by John Wieczorek on 2011-10-28
Higher Geography: South America, Argentina, Neuquen
Verbatim Locality: Estancia Fortin Chacabuco, 3 km S and 2 km W Co. Puntudo
Specific Locality: Estancia Fortin Chacabuco, 3 km S and 2 km W Cerro Puntudo, Depto. Los Lagos
Locality Remarks: The colony was just N of the fence and just E of the stream according to Michael Christie, who verified on Google Earth (about 40. 58' 06 to 07" and 71. 11' 30 to 31").
Collecting Source: wild caught
Event Date: 16 Nov 1983

Identifiers
collector number: 7101

Details

Part Name	Condition	Qty	Remarks
skeleton	unchecked; partial	1	
skull	unchecked	1	
study skin	unchecked	1	

sex: female
Museum of Vertebrate Zoology, University of California, Berkeley, 2005-11-01

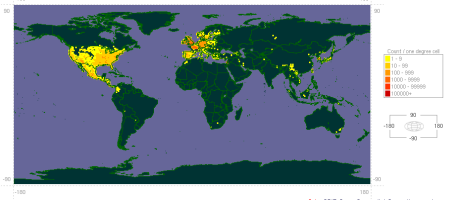
Accession
12272

Thematic Networks

OBIS
PaleoPortal
Manis
Ornis
HerpNet

GBIF

Global Biodiversity Information Facility



Aggregated Data

XML: DiGIR/Tapir
DarwinCore,ABCD

Specimen and Field Images

Morphbank

Flickr

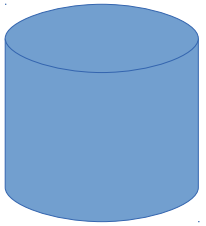
Researcher

Publications

Spreadsheets and local databases.

EOL Lifedesks

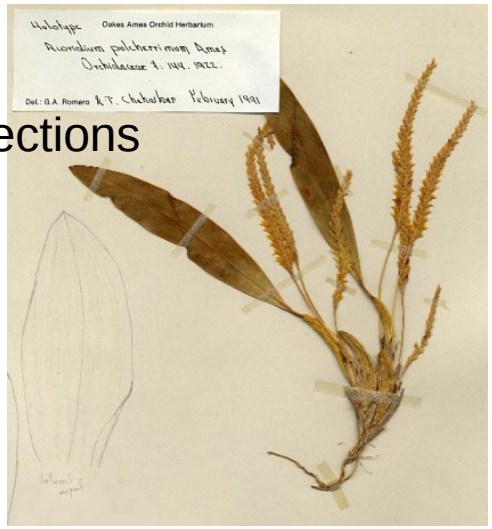
EDIT Scratchpads



No Return Path

Collection

Natural Science Collections



A Filtered Push Network

An image of a specimen on a remote site

Researcher annotates the data

FP API

Triage

Plan: Find out who is interested in this. Tell them.

Messaging

Global Knowledge

Analytical Engine

Specify 6

Database holding the specimen

Other interested parties

A Filtered Push Network

An image of a specimen on a remote site

Researcher annotates the data

FP API

Triage

Plan: Find out who is interested in this. Tell them.

