Extending OBI Herbarium Records to include associated NCBI GenBank sequences

hash://md5/40b93e072ceb31bb9e78078b929f19d8
hash://sha256/be5605e58d2644baedcb160604080d9f02ce528064b7fbb13a5b556dd55cfeb6

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2023-07-19

Abstract

Specimen from Natural History Collections are physical repositories of genetic information. Genetic sequences extracted from specimen are stored in genetic sequence databases like the openly accessible GenBank at NCBI, DNA DataBank of Japan, or the European Nucleotide Archive (ENA). While researchers and collection managers make efforts to associate (or link) Natural History Collection records with their derived genetic accession records, extra work is need to make these associations explicit. We describe how a collaboration between a biodiversity informatics expert and collection managers of the Hoover/OBI Herbarium at CalPoly, San Luis Obispo, CA was forged with the aim to extend OBI specimen records to include their associated GenBank records. In addition, we quantify the costs of creating these specimen extensions, and discuss the socio-economic capacity needed to repeat this digital specimen extension process for the hundreds of millions of specimen records available globally today.

Contents

https://linker.bio/hash://sha256/be5605e58d2644baedcb160604080d9f02ce528064b7fbb13a5b556dd55cfeb6

archived swh:1:dir:2b8a4eb0f0a03739a39927066de5540b1ab88e5d

Introduction

Billions of biodiversity data records are made openly available by hundreds of Natural History Collections all over the world. Also, since 1982, National Institutes of Health have published versions nucleotide sequences through GenBank. Many specimen described in Natural History Collections have associated GenBank sequence accessions available in GenBank.

During the 2023 Annual Conference of Digital Data in Biodiversity Research hosted by Arizona State University, Jenn Yost expressed a desire to make it easier to link GenBank accession records to the specimen records the helps curate at the The Hoover Herbarium (`{"http://rs.tdwg.org/dwc/terms/institutionCode": "OBI"}`), Cal Poly State University, San Luis Obispo, CA (Yost 2023).

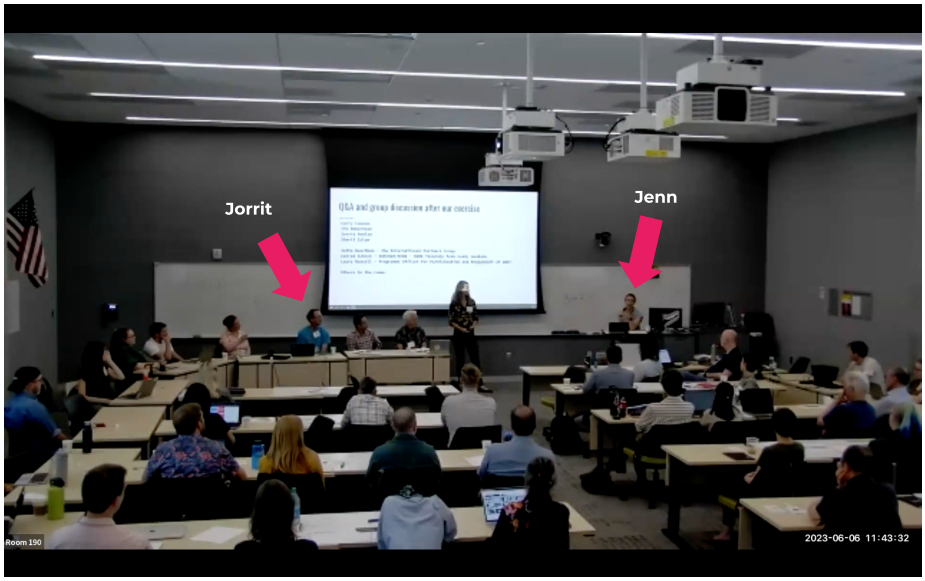


Figure 1: Jenn Yost expressing her desire to better link GenBank records to their associated specimen records (Yost 2023).

This repository is the outcome at a first prototype to help outline a process to discover OBI specimen record references in GenBank. With this, Jenn Yost and collaborators like Kate Pearson can link specimen records to the GenBank accession they are associated with.

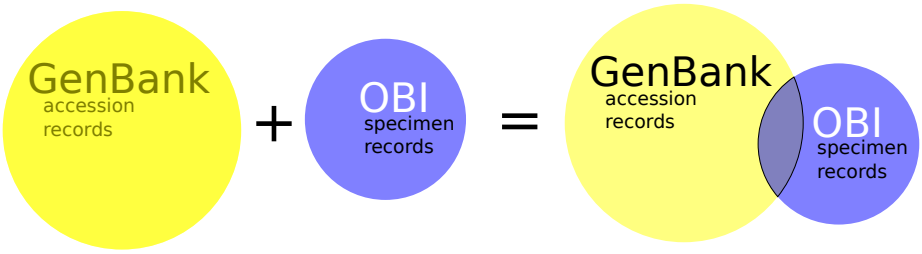


Figure 2: Hoover Herbarium (OBI) at Cal Poly State University, San Luis Obispo, CA keeps herbarium specimen. Some of these specimen have associated record in GenBank. These GenBank records extend the OBI specimen additional information such as genetic sequences.

Example

The Hoover Herbarium hosts a preserved specimen of type *Angelica hendersonii* Coult. & Rose that was collected in 1966-07-05 by Tracey & Viola Call at the north end of Tomales Bay and 2 mi south of Tomales in Marin County, California with catalog number: OBI09031, collector number: 2490, occurrence id: 256368e3-f8d7-4028-8010-1a4ff3eb8111, and web reference https://cch2.org/portal/collections/individual/index.php?occid=166203.