Messaging

Global Knowledge

Analytical Engine

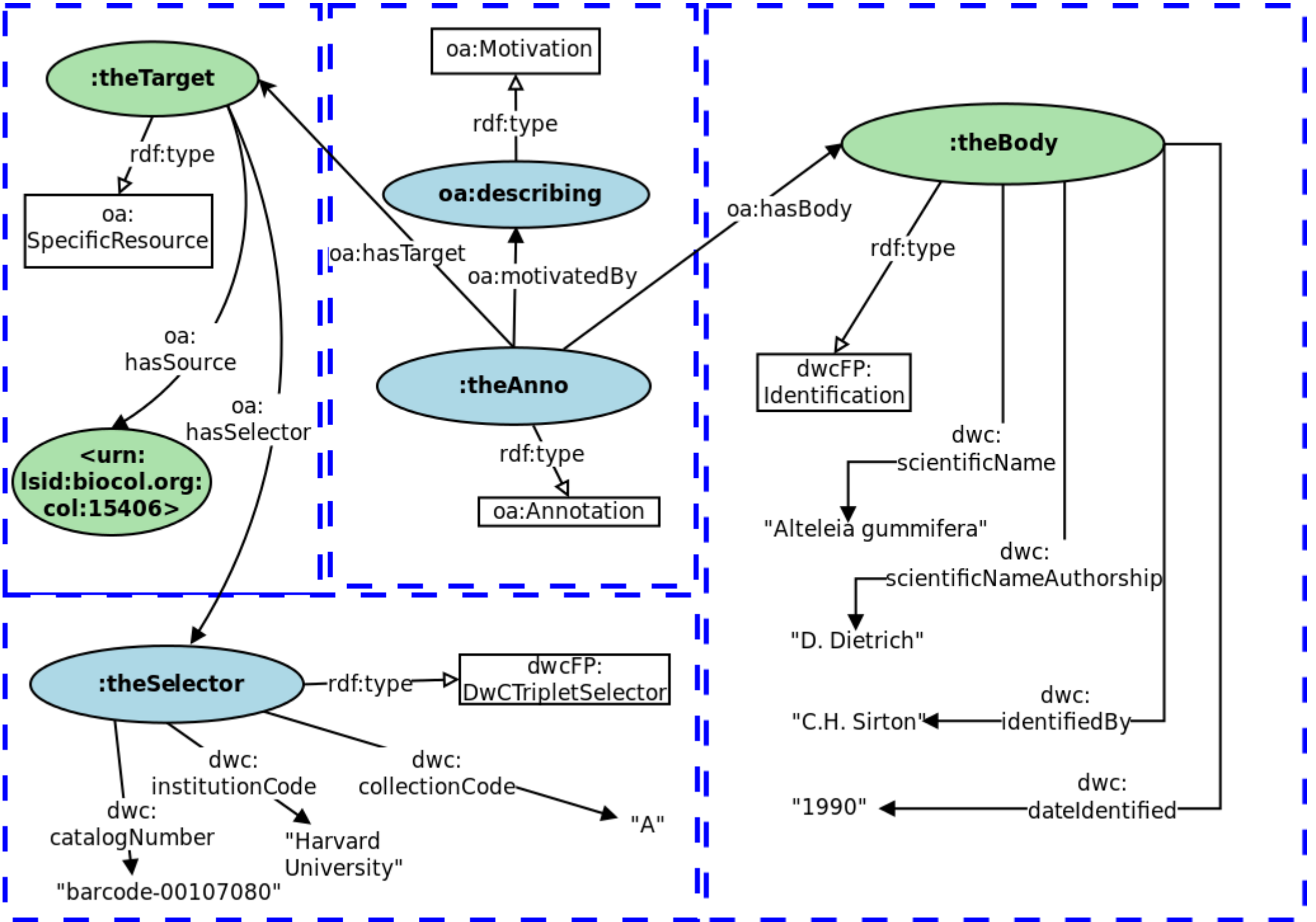
Specify 6

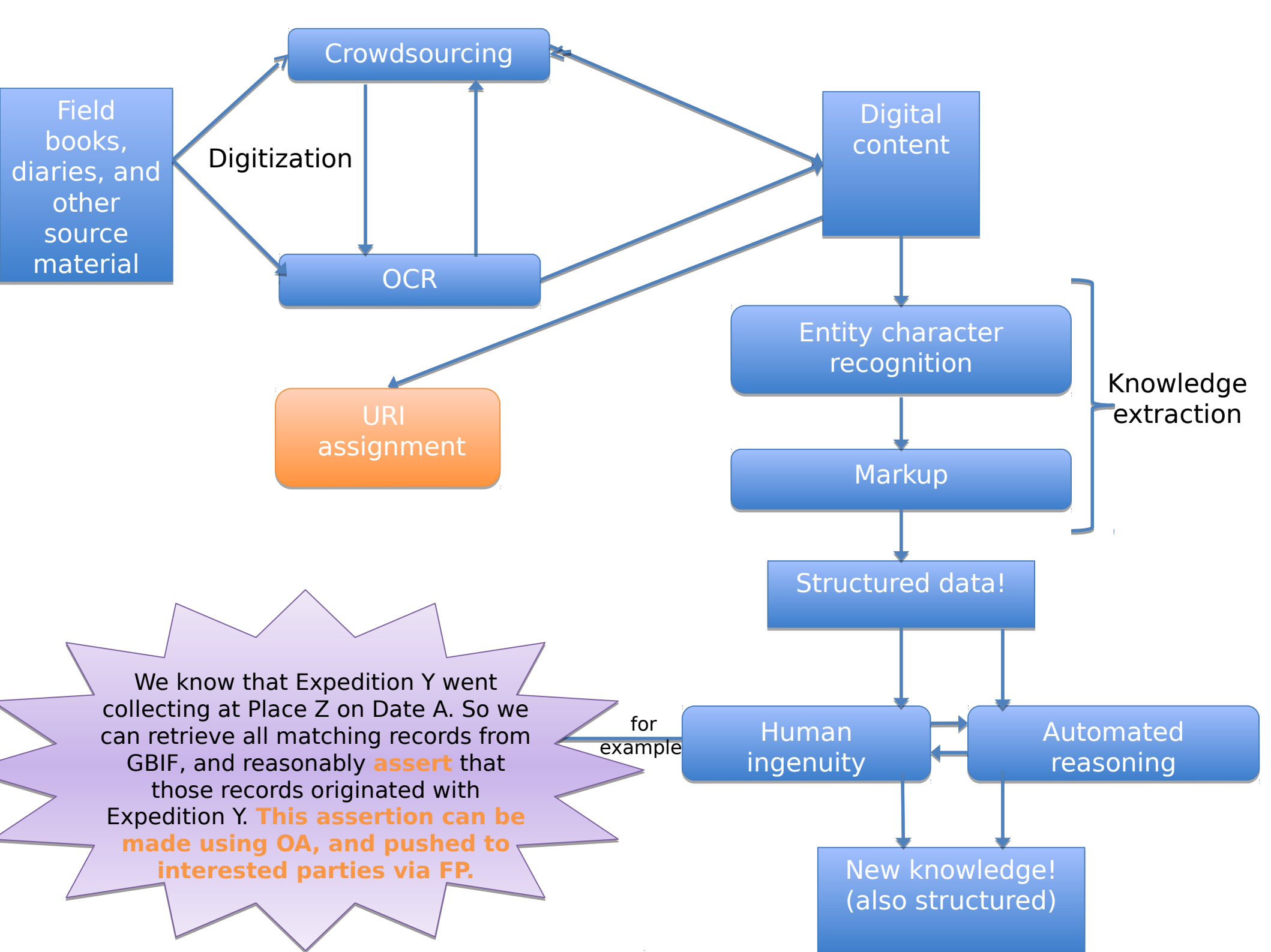
Annotation rejected

Database holding the specimen

Network retains knowledge of the annotation and its rejection.

W3C Open Annotation Collaboration (OA): Data




Crowdsourcing
Field books, diaries, and other source material
Digitization
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Digital content
URI assignment
Entity character recognition
Markup
Knowledge extraction
Structured data!
We know that Expedition Y went collecting at Place Z on Date A. So we can retrieve all matching records from GBIF, and reasonably assert that those records originated with Expedition Y. This assertion can be made using OA, and pushed to interested parties via FP.
for example
Human ingenuity
Automated reasoning
New knowledge! (also structured)

What does all this buy us?

- Query answering
  - Find all specimens that were collected on the United States Exploring Expedition of 1838 - 1842?
    - Who were the botanists that were on that expedition?
  - What expeditions collected lizards in the American Southwest from 1850 – 1900?
    - Where are those lizards now?

- Breadcrumb following (aka data browsing)
  - Why were those people on that expedition?
  - What else did William Rich (botanist on expedition) do in life?
  - What other people studied lizards during 1850 - 1900?

JSTOR

BioOne RESEARCH EVOLVED

PLAZI taking care of freedom

GoldenGate

NCBI GenBank

Specimen and Field Images

Publications

Biodiversity Heritage Library

ETC Explorer of Taxon Concepts

Barcode of Life Initiative

BOLDSYSTEMS

Photo © Carl Farmer

GBIF

FP Network

QC Analysis

Annotation Store

Portal X

PUSH

Herbaria

Current Treatment

2. Cirsium arvense (Linnaeus) Scopoli, Fl. Carniol. ed. 2. 2: 126. 1772.

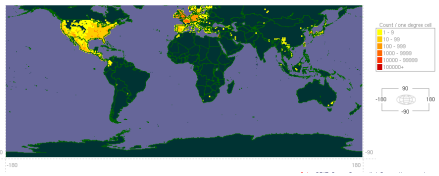
Canada or creeping or field thistle, chardon du Canada ou des champs, cirse des champs

Serratula arvensis Linnaeus, Sp. Pl. 2: 820. 1753; Breea arvensis (Linnaeus) Lessing; Carduus arvensis (Linnaeus) Robson; Cirsium arvense var. argenteum (Peyer ex Vest) Fiori; C. arvense var. horridum Wimmer & Grabowski; C. arvense var. integrifolium Wimmer & Grabowski; C. arvense var. mite Wimmer & Grabowski; C. arvense var. vestitum Wimmer & Grabowski; C. incanum (S. G. Gmelin) Fischer ex M. Bieberstein; C. setosum (Willdenow) Besser ex M. Bieberstein

Perennials, dioecious or nearly so, 30–120(–200) cm; colonial from deep-seated creeping roots producing adventitious buds. Stems 1–many, erect, glabrous to appressed gray-tomentose; branches 0–many, ascending. Leaves: blades oblong to elliptic, 3–30 × 1–6 cm, margins plane to revolute, entire and spinulose, dentate, or shallowly to deeply pinnatifid, lobes well separated, lance-oblong to triangular-ovate, spinulose to few-toothed or few-lobed near base, main spines 1–7 mm, abaxial faces glabrous to densely gray-tomentose, adaxial green, glabrous to thinly tomentose; basal absent at flowering, petioles narrowly winged, bases tapered; principal larger cauline proximally winged-petiolate, distally sessile, well distributed, gradually reduced, not decurrent; distal cauline becoming bractlike, entire, toothed, or lobed, spinulose or not. Heads 1–many, borne singly or in corymbiform or paniculiform arrays at tips of main stem and branches. Peduncles 0.2–7 cm. Involucres ovoid in flower, ± campanulate in fruit, 1–2 × 1–2 cm, arachnoid tomentose, ± glabrate. Phyllaries in 6–8 series, strongly imbricate, (usually purple-tinged), ovate (outer) to linear (inner), abaxial faces with narrow glutinous ridge, outer and middle appressed, entire, apices ascending to spreading, spines 0–1 mm (fine); apices of inner phyllaries flat, ± flexuous, margins entire to minutely erose or ciliolate. Corollas purple (white or pink); staminate 12–18 mm, (remaining longer than pappus when head is fully mature), tubes 8–11 mm, throats 1–1.5 mm, lobes 3–5 mm; pistillate 14–20 mm, (overtopped by pappi in fruit), tubes 10–15 mm, throats ca. 1 mm, lobes 2–3 mm; style tips 1–2 mm. Cypselae brown, 2–4 mm, apical collar not differentiated; Pappi 13–32 mm, exceeding corollas. 2N = 34.

Flowering summer (Jun–Oct). Disturbed sites, fields, pastures, roadsides, forest openings; 0–2600 m; introduced; Greenland; St. Pierre and Miquelon; Alta., B.C., Man., N.B., Nfld. and Labr. (Nfld.), N.W.T., N.S., Ont., P.E.I., Que., Sask., Yukon; Ala., Alaska, Ariz., Ark., Calif., Colo., Conn., Del., D.C., Idaho, Ill., Ind., Iowa, Kans., Ky., Maine, Md., Mass., Mich., Minn., Mo., Mont., Nebr., Nev., N.H., N.J., N.Mex., N.Y., N.C., N.Dak., Ohio, Oreg., Pa., R.I., S.Dak., Tenn., Tex., Utah, Vt., Va., Wash., W.Va., Wis., Wyo.; native, Eurasia.

Distribution Maps GIS, modeling



EDITORIAL PROCESSING

81. **Salix cinerea** Linnaeus, Sp. Pl. 2: 1021. 1753.

Large gray or gray willow Large gray or gray willow

Shrubs, 3-7 m. **Stems:** branches brownish, not glaucous, pilose, villous, or tomentose to glabrescent, (peeled wood with striae to 62 mm); branchlets yellow-brown, pilose, velvety, or densely villous. **Leaves:** stipules rudi-mentary or foliaceous on early ones, foliaceous on late ones, apex acute or rounded; petiole convex to flat adaxially, 4-15 mm, tomentose adaxially; largest medial blade elliptic, broadly elliptic, oblanceolate, or obovate, 65-105 × 22-52 mm, 2-3 times as long as wide, base convex or cuneate, margins slightly revolute, entire, crenate, or sinuate, (glands submarginal), apex acuminate or convex, abaxial surface glaucous, tomentose, hairs erect or spreading, curly, adaxial dull or slightly glossy, pubescent or tomentose; proximal blade margins entire; juvenile blade yellowish green, sparsely to densely tomentose abaxially, hairs white. **Catkins** flowering before leaves emerge; staminate stout or subglobose, 26-39 × 12-26 mm, flowering branchlet 0-5 mm; pistillate densely flowered, stout or subglobose, 27-54(-75 in fruit) × 4-15 mm, flowering branchlet 1-5(-10) mm; floral bract dark brown, black, or bicolor, 2-3 mm, apex acute or convex, abaxially hairy, hairs straight. **Staminate flowers:** adaxial nectary oblong or ovate, 0.5-1 mm; filaments distinct, glabrous or hairy basally; anthers yellow or purple turning yellow, ellipsoid or shortly cylindrical, 0.7-1 mm. **Pistillate flowers:** adaxial nectary oblong or square, 0.4-1 mm, shorter than stipe; stipe 1.2-2.7 mm; ovary pyriform, long-silky, beak slightly bulged below styles; ovules 12 per ovary; styles 0.2-0.5 mm; stigmas slenderly or broadly cylindrical, 0.3-0.6 mm. **Capsules** 5-5.6 mm. ***2n*** = 76.

Flowering mid Mar-late May. Stream shores, mesic woodlands, gravelly or sandy beaches, waste ground; 0-700 m; introduced; Ont.; Ala., Conn., D.C., Ga., Iowa, Ky., La., Md., Mass., Mich., Mo., N.J., N.Y., N.C., Ohio, Pa., R.I., S.C., S.Dak., Tenn., Utah, Va., W.Va., Wis.; Eurasia.

The Ohio occurrence of *Salix cinerea* is based on information from T. Cooperrider (pers. comm.).