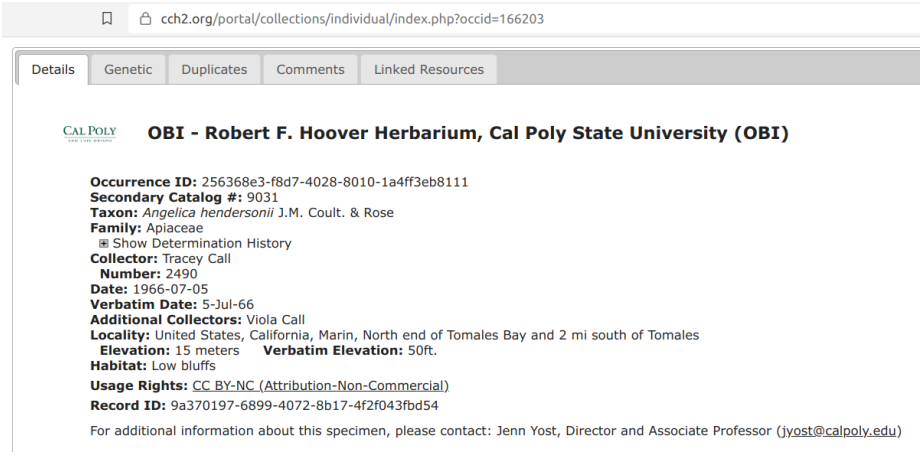


Figure 3: Webpage associated with OBI09031 as seen via https://cch2.org/portal/collections/individual/index.php?occid=166203 on 2023-09-11.

GenBank hosts a accession record https://www.ncbi.nlm.nih.gov/nuccore/MT735455 with locus Angelica hendersonii voucher Tracey & V. Call 2490 (OBI09031) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.

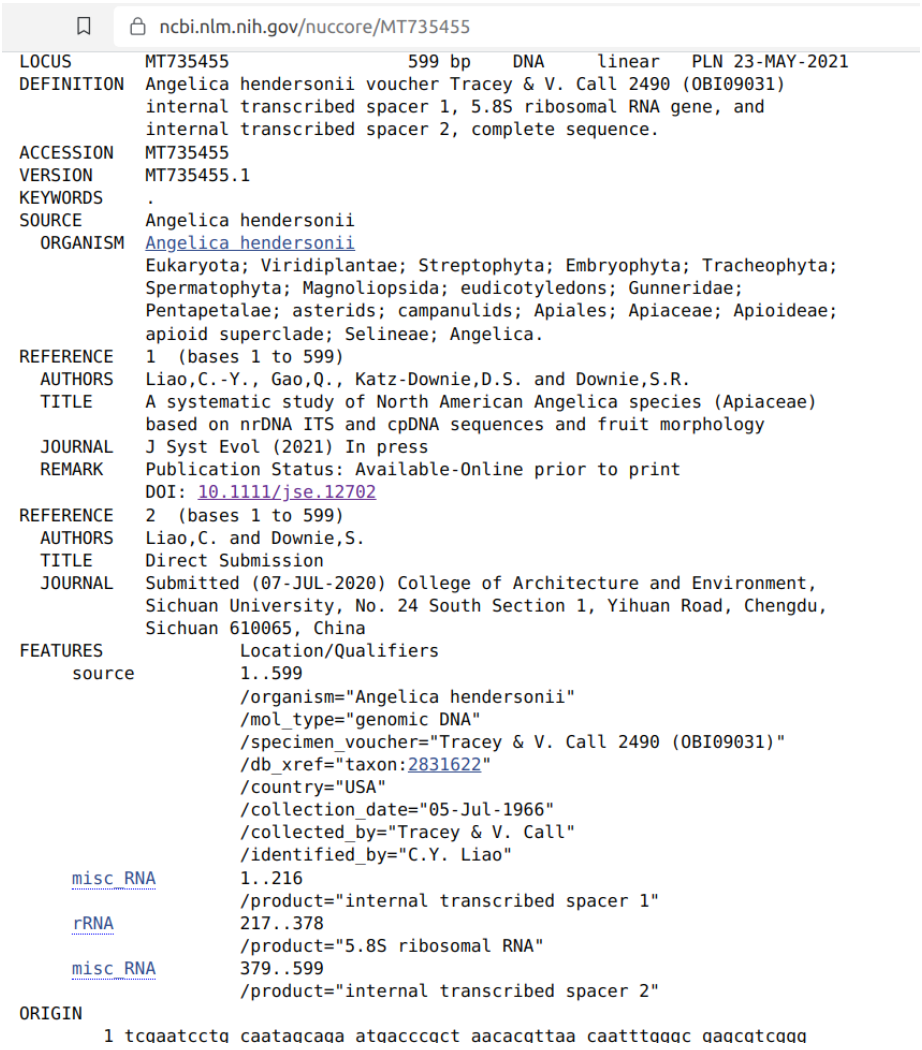


Figure 4: Webpage associated with GenBank accession MT735455 as seen via https://www.ncbi.nlm.nih.gov/nuccore/MT735455 on 2023-09-11.

Our desire is to develop a method to facilitate the discovery of this preserved specimen and their associated GenBank accession records. The annotated web page screenshots below gives some hints to what information elements may be used to help associated related records.

Methods

Instead of relying on visual inspection of individual html pages for herbarium specimen and GenBank accession records, an data-driven workflow was designed to first acquire and version GenBank and OBI records. Then, using these versioned archives, the records are analyzed and associated record candidates are proposed.

Phase 1. Acquire and Version

Acquire and Version GenBank Accession Records GenBank publishes their sequence accession records in flat file archives online via https://ftp.ncbi.nlm.nih.gov/genbank/ . Their publications are published grouped by divisions. One of these divisions, the so-called PLN division, covers sequences of plants, fungi and algae.

We used Preston, a biodiversity dataset tracker, to track GenBank PLN sequence records and make them available for versioned archiving, and offline processing (Poelen, Pearson, and Yost 2023).