Salix cinerea and *S. atrocinerea* are very closely related. Their occurrence in the flora area, as naturalized introductions, is not well understood, probably because they usually are introduced under the name *S. caprea*, and that species often is not treated in North American floristic literature (e.g., C. K. Schneider 1921; M. L. Fernald 1950). They probably are introductions of long-standing brought to the New World for their value as ornamentals and bee-plants. *Salix atrocinerea* was first documented in the southeastern United States (G. W. Argus 1986) after plants with ferruginous hairs and prominently striate wood were found in North Carolina; since that time, it has been found in other states and provinces. In the northeastern states, *S. atrocinerea* and *S. cinerea* are thought to be invasive species. The species do reproduce by seed and hundreds of seedlings were observed in a drained reservoir (A. Zinovjev, pers. comm.) and on sandy pond shores (T. Rawinski, pers. comm.), where they are thought to compete with native species.

The presence of long, prominent, striae on the peeled wood of 4-5 year old branches is commonly used in European literature (K. H. Rechinger 1993; A. K. Skvortsov 1999) to separate *Salix cinerea* and *S. atrocinerea* from *S. caprea* etc., in which the wood is smooth or with fewer, shorter striae. In the flora area, long striae also occur in *S. bebbiana, S. discolor,* and *S. humilis*, but usually they are not as long as or as prominent in *S. cinerea* and *S. atrocinerea*. Some floras (e.g., F. Martini and P. Paiero 1988) use the relative prominence of striae to separate *S. cinerea* and *S. atrocinerea*, but their separation remains difficult. The presence of ferruginous hairs on the leaves of *S. atrocinerea* is the best diagnostic characteristic, but they are not always present or easily observed. For a comparison of these species, see the key to species under subg. *Vetrix*. For further discussion of morphologies, see *Salix* ×*smithiana* Willdenow [p. 132] and 76. *S. discolor*.

2. Cirsium arvense (Linnaeus) Scopoli, Fl. Carniol. ed. 2. 2: 126. 1772.

Canada or creeping or field thistle, chardon du Canada ou des champs, cirse des champs

Serratula arvensis Linnaeus, Sp. Pl. 2: 820. 1753; Breea arvensis (Linnaeus) Lessing; Carduus arvensis (Linnaeus) Robson; Cirsium arvense var. argenteum (Peyer ex Vest) Fiori; C. arvense var. horridum Wimmer & Grabowski; C. arvense var. integrifolium Wimmer & Grabowski; C. arvense var. mite Wimmer & Grabowski; C. arvense var. vestitum Wimmer & Grabowski; C. incanum (S. G. Gmelin) Fischer ex M. Bieberstein; C. setosum (Willdenow) Besser ex M. Bieberstein

<description>Perennials, dioecious or nearly so, 30–120(–200) cm; colonial from deep-seated creeping roots producing adventitious buds. Stems 1–many, erect, glabrous to appressed gray-tomentose; branches 0–many, ascending. Leaves: blades oblong to elliptic, 3–30 × 1–6 cm, margins plane to revolute, entire and spinulose, dentate, or shallowly to deeply pinnatifid, lobes well separated, lance-oblong to triangular-ovate, spinulose to few-toothed or few-lobed near base, main spines 1–7 mm, abaxial faces glabrous to densely gray-tomentose, adaxial green, glabrous to thinly tomentose; basal absent at flowering, petioles narrowly winged, bases tapered; principal larger cauline proximally winged-petiolate, distally sessile, well distributed, gradually reduced, not decurrent; distal cauline becoming bractlike, entire, toothed, or lobed, spinulose or not. Heads 1–many, borne singly or in corymbiform or paniculiform arrays at tips of main stem and branches. Peduncles 0.2–7 cm. Involucres ovoid in flower, ± campanulate in fruit, 1–2 × 1–2 cm, arachnoid tomentose, ± glabrate. Phyllaries in 6–8 series, strongly imbricate, (usually purple-tinged), ovate (outer) to linear (inner), abaxial faces with narrow glutinous ridge, outer and middle appressed, entire, apices ascending to spreading, spines 0–1 mm (fine); apices of inner phyllaries flat, ± flexuous, margins entire to minutely erose or ciliolate. Corollas purple (white or pink); staminate 12–18 mm, (remaining longer than pappus when head is fully mature), tubes 8–11 mm, throats 1–1.5 mm, lobes 3–5 mm; pistillate 14–20 mm, (overtopped by pappi in fruit), tubes 10–15 mm, throats ca. 1 mm, lobes 2–3 mm; style tips 1–2 mm. Cypselae brown, 2–4 mm, apical collar not differentiated; Pappi 13–32 mm, exceeding corollas. 2N = 34.**</description>**

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Leaves: blades oblong to elliptic, 3–30 × 1–6 cm, margins plane to revolute, entire and spinulose, dentate, or shallowly to deeply pinnatifid, lobes well separated, lance-oblong to triangular-ovate, spinulose to few-toothed or few-lobed near base, main spines 1–7 mm, abaxial faces glabrous to densely gray-tomentose, adaxial green, glabrous to thinly tomentose; basal absent at flowering, petioles narrowly winged, bases tapered; principal larger cauline proximally winged-petiolate, distally sessile, well distributed, gradually reduced, not decurrent; distal cauline becoming bractlike, entire, toothed, or lobed, spinulose or not.


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Ontological Term Organizer (OTO)

Explorer of Taxon Concepts

THE ETC PIPELINE

ETC toolbox consists of four tools that can be used as a pipe line that takes clean textual phenotypical descriptions and outputs taxon-character data for taxon concept analysis. The tools may also be used separately if their required input data is available. The tools are produced through a collaborative project (NSF-DBI-1147266) between the University of Arizona and University of California at Davis.

FEATURES

- Data Sharing
- Begin at any step
- Full pipeline creation

Matrix Generation

Matrix generation generates taxon-character matrices from clean textual descriptions of organisms. The matrices can be used to create specimen identification keys or be used as input to the Tree Generation tool.

Begin Matrix Generation

Tree Generation

Tree Generation generates candidate taxonomies from taxon-character matrices, based on the similarity of characters of taxa. The character-similarity based taxonomies may be one source of input for the Taxonomy Comparison tool.

Begin Tree Generation

Taxonomy Comparison

Taxonomy Comparison takes expert provided relationships among taxa and optionally the result from the Tree Generation to perform logic reasoning and identify logic conflicts and/or ambiguities.

Begin Taxonomy Comparison

Visualization

Visualization integrates relationships among taxa and relationships between character and taxa in a visual way to facilitate taxon concept comparison and analysis.

Begin Visualization

OR

Begin New Pipeline

Explorer of Taxon Concepts

Matrix Generation | Tree Generation | Taxonomy Comparison | Visualization

1 Input 2 Preprocess Text 3 Learn Terms 4 Review Terms 5 Parse Text 6 Output

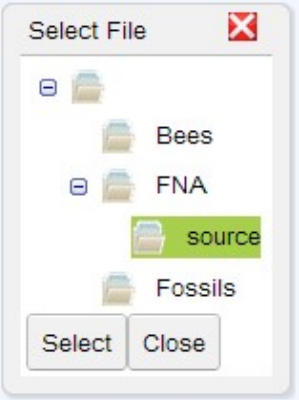
Please provide us with a folder that contains the input taxon descriptions and the closest taxon group to be processed. You can upload the input taxon descriptions using the File Manager. See our format requirements for taxon descriptions.

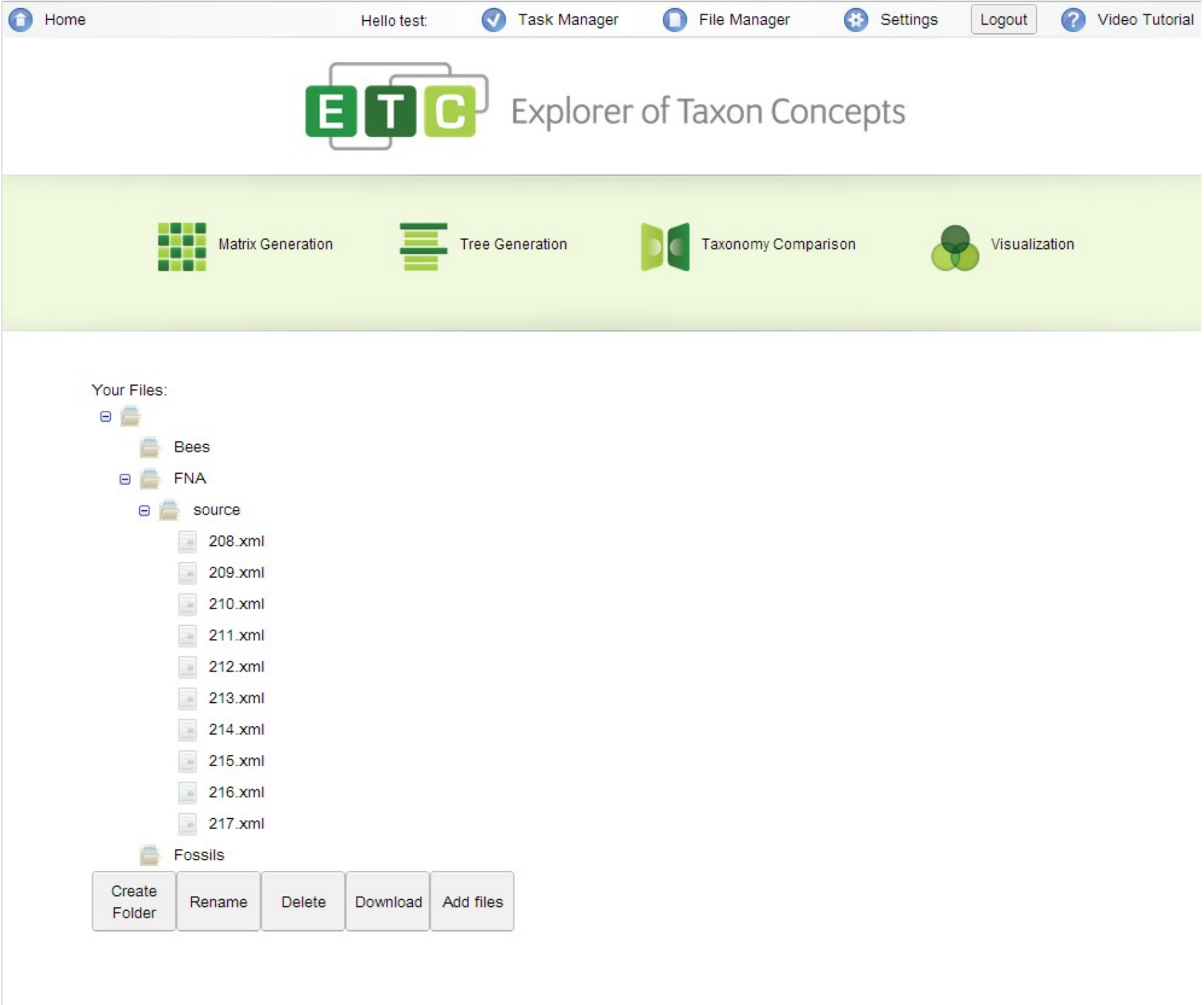
Task name: FNA

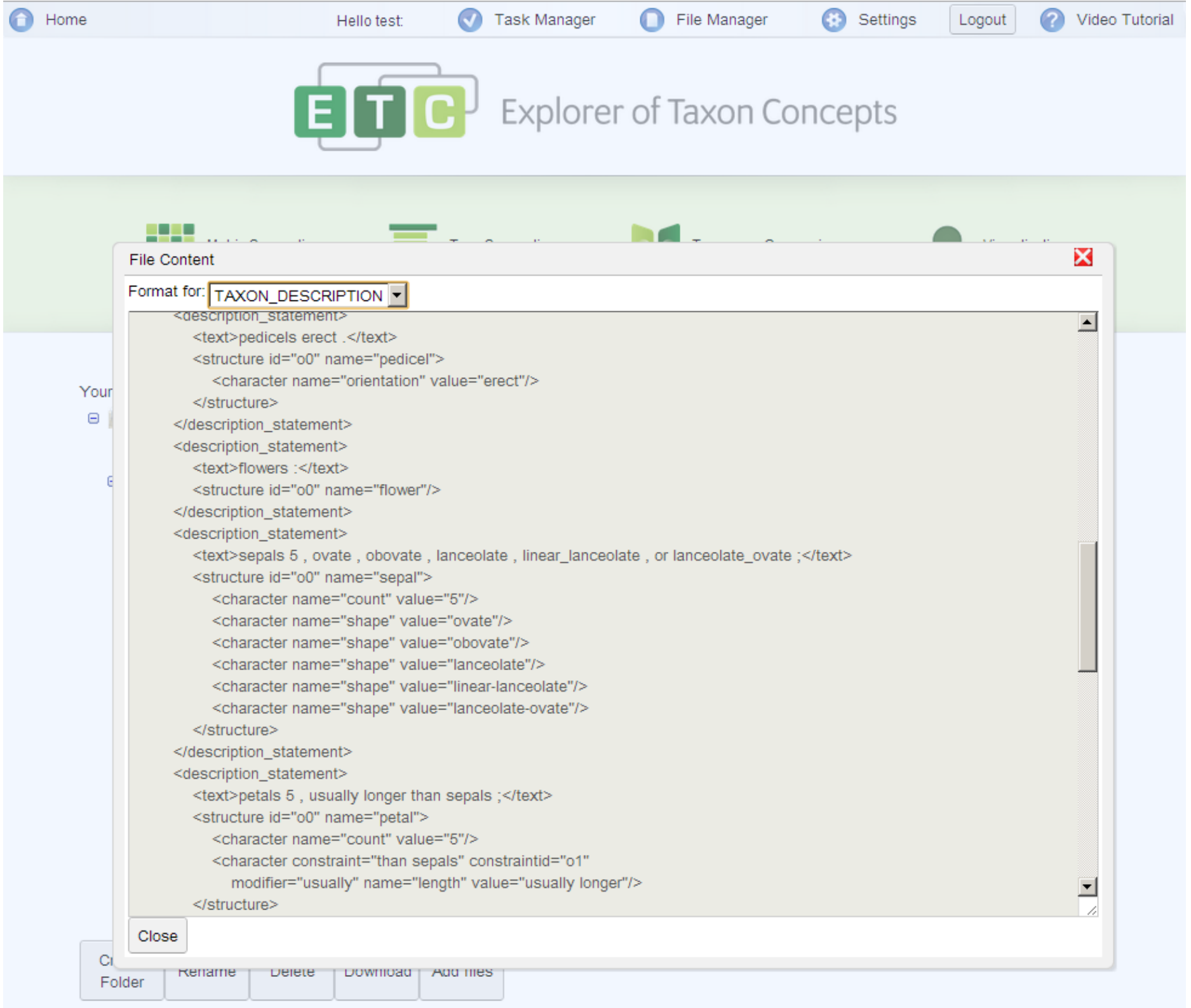
Select Taxon Descriptions //FNA//source

Taxon group: Plant

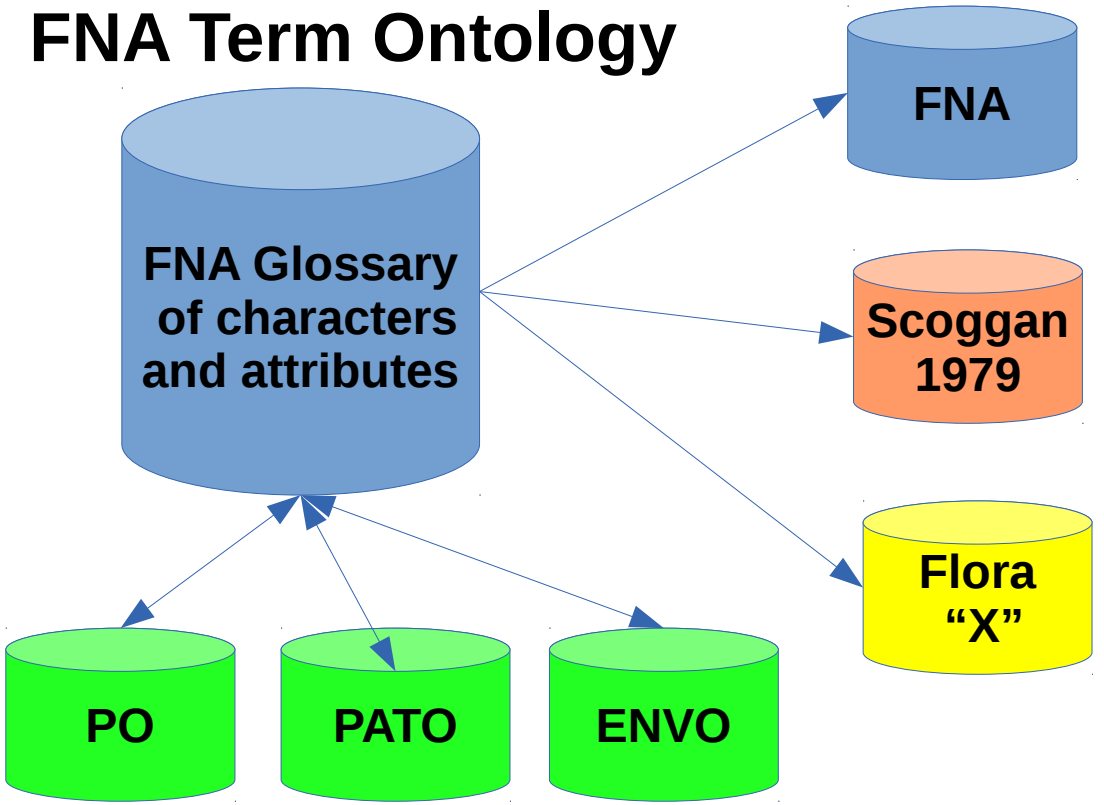
Next




Home
Hello test:
Task Manager
File Manager
Settings
Logout
Video Tutorial
ETC
Explorer of Taxon Concepts
Matrix Generation
Tree Generation
Taxonomy Comparison
Visualization
Your Files:
Bees
FNA
source
208.xml
209.xml
210.xml
211.xml
212.xml
213.xml
214.xml
215.xml
216.xml
217.xml
Fossils
Create Folder
Rename
Delete
Download
Add files