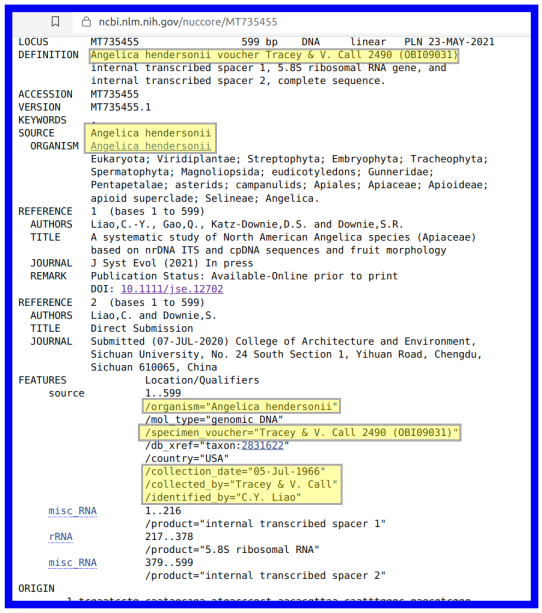
The following script was used to track the GenBank PLN sequence records:

```
#!/bin/bash
#
# Lists Genbank Plant sequence entries (including fungi and algae)
#
# For more info, see https://ftp.ncbi.nlm.nih.gov/genbank/README.genbank

preston track "https://ftp.ncbi.nlm.nih.gov/genbank/gbrel.txt"\
 | preston cat\
 | grep -oE "gbpln+[0-9]+[.]seq"\
 | sed 's+^+https://ftp.ncbi.nlm.nih.gov/genbank/+g'\
 | sed 's+$+.gz+g'
```

At the time, this produced a list of resources starting with:

```
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1.seq.gz
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln10.seq.gz
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln100.seq.gz
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1000.seq.gz
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1001.seq.gz
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1002.seq.gz
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1003.seq.gz
https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1004.seq.gz
```



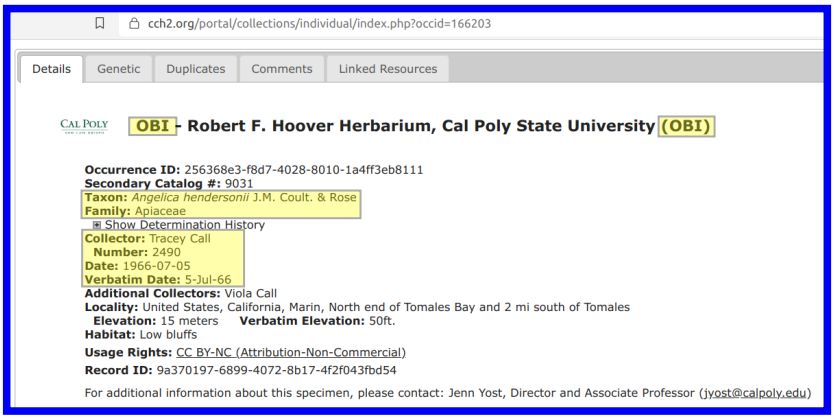


Figure 5: At first glance, the highlighted parts of the html pages appear to suggest evidence of association between specimen record OBI09031 and accession record MT735455. These associations include OBI (the institution code), *Angelica hendersonii* (taxonomic identification), 1966 (collection year), 2490 (collector number), 9031 (secondary catalog), and Tracy Call and Viola Call (collectors).

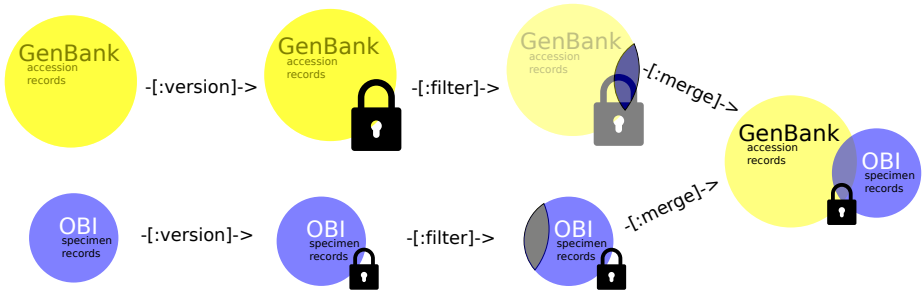


Figure 6: Version, Filter and Merge Workflow

`https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1005.seq.gz`
`https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1006.seq.gz`

These files ending with `seq.gz` were then tracked using command like:

```
preston track https://ftp.ncbi.nlm.nih.gov/genbank/gbpln1.seq.gz
```

A Preston package was built using these "track" commands to document where and when genbank resources were accessed, and what they contained. In addition, copies of the resources were made. This package can be uniquely identified by the following content id:

`hash://sha256/bc7368469e50020ce8ae27b9d6a9a869e0b9a2a0a9b5480c69ce6751fa4b870e`

This resulting Preston package of GenBanks PLN division record was archived offline on an external harddisk and online at ASU's BioKiC (Biodiversity Knowledge integration Center) and made available via https://linker.bio . The total volume of the GenBank PLN records was a little over 200GB, small enough to fit on a personal computer, or external hard disk.

Acquire and Version OBI Herbarium Specimen Records Similarly, the OBI specimen records were tracked and archived using Preston (Poelen 2023). Then, this versioned and offline enabled archive was used to query for identifiers found in candidate records.

For instance, GenBank accession record https://www.ncbi.nlm.nih.gov/nuccore/MT735455 references numbers like "2490" and "9031" (from OBI09031) extracted from their locus. These numbers are then used to select records that contain both via query:

```
preston ls\
 --anchor hash://sha256/be5605e58d2644baedcb160604080d9f02ce528064b7fbb13a5b556dd55cfeb6\
 --remote https://linker.bio\
 --no-cache\
 | preston dwc-stream\
 --remote https://linker.bio\
```

```
 --no-cache\
 | grep -E "[^0-9a-zA-Z-](2490)[^0-9a-zA-Z]"\
 | grep -E "[^0-9a-zA-Z-](9031)[^0-9a-zA-Z]"
```

where the lines with "grep" in is select only records that have the specified number (e.g., 2490, 9031) where the characters preceding and following are *not* alphanumeric characters. In this example, on only a single record has both numbers in it.

Phase 2. Propose OBI associated GenBank Records

Then the GenBank archive was processed to list all records that mention "OBI" in their (locus, voucher_specimen) descriptions using:

```
preston ls\
 --anchor hash://sha256/bc7368469e50020ce8ae27b9d6a9a869e0b9a2a0a9b5480c69ce6751fa4b870e\
 --remote https://linker.bio,https://zenodo.org/record/8117720/files/,https://biokic6.rc.asu
 --no-cache\
 | preston gb-stream\
 --remote https://linker.bio,https://zenodo.org/record/8117720/files/,https://biokic6.rc.asu
 --no-cache\
 | grep "OBI"
```

The first command (i.e., `preston ls ... https://linker.bio`) lists the content of the package with id hash://sha256/bc7368469e50020ce8ae27b9d6a9a869e0b9a2a0a9b5480c69ce6751fa4b87
and downloads the necessary data via https://linker.bio if needed.

The second command (i.e., `preston gb-stream`) analyzes the package content as a stream, and generates metadata objects for each genbank accession encountered.

The third command (i.e., `grep "OBI"`) includes only those datadata records that contain "OBI".

Results

Capture GenBank Candidate Records

On processing millions of GenBank accession records, 256 candidate genbank accession records with mention of OBI were shared with Katelin Pearson for review. By selecting the PLN division (plants), and selecting the OBI institutions code, we reduced the search space by a couple of order of magnitudes. With only a few hundred records, Kateline Pearson, an OBI curator, was able to make the candidate GenBank accession records that likely referenced OBI specimen records (see genbank-associations-mentioning-OBI.csv or associated online sheet for the table with manual review notes).

Following, Jorrit Poelen used the OBI preston archive and retrieved preserved specimen records that contained numbers and/or other identifying information (e.g., scientific name occurring in the genbank accession record) to select a

candidate specimen record for each candidate accession record. In about 1.5 hours, he compiled this list of specimen record / accession records associations in the following format.

occid	url	resourcename	locus
4060422	https://www.ncbi.nlm.nih.gov/nuccore/MW025415	GenBank Record	MW025415 Fusarium sp. SR-2020 voucher OBI161445 small subunit ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; and large subunit ribosomal RNA gene, partial sequence.

Curatorial Candidate Record Review

With this information, Katelin Pearson, a OBI data curator, took about 15 minutes to annotate the specimen records in the CCH2 Symbiota database with their related GenBank Accession number. Most of this time was spent to convert the information provided by Jorrit Poelen into a more convenient format. The full table can be found in Appendix A and the first two lines of the OBI genetics table can be found below. Here, the occid is the record number unique to the CCH2 Symbiota database, url is the reference a GenBank accession, resourcename is the type of resource that Symbiota understands, and locus the optional information supported by Symbiota to include in an associated sequence record.

Adding GenBank Links to Symbiota Records

After Katelin Pearson upload the genbank link table into the CCH2 Symbiota database, she exported the updated records to the published DwC-A. Following, Jorrit Poelen tracked the updated version of the DwC-A and selected the records with associated GenBank sequence records. Following, he created a table (see Appendix B.) including the reference to the original record, a web url to a html

record page, and the associated genbank record annotations. The first three lines of Appendix B. can be found below.

derivedFrom	reference	associatedSequences
https://linker.bio/line:zip:ha[illegible]	[illegible]	[illegible]678037b99ab
https://linker.bio/line:zip:ha[illegible]	[illegible]	[illegible]678037b99ab Angelica hendersonii voucher Tracey & V. Call 2490 (OBI09031) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735455|GenB[illegible] Record, Angelica hendersonii Tracey & V. Call 2490 (OBI09031) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765790|GenB[illegible] Record, Angelica hendersonii Tracey & V. Call 2490 (OBI09031) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765975|GenB[illegible] Record, Angelica hendersonii Tracey & V. Call 2490 (OBI09031) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766140

Comparing Example Record Before and After Record Linking In our methods, we keep track of the versions of the datasets we work with. The OBI specimen records were versioned prior and after annotating OBI specimen records with their associated GenBank accessions. This means that the changes in the records, as published via the OBI DwC-A can be measured.

To demonstrate the changes to a specific record related to our example specimen record OBI09031, please consider the record prior to annotating the association:

```
preston ls\
 --anchor hash://sha256/be5605e58d2644baedcb160604080d9f02ce528064b7fbb13a5b556dd55cfeb6\
 --remote https://linker.bio\
 --no-cache\
 | preston dwc-stream\
 --remote https://linker.bio\
 --no-cache\
 | grep -E "[^0-9a-zA-Z-](2490)[^0-9a-zA-Z]"\
 | grep -E "[^0-9a-zA-Z-](9031)[^0-9a-zA-Z]"\
 | tail -n1\
 | jq --raw-output '.["http://www.w3.org/ns/prov#wasDerivedFrom"]'
```

which points us to the versioned records with identifier:

`line:zip:hash://sha256/b60f9dd7868d6296ddea107219d41e5a92d55f1a5e0e5ee894c6e9977cb872cd!/occ`

The content associated with this content identifier can be retrieved via `preston cat 'line:zip:hash://sha256/b60f9dd7868d6296ddea107219d41e5a92d55f1a5e0e5ee894c6e9977cb872cd'` or accessed via OBI09031@b60f9.csv.

A textual representation of the record is shown below.

id	166203
institutionCode	OBI
collectionCode	
ownerInstitutionCode	
collectionID	3818d95b-b6a4-11e8-b408-001a64db2964
basisOfRecord	PreservedSpecimen
occurrenceID	256368e3-f8d7-4028-8010-1a4ff3eb8111
catalogNumber	
otherCatalogNumbers	9031
higherClassification	Organism|Plantae|Viridiplantae|Streptophyta|Embryophyta|Trach
kingdom	Plantae
phylum	Tracheophyta
class	Magnoliopsida
order	Apiales
family	Apiaceae
scientificName	Angelica hendersonii
taxonID	210544
scientificNameAuthorship	Coult. & Rose
genus	Angelica
subgenus	
specificEpithet	hendersonii
verbatimTaxonRank	
infraspecificEpithet	
taxonRank	Species

identifiedBy	
dateIdentified	
identificationReferences	
identificationRemarks	
taxonRemarks	
identificationQualifier	
typeStatus	
recordedBy	Tracey Call; Viola Call
recordNumber	2490
eventDate	1966-07-05
year	1966
month	7
day	5
startDayOfYear	186
endDayOfYear	
verbatimEventDate	5-Jul-66
occurrenceRemarks	
habitat	Low bluffs
fieldNumber	
eventID	
informationWithheld	
dataGeneralizations	
dynamicProperties	
associatedOccurrences	herbariumSpecimenDuplicate: https://cch2.org/portal/collectio
associatedSequences	
associatedTaxa	
reproductiveCondition	
establishmentMeans	
lifeStage	
sex	
individualCount	
preparations	
locationID	
continent	
waterBody	
islandGroup	
island	
country	United States
stateProvince	California
county	Marin
municipality	
locality	North end of Tomales Bay and 2 mi south of Tomales
locationRemarks	
decimalLatitude	
decimalLongitude	
geodeticDatum	

```
coordinateUncertaintyInMeters
verbatimCoordinates
georeferencedBy
georeferenceProtocol
georeferenceSources
georeferenceVerificationStatus
georeferenceRemarks
minimumElevationInMeters       15
maximumElevationInMeters
minimumDepthInMeters
maximumDepthInMeters
verbatimDepth
verbatimElevation              50ft.
disposition
language
recordEnteredBy
modified                       2011-08-18 00:00:00
rights                         http://creativecommons.org/licenses/by-nc/4.0/
rightsHolder
accessRights
recordID                       9a370197-6899-4072-8b17-4f2f043fbd54
references                     https://cch2.org/portal/collections/individual/index.php?occi
```

Similarly, the record seen after the annotation can be retrieved using:

```
preston ls\
 --anchor hash://sha256/be5605e58d2644baedcb160604080d9f02ce528064b7fbb13a5b556dd55cfeb6\
 --remote https://linker.bio\
 --no-cache\
 | preston dwc-stream\
 --remote https://linker.bio\
 --no-cache\
 | grep -E "[^0-9a-zA-Z-](2490)[^0-9a-zA-Z]"\
 | grep -E "[^0-9a-zA-Z-](9031)[^0-9a-zA-Z]"\
 | head -n1\
 | jq --raw-output '.["http://www.w3.org/ns/prov#wasDerivedFrom"]'
```

yielding:

```
line:zip:hash://sha256/cd9de973510975dac3394952bba9c486a482762b3beab05ecb678037b99ab85b!/occ
```

Now, we can use a text comparison between the two versioned records, using diff, a widely available linux tool.

```
diff <(preston cat 'line:zip:hash://sha256/b60f9dd7868d6296ddea107219d41e5a92d55f1a5e0e5ee89
```

which results in

```
50c50
<   "associatedSequences": "",
```

```
---
>   "associatedSequences": "GenBank Record, Angelica hendersonii voucher Tracey & V. Call 24
```

: output of a commonly used programming tool `diff` as applied to our OBI09031 example.

Figure 7: Output of a visual text comparison tool available via https://commontools.org as applied to our OBI09031 example.

Additionally, you can find the before/after example records in json (i.e., OBI09031-before.json/ OBI09031-after.json) or csv (i.e., OBI09031-before.csv / OBI09031-after.csv) formats.

Finally, because we have our versioned records available in text formats, the options for re-use, archiving, or other subsequent processing are plentiful, and is consistent with one of the Unix principles (McIlroy, Pinson, and Tague 1978).

> Expect the output of every program to become the input to another, as yet unknown, program.

Discussion

We took a systematic approach to independently track natural history collection records and sequence records. Then, we used regular expressions (or queries) to select candidate GenBank accession records. Following, after manual review of candidate records, we extracted identifiers and names to link locate their associated specimen records in the Hoover Herbarium collection as tracked. While the method is not fully automated, our method reduced the number of candidate accession records from millions to hundreds. This many order of magnitude reduction of candidates made manual review was feasible. We expect that periodic revisiting of the available records in GenBank will yield additional associated genbank records. Also, we hope that this example show that

links between existing GenBank accessions and their specimen records can be found without major technological investment. And, we hope that this example will help inspire to develop best practices to place identifying information in GenBank records such that collection managers can somehwat easily locate sequences associated to the specimen they keep.

Appendix A

GenBank link table created by Katelin Pearson to link OBI specimen records to their associated GenBank sequences.

See also OBI_genetics.csv.

occid	url	resourcename	locus
4060422	https://www.ncbi.nlm.nih.gov/nuccore/MT025115	GenBank Record	MT025115 Pseudemys sp. SR-2020 voucher OBI161445 small subunit ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; and large subunit ribosomal RNA gene, partial sequence.
2186655	https://www.ncbi.nlm.nih.gov/nuccore/MT670383	GenBank Record	MT670383 Trionyx marlothii voucher Rodin 9194 (OBI) trnS-trnG intergenic spacer, partial sequence; chloroplast.

occid	url	resourcename	locus
2186655	https://www.ncbi.nlm.nih.gov/nuccore/MT768406	GenBank Record	MT768406 Plagiochlamys marlothii voucher Rodin 9194 (OBI) ribosomal protein S16 (rps16) gene, intron; chloroplast.
2186655	https://www.ncbi.nlm.nih.gov/nuccore/MT768302	GenBank Record	MT768302 Plagiochlamys marlothii voucher Rodin 9194 (OBI) trnT-trnL intergenic spacer, partial sequence; chloroplast.
2186655	https://www.ncbi.nlm.nih.gov/nuccore/MT768361	GenBank Record	MT768361 Plagiochlamys marlothii voucher Rodin 9194 (OBI) trnL-trnF intergenic spacer, partial sequence; chloroplast.
2186655	https://www.ncbi.nlm.nih.gov/nuccore/MT768408	GenBank Record	MT768408 Plagiochlamys marlothii voucher Rodin 9194 (OBI) internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.

occid	url	resourcename	locus
214465	https://www.ncbi.nlm.nih.gov/nuccore/MT735479	GenBank Record	Trigonia lucida voucher D. Smith 203 (OBI13881) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
214465	https://www.ncbi.nlm.nih.gov/nuccore/MT765849	GenBank Record	Trigonia lucida D. Smith 203 (OBI13881) ndhF-rpl32 intergenic spacer, partial sequence.
214465	https://www.ncbi.nlm.nih.gov/nuccore/MT766044	GenBank Record	Trigonia lucida D. Smith 203 (OBI13881) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
214465	https://www.ncbi.nlm.nih.gov/nuccore/MT766204	GenBank Record	Trigonia lucida D. Smith 203 (OBI13881) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.

occid	url	resourcename	locus
214463	https://www.ncbi.nlm.nih.gov/nuccore/MT735449	GenBank Record	Angelica scabrida voucher A.C. Sanders et al. 6885 (OBI044899) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
214463	https://www.ncbi.nlm.nih.gov/nuccore/MT765845	GenBank Record	Angelica scabrida A.C. Sanders et al. 6885 (OBI044899) ndhF-rpl32 intergenic spacer, partial sequence.
214463	https://www.ncbi.nlm.nih.gov/nuccore/MT766024	GenBank Record	Angelica scabrida A.C. Sanders et al. 6885 (OBI044899) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
214463	https://www.ncbi.nlm.nih.gov/nuccore/MT766162	GenBank Record	Angelica scabrida A.C. Sanders et al. 6885 (OBI044899) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.

occid	url	resourcename	locus
211800	https://www.ncbi.nlm.nih.gov/nuccore/MT735480	GenBank Record	MT735480 Trigona lucida voucher Tracey & V. Call 2507 (OBI081640) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
211800	https://www.ncbi.nlm.nih.gov/nuccore/MT765854	GenBank Record	MT765854 Trigona lucida Tracey & V. Call 2507 (OBI081640) ndhF-rpl32 intergenic spacer, partial sequence.
211800	https://www.ncbi.nlm.nih.gov/nuccore/MT766050	GenBank Record	MT766050 Trigona lucida Tracey & V. Call 2507 (OBI081640) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
211800	https://www.ncbi.nlm.nih.gov/nuccore/MT766205	GenBank Record	MT766205 Trigona lucida Tracey & V. Call 2507 (OBI081640) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.

occid	url	resourcename	locus
198762	https://www.ncbi.nlm.nih.gov/nuccore/JF951103	GenBank Record	Pellaea lemmonii isolate LEM25383 trnT-trnL intergenic spacer, partial sequence; tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; plastid.
196156	https://www.ncbi.nlm.nih.gov/nuccore/OK157416	GenBank Record	Kenhadus secundiflorus var. secundiflorus voucher OBI:29532 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
196156	https://www.ncbi.nlm.nih.gov/nuccore/OK136165	GenBank Record	Kenhadus secundiflorus var. secundiflorus voucher OBI:DKeil29532 atpB-rbcL intergenic spacer region, partial sequence; chloroplast.

occid	url	resourcename	locus
184474	https://www.ncbi.nlm.nih.gov/nuccore/MW025106	GenBank Record	MW025106 ojaiensis voucher OBI75168 small subunit ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; and large subunit ribosomal RNA gene, partial sequence.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG604492	GenBank Record	MG604492 scariosum var. scariosum voucher OBI 60356 external transcribed spacer, partial sequence.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG604582	GenBank Record	MG604582 scariosum var. scariosum voucher OBI 60356 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.

occid	url	resourcename	locus
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG604638	GenBank Record	MG604638 Cnidoscolus scariosum var. scariosum voucher OBI 60356 maturase K (matK) gene, partial cds; chloroplast.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG617272	GenBank Record	MG617272 Cnidoscolus scariosum var. scariosum voucher OBI 60356 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG617332	GenBank Record	MG617332 Cnidoscolus scariosum var. scariosum voucher OBI 60356 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG604496	GenBank Record	MG604496 Cnidoscolus undulatum voucher OBI 60365 external transcribed spacer, partial sequence.

occid	url	resourcename	locus
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG668460	GenBank Record	MG668460 Cnestis undulatum voucher OBI 60365 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG668461	GenBank Record	MG668461 Cnestis undulatum voucher OBI 60365 maturase K (matK) gene, partial cds; chloroplast.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG617276	GenBank Record	MG617276 Cnestis undulatum voucher OBI 60365 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175596	https://www.ncbi.nlm.nih.gov/nuccore/MG617335	GenBank Record	MG617335 Cnestis undulatum voucher OBI 60365 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.

occid	url	resourcename	locus
175592	https://www.ncbi.nlm.nih.gov/nuccore/MG275437	GenBank Record	MG275437 scariosum var. citrinum voucher OBI 29634F photosystem II protein D1 (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175592	https://www.ncbi.nlm.nih.gov/nuccore/MG334906	GenBank Record	MG334906 scariosum var. citrinum voucher OBI 29634F tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; chloroplast.
175592	https://www.ncbi.nlm.nih.gov/nuccore/MG335162	GenBank Record	MG335162 scariosum var. citrinum voucher OBI 29634F internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.

occid	url	resourcename	locus
175592	https://www.ncbi.nlm.nih.gov/nuccore/MG230952	GenBank Record	MG230952 Cnidium scariosum var. citrinum voucher OBI 29634F external transcribed spacer, partial sequence.
175581	https://www.ncbi.nlm.nih.gov/nuccore/MG604493	GenBank Record	MG604493 Cnidium scariosum var. toiyabense voucher OBI 60380 external transcribed spacer, partial sequence.
175581	https://www.ncbi.nlm.nih.gov/nuccore/MG604583	GenBank Record	MG604583 Cnidium scariosum var. toiyabense voucher OBI 60380 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
175581	https://www.ncbi.nlm.nih.gov/nuccore/MG604639	GenBank Record	MG604639 Cnidium scariosum var. toiyabense voucher OBI 60380 maturase K (matK) gene, partial cds; chloroplast.

occid	url	resourcename	locus
175581	https://www.ncbi.nlm.nih.gov/nuccore/MG617273	GenBank Record	MG617273 Cistanche scariosum var. toiyabense voucher OBI 60380 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175581	https://www.ncbi.nlm.nih.gov/nuccore/MG617333	GenBank Record	MG617333 Cistanche scariosum var. toiyabense voucher OBI 60380 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.
175526	https://www.ncbi.nlm.nih.gov/nuccore/MG604487	GenBank Record	MG604487 Orobanche ochrocentrum voucher OBI 60392 external transcribed spacer, partial sequence.

occid	url	resourcename	locus
175526	https://www.ncbi.nlm.nih.gov/nuccore/MN684571	GenBank Record	MN684571 ochrocentrum voucher OBI 60392 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
175526	https://www.ncbi.nlm.nih.gov/nuccore/MN684574	GenBank Record	MN684574 ochrocentrum voucher OBI 60392 maturase K (matK) gene, partial cds; chloroplast.
175526	https://www.ncbi.nlm.nih.gov/nuccore/MN617259	GenBank Record	MN617259 ochrocentrum voucher OBI 60392 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175526	https://www.ncbi.nlm.nih.gov/nuccore/MN617341	GenBank Record	MN617341 ochrocentrum voucher OBI 60392 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.

occid	url	resourcename	locus
175241	https://www.ncbi.nlm.nih.gov/nuccore/MG123095	GenBank Record	MG123095 Centaurea fontinalevar. campylon voucher OBI 27922 external transcribed spacer, partial sequence.
175241	https://www.ncbi.nlm.nih.gov/nuccore/MG127534	GenBank Record	MG127534 Centaurea fontinalevar. campylon voucher OBI 27922 maturase K (matK) gene, partial cds; chloroplast.
175241	https://www.ncbi.nlm.nih.gov/nuccore/MG127438	GenBank Record	MG127438 Centaurea fontinalevar. campylon voucher OBI 27922 photosystem II protein D1 (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175241	https://www.ncbi.nlm.nih.gov/nuccore/MG131405	GenBank Record	MG131405 Centaurea fontinalevar. campylon voucher OBI 27922 tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; chloroplast.

occid	url	resourcename	locus
175241	https://www.ncbi.nlm.nih.gov/nuccore/MG335163	GenBank Record	Crossothamnion fontinale var. campylon voucher OBI 27922 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
175241	https://www.ncbi.nlm.nih.gov/nuccore/MG230952	GenBank Record	Crossothamnion scariosum var. citrinum voucher OBI 29634F external transcribed spacer, partial sequence.
175222	https://www.ncbi.nlm.nih.gov/nuccore/MG660514	GenBank Record	Crossothamnion eatonii var. eatonii voucher OBI 64116 external transcribed spacer, partial sequence.
175222	https://www.ncbi.nlm.nih.gov/nuccore/MG660550	GenBank Record	Crossothamnion eatonii var. eatonii voucher OBI 64116 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.

occid	url	resourcename	locus
175222	https://www.ncbi.nlm.nih.gov/nuccore/MG684666	GenBank Record	MG684666 Cistanche tubulosa var. eatonii voucher OBI 64116 maturase K (matK) gene, partial cds; chloroplast.
175222	https://www.ncbi.nlm.nih.gov/nuccore/MG617234	GenBank Record	MG617234 Cistanche tubulosa var. eatonii voucher OBI 64116 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175222	https://www.ncbi.nlm.nih.gov/nuccore/MG617310	GenBank Record	MG617310 Cistanche tubulosa var. eatonii voucher OBI 64116 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.
175203	https://www.ncbi.nlm.nih.gov/nuccore/MG230034	GenBank Record	MG230034 Orobanche cymosum var. canovirens voucher OBI 30302-8 external transcribed spacer, partial sequence.
175203	https://www.ncbi.nlm.nih.gov/nuccore/MG275314	GenBank Record	MG275314 Orobanche cymosum var. canovirens voucher OBI 30302-8 maturase K (matK) gene, partial cds; chloroplast.

occid	url	resourcename	locus
175203	https://www.ncbi.nlm.nih.gov/nuccore/MG275448	GenBank Record	Cystoseira cymosum var. canovirens voucher OBI 30302-8 photosystem II protein D1 (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175203	https://www.ncbi.nlm.nih.gov/nuccore/MG334894	GenBank Record	Cystoseira cymosum var. canovirens voucher OBI 30302-8 tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; chloroplast.
175203	https://www.ncbi.nlm.nih.gov/nuccore/MG335114	GenBank Record	Cystoseira cymosum var. canovirens voucher OBI 30302-8 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.

occid	url	resourcename	locus
175187	https://www.ncbi.nlm.nih.gov/nuccore/MG684465	GenBank Record	Cistanche tubulosa voucher OBI 62978 external transcribed spacer, partial sequence.
175187	https://www.ncbi.nlm.nih.gov/nuccore/MG684549	GenBank Record	Cistanche tubulosa voucher OBI 62978 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
175187	https://www.ncbi.nlm.nih.gov/nuccore/MG684665	GenBank Record	Cistanche tubulosa voucher OBI 62978 maturase K (matK) gene, partial cds; chloroplast.
175187	https://www.ncbi.nlm.nih.gov/nuccore/MG617233	GenBank Record	Cistanche tubulosa voucher OBI 62978 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.

occid	url	resourcename	locus
175187	https://www.ncbi.nlm.nih.gov/nuccore/MG617309	GenBank Record	MG617309 Cnidium eatonii var. clokeyi voucher OBI 62978 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.
175185	https://www.ncbi.nlm.nih.gov/nuccore/MG604450	GenBank Record	MG604450 ciliolatum voucher OBI 60321 external transcribed spacer, partial sequence.
175185	https://www.ncbi.nlm.nih.gov/nuccore/MG604539	GenBank Record	MG604539 ciliolatum voucher OBI 60321 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
175185	https://www.ncbi.nlm.nih.gov/nuccore/MG604661	GenBank Record	MG604661 ciliolatum voucher OBI 60321 maturase K (matK) gene, partial cds; chloroplast.

occid	url	resourcename	locus
175185	https://www.ncbi.nlm.nih.gov/nuccore/MG617219	GenBank Record	MG617219 Crossidium ciliolatum voucher OBI 60321 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.
175185	https://www.ncbi.nlm.nih.gov/nuccore/MG617296	GenBank Record	MG617296 Crossidium ciliolatum voucher OBI 60321 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.
175101	https://www.ncbi.nlm.nih.gov/nuccore/MG604445	GenBank Record	MG604445 Crossidium arizonicum var. tenuisectum voucher OBI 62969 external transcribed spacer, partial sequence.

occid	url	resourcename	locus
175101	https://www.ncbi.nlm.nih.gov/nuccore/MG684609	GenBank Record	MG684609 Cirsium arizonicum var. tenuisectum voucher OBI 62969 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence.
175101	https://www.ncbi.nlm.nih.gov/nuccore/MG684612	GenBank Record	MG684612 Cirsium arizonicum var. tenuisectum voucher OBI 62969 maturase K (matK) gene, partial cds; chloroplast.
175101	https://www.ncbi.nlm.nih.gov/nuccore/MG684614	GenBank Record	MG684614 Cirsium arizonicum var. tenuisectum voucher OBI 62969 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast.

occid	url	resourcename	locus
175101	https://www.ncbi.nlm.nih.gov/nuccore/MG617291	GenBank Record	Cirsium arizonicum var. tenuisectum voucher OBI 62969 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast.
166210	https://www.ncbi.nlm.nih.gov/nuccore/MN735442	GenBank Record	Angelica lineariloba voucher Tracey & V. Call 2043 (OBI081607) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
166210	https://www.ncbi.nlm.nih.gov/nuccore/MN765840	GenBank Record	Angelica lineariloba Tracey & V. Call 2043 (OBI081607) ndhF-rpl32 intergenic spacer, partial sequence.

occid	url	resourcename	locus
166210	https://www.ncbi.nlm.nih.gov/nuccore/MT766019	GenBank Record	MT766019 Anguilla linearioba Tracey & V. Call 2043 (OBI081607) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
166210	https://www.ncbi.nlm.nih.gov/nuccore/MT766157	GenBank Record	MT766157 Anguilla linearioba Tracey & V. Call 2043 (OBI081607) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.
166209	https://www.ncbi.nlm.nih.gov/nuccore/MT765448	GenBank Record	MT765448 Anguilla linearioba voucher Tracey & V. Call 2321 (OBI09033) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
166209	https://www.ncbi.nlm.nih.gov/nuccore/MT765844	GenBank Record	MT765844 Anguilla linearioba Tracey & V. Call 2321 (OBI09033) ndhF-rpl32 intergenic spacer, partial sequence.

occid	url	resourcename	locus
166209	https://www.ncbi.nlm.nih.gov/nuccore/MT766023	GenBank Record	MT766023 Arnica linearifolia Tracey & V. Call 2321 (OBI09033) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
166209	https://www.ncbi.nlm.nih.gov/nuccore/MT766159	GenBank Record	MT766159 Arnica linearifolia Tracey & V. Call 2321 (OBI09033) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.
166208	https://www.ncbi.nlm.nih.gov/nuccore/MT765551	GenBank Record	MT765551 Cirsium dissectum voucher D. Keilet al. 30299 (OBI068349) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
166208	https://www.ncbi.nlm.nih.gov/nuccore/MT765778	GenBank Record	MT765778 Cirsium dissectum D. Keilet al. 30299 (OBI068349) ndhF-rpl32 intergenic spacer, partial sequence.

occid	url	resourcename	locus
166208	https://www.ncbi.nlm.nih.gov/nuccore/MT766091	GenBank Record	Lomatium dissectum D. Keilet al. 30299 (OBI068349) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
166208	https://www.ncbi.nlm.nih.gov/nuccore/MT766279	GenBank Record	Lomatium dissectum D. Keilet al. 30299 (OBI068349) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.
166207	https://www.ncbi.nlm.nih.gov/nuccore/MT765443	GenBank Record	Angelica lineariloba voucher D. Keil 21070 (OBI071409) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
166207	https://www.ncbi.nlm.nih.gov/nuccore/MT765841	GenBank Record	Angelica lineariloba D. Keil 21070 (OBI071409) ndhF-rpl32 intergenic spacer, partial sequence.

occid	url	resourcename	locus
166207	https://www.ncbi.nlm.nih.gov/nuccore/MT766022	GenBank Record	MT766022 linearioba D. Keil 21070 (OBI071409) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
166207	https://www.ncbi.nlm.nih.gov/nuccore/MT766158	GenBank Record	MT766158 linearioba D. Keil 21070 (OBI071409) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.
166204	https://www.ncbi.nlm.nih.gov/nuccore/MT765454	GenBank Record	MT765454 hendersonii voucher Tracey & V. Call 2071 (OBI09030) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
166204	https://www.ncbi.nlm.nih.gov/nuccore/MT765781	GenBank Record	MT765781 hendersonii Tracey & V. Call 2071 (OBI09030) ndhF-rpl32 intergenic spacer, partial sequence.

occid	url	resourcename	locus
166204	https://www.ncbi.nlm.nih.gov/nuccore/MT765974	GenBank Record	MT765974 Amphiura hendersonii Tracey & V. Call 2071 (OBI09030) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
166204	https://www.ncbi.nlm.nih.gov/nuccore/MT766139	GenBank Record	MT766139 Amphiura hendersonii Tracey & V. Call 2071 (OBI09030) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.
166203	https://www.ncbi.nlm.nih.gov/nuccore/MT735455	GenBank Record	MT735455 Amphiura hendersonii voucher Tracey & V. Call 2490 (OBI09031) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence.
166203	https://www.ncbi.nlm.nih.gov/nuccore/MT765790	GenBank Record	MT765790 Amphiura hendersonii Tracey & V. Call 2490 (OBI09031) ndhF-rpl32 intergenic spacer, partial sequence.

occid	url	resourcename	locus
166203	https://www.ncbi.nlm.nih.gov/nuccore/MT765975	GenBank Record	MT765975 Trigona hendersonii Tracey & V. Call 2490 (OBI09031) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence.
166203	https://www.ncbi.nlm.nih.gov/nuccore/MT766140	GenBank Record	MT766140 Trigona hendersonii Tracey & V. Call 2490 (OBI09031) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence.

Appendix B

References to specimen records with associated sequences after application of links of Appendix A.

generated using:

```
preston cat\
 --remote https://linker.bio\

 ↪  hash://sha256/be5605e58d2644baedcb160604080d9f02ce528064b7fbb13a5b556dd55cfeb6 ⌋
 ↪  \
 | preston dwc-stream\
 | jq -c ⌋
 ↪  'select(.["http://rs.tdwg.org/dwc/terms/associatedSequences"]
 ↪  != null)'\
 | jq '{ derivedFrom:
 ↪  .["http://www.w3.org/ns/prov#wasDerivedFrom"], reference:
 ↪  .["http://purl.org/dc/terms/references"],
 ↪  associatedSequences:
 ↪  .["http://rs.tdwg.org/dwc/terms/associatedSequences"] }'\
```

```
| sed 's+line:zip+https://linker.bio/line:zip+g'\
| sed 's+occurrences.csv!/+occurrences.csv!/L1,+g'\
| mlr --ijson --ocsv cat
```

See also specimen-record-with-associated-sequences.csv.

derivedFrom	reference	associatedSequences