Home
Hello test:
Task Manager
File Manager
Settings
Logout
Video Tutorial
Explorer of Taxon Concepts
File Content
Format for:
TAXON_DESCRIPTION
<description_statement>
<text>pedicels erect .</text>
<structure id="o0" name="pedicel">
<character name="orientation" value="erect"/>
</structure>
</description_statement>
<description_statement>
<text>flowers :</text>
<structure id="o0" name="flower"/>
</description_statement>
<description_statement>
<text>sepals 5 , ovate , obovate , lanceolate , linear_lanceolate , or lanceolate_ovate ;</text>
<structure id="o0" name="sepal">
<character name="count" value="5"/>
<character name="shape" value="ovate"/>
<character name="shape" value="obovate"/>
<character name="shape" value="lanceolate"/>
<character name="shape" value="linear-lanceolate"/>
<character name="shape" value="lanceolate-ovate"/>
</structure>
</description_statement>
<description_statement>
<text>petals 5 , usually longer than sepals ;</text>
<structure id="o0" name="petal">
<character name="count" value="5"/>
<character constraint="than sepals" constraintid="o1"
modifier="usually" name="length" value="usually longer"/>
</structure>
Close
Folder
Rename
Delete
Download
Add files

FNA Term Ontology




```
structure id="o1069" name="leaf"
  structure id="o1070" name="blade"
    character char_type="range_value" name="length"
    from="3" from_unit="cm" to="30" to_unit="cm"
```

```
structure id="o1069" same_as structure id="FOC896"
name="leaf"
  structure id="o1070" same_as structure id="FOC1978"
  name="blade"
    character char_type="range_value" name="length"
    from="4" from_unit="cm" to="17" to_unit="cm"
```

```
structure id="o1069" same_as name="leaf"
  structure id="o1070" same_as name=""
    character char_type="range_value" name="length"
    character name="size" value="long"
```

PO: Plant Ontology; **PATO:** Phenotypic Qualities; **ENVO:** Environmental Ontology

Browse data: Plant

Main page
Recent changes
Toolbox
Upload file
Special pages

Plant

Click on one or more items below to narrow your results.

Choose a category:
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Books (4)
Plant (647)
Treatment (0)

Corolla coloration:

aging (2) · black (2) · blue (6) · bluish (9) · bright (3) · bronze (1) · brown (1) · coloration (1) · cream (6) · cream-colored (2) · creamy (1) · deep (2) · drying (3) · dull (3) · gray (1) · gray-striped (4) · grayish (1) · green (1) · greenish (1) · lavender (17) · lavender-pink (3) · lavender-tinged (2) · lemon (1) · light (1) · maroon-purple (1) · medium (1) · ochroleucous (5) · orange (8) · orange-yellow (1) · outer (2) · outermost (1) · pale (1) · pink (27) · pink-lavender (1) · pink-purple (7) · pink-tinged (1) · pinkish (5) · pinkish-striped (1) · pinkish-tinged (1) · purple (47) · purple-striped (1) · purple-tinged (1) · purplish (21) · purplish-tinged (1) · red (8) · red-purple (1) · red-tinged (6) · reddish (5) · reddish-tinged (2) · rose (1) · rose-pink (1) · rose-purple (1) · rosy (2) · salmon (1) · streaked (1) · striped (4) · tan (1) · tinged (2) · violet (2) · white (67) · whitish (9) · with (3) · yellow (188) · yellow-brown (1) · yellow-orange (6) · yellowish (11)

Stem orientation:

arcuate-ascending (1) · ascending (67) · decumbent-ascending (7) · erect (183) · prostrate (9) · spreading (3) · spreading-ascending (1) · to ascending (3)

Stem external texture:

appressed (1) · appressed-hairy (1) · appressed-puberulent (3) · appressed-tomentose (1) · arachno-puberulent (1) · arachnoid (5) · arachnoid-tomentose (5) · arachnose (8) · arachnose-tomentose (3) · bristly (1) · bristly-setose (1) · brittle (5) · canescent (8) · canescent-tomentulose (1) · coarse (1) · cobwebby-villous (1) · felty-tomentose (1) · floccose (1) · glabrate (43) · glabrescent (30) · glabrous (130) · glandular-puberulent (1) · glandular-villous (4) · glaucous (8) · gray-or-white-tomentose (1) · gray-tomentose (9) · hairy (17) · hirsute (1) · hirtellous (1) · hispid (11) · hispidulous (1) · lanate (2) · lanate-tomentose (1) · matted-villous (1) · pannose (5) · pannose-tomentose (1) · pilose (3) · piloso-hirsute (35) · pilosulous (5) · puberulent (17) · pubescent (1) · scabrous-puberulent (1) · sericeous (4) · sericeous-canescent (1) · setose (9) · setulose (2) · short-pilose (1) · soft (1) · spreading-hairy (1) · stellate-pubescent (28) · strigillose (5) · strigose (2) · strigoso-sericeous (3) · subpannose (1) · tomentose (58) · tomentose-arachnose (1) · tomentose-canescent (1) · tomentulose (17) · villous (28) · viscid (2) · white-pannose (4) · white-tomentose (10) · white-tomentose-floccose (1) · woolly (2) · woolly-pubescent (1) · woolly-tomentose (3) · woolly-tomentose-sericeous (1)

Flowering time:

(year-round (1) · apr (192) · aug (361) · dec (17) · early (6) · fall (248) · feb (28) · feb–jun. (1) · in (1) · jan (17) · jul (384) · jul–oct (1) · jun (375) · late (6) · mar (135) · may (238) · mid (4) · nov (82) · oct (146) · round (2) · sep (232) · south). (1) · spring (258) · summer (496) · winter (38) · year (2)

Showing below up to **250** results starting with **#1**.

Browse data: Plant

Plant > Corolla coloration: purple ⊗ & **Stem orientation:** erect ⊗

Click on one or more items below to narrow your results.

Choose a category:
Authors (1)
Books (4)
Plant (647)
Treatment (0)

▶ **Corolla coloration:** (Click arrow to add another value)

▶ **Stem orientation:** (Click arrow to add another value)

▼ **Stem external texture:**

appressed-tomentose (1) · arachnoid (2) · arachnoid-tomentose (2) · arachnose-tomentose (1) · glabrate (6) · glabrescent (1) · glabrous (5) · gray-or-white-tomentose (1) · gray-tomentose (3) · pannose (1) · pilose (1) · puberulent (1) · short-pilose (1) · strigoso-sericeous (1) · subpannose (1) · tomentose (4) · villous (8)

▼ **Flowering time:**

apr (10) · aug (16) · dec (1) · fall (13) · feb (2) · jan (1) · jul (18) · jun (18) · late (1) · mar (8) · may (11) · nov (5) · oct (6) · round (1) · sep (13) · spring (11) · summer (21) · winter (2) · year (1)

Showing below up to **24** results starting with **#1**.

View (previous 250 | next 250) (20 | 50 | 100 | 250 | 500)

A

- Anthemis arvensis

C

- Cirsium altissimum
- Cirsium discolor
- Cirsium engelmannii
- Cirsium flodmanii

C cont.

- Cirsium nuttallii
- Cirsium perplexans
- Cirsium pitcheri
- Cirsium repandum
- Cirsium undulatum
- Cirsium virginianum

G

- Gamochaeta antillana
- Gamochaeta calviceps
- Gamochaeta chionesthes

L

- Lygodesmia grandiflora
- Lygodesmia texana

Main page
Recent changes

Toolbox
Upload file
Special pages

Browse data: Plant

Main page
Recent changes

Toolbox
Upload file
Special pages

Plant > Corolla coloration: purple ⊗ & **Stem orientation:** erect ⊗ & **Stem external texture:** glabrous ⊗ & **Flowering time:** summer ⊗

Click on one or more items below to narrow your results.

- **Corolla coloration:** (Click arrow to add another value)
- **Stem orientation:** (Click arrow to add another value)
- **Stem external texture:** (Click arrow to add another value)
- **Flowering time:** (Click arrow to add another value)

Choose a category:
Authors (1)
Books (4)
Plant (647)
Treatment (0)

Showing below up to **4** results starting with **#1**.

View (previous 250 | next 250) (20 | 50 | 100 | 250 | 500)

C

- Cirsium arvense
- Cirsium kamtschaticum

C cont.

- Cirsium nuttallii

L

- Lygodesmia texana

View (previous 250 | next 250) (20 | 50 | 100 | 250 | 500)

Cirsium arvense

Main page
Recent changes
Toolbox
What links here
Related changes
Upload file
Special pages
Printable version
Permanent link
Browse properties
Cite this page

Cirsium arvense (Linnaeus) Scopoli, Fl. Carniol. ed. 2. 2: 126. 1772.

Canada or creeping or field thistle, chardon du Canada ou des champs, cirse des champs

Cirsium arvense	
Stem orientation	erect
Stem external texture	glabrous, appressed
Corolla coloration	purple, white, pink
Flowering time	summer, jun, jul, aug, sep, fall, oct

Serratula arvensis Linnaeus, Sp. Pl. 2: 820. 1753; Breea arvensis (Linnaeus) Lessing; Carduus arvensis (Linnaeus) Robson; Cirsium arvense var. argenteum (Peyer ex Vest) Fiori; C. arvense var. horridum Wimmer & Grabowski; C. arvense var. integrifolium Wimmer & Grabowski; C. arvense var. mite Wimmer & Grabowski; C. arvense var. vestitum Wimmer & Grabowski; C. incanum (S. G. Gmelin) Fischer ex M. Bieberstein; C. setosum (Willdenow) Besser ex M. Bieberstein

Perennials, dioecious or nearly so, 30–120(–200) cm; colonial from deep-seated creeping roots producing adventitious buds. Stems 1–many, erect, glabrous to appressed gray-tomentose; branches 0–many, ascending. Leaves: blades oblong to elliptic, 3–30 × 1–6 cm, margins plane to revolute, entire and spinulose, dentate, or shallowly to deeply pinnatifid, lobes well separated, lance-oblong to triangular-ovate, spinulose to few-toothed or few-lobed near base, main spines 1–7 mm, abaxial faces glabrous to densely gray-tomentose, adaxial green, glabrous to thinly tomentose; basal absent at flowering, petioles narrowly winged, bases tapered; principal larger cauline proximally winged-petiolate, distally sessile, well distributed, gradually reduced, not decurrent; distal cauline becoming bractlike, entire, toothed, or lobed, spinulose or not. Heads 1–many, borne singly or in corymbiform or paniculiform arrays at tips of main stem and branches. Peduncles 0.2–7 cm. Involucres ovoid in flower, ± campanulate in fruit, 1–2 × 1–2 cm, arachnoid tomentose, ± glabrate. Phyllaries in 6–8 series, strongly imbricate, (usually purple-tinged), ovate (outer) to linear (inner), abaxial faces with narrow glutinous ridge, outer and middle appressed, entire, apices ascending to spreading, spines 0–1 mm (fine); apices of inner phyllaries flat, ± flexuous, margins entire to minutely erose or ciliolate. Corollas purple (white or pink); staminate 12–18 mm, (remaining longer than pappus when head is fully mature), tubes 8–11 mm, throats 1–1.5 mm, lobes 3–5 mm; pistillate 14–20 mm, (overtopped by pappi in fruit), tubes 10–15 mm, throats ca. 1 mm, lobes 2–3 mm; style tips 1–2 mm. Cypselae brown, 2–4 mm, apical collar not differentiated; pappi 13–32 mm, exceeding corollas. 2n = 34.

Flowering summer (Jun–Oct). Disturbed sites, fields, pastures, roadsides, forest openings; 0–2600 m; introduced; Greenland; St. Pierre and Miquelon; Alta., B.C., Man., N.B., Nfld. and Labr. (Nfld.), N.W.T., N.S., Ont., P.E.I., Que., Sask., Yukon; Ala., Alaska, Ariz., Ark., Calif., Colo.,

An iDigBio VoCamp ?

- Begun in 2008 VoCamps have been used to leverage existing standards and community expertise to deploy Linked Data vocabularies for particular communities of practice.
  - It is these vocabularies that are used to say things about the resources that are described in our source material.

Step 1: Determine our “vocabulary needs”.

- What are the things we want to describe?
  - *Person*, *Expedition*, *Specimen*, *Place*, etc.
- What are the relations that can exist between them?
  - *member_of, collected_as_part_of, derived_from, etc.*

Step 2: *Which of these concepts already have URIs?*

- *Look in FOAF, Dublin Core, Darwin Core, schema.org, Wikidata, etc.*

Step 3: For the leftover concepts, mint new URIs in the iDigBio namespace.

Acknowledgements

- **Botanical Knowledge Portal**
  - Joel Sachs, Heather Cole
- **Exploring Taxon Concepts** 

  - Bertram Ludaescher, Robert A. Morris
- **Filtered Push Team** 

  - **Harvard:** James Hanken, Chinua Iloabachie, Maureen A. Kelly, David B. Lowery, Paul J. Morris, Robert A. Morris, Donna Tremonte, Zhimin Wang
  - **UC Davis:** Lei Dou, Bertram Ludaescher, Timothy Mcphillips
- **FNAA: Flora of North America Association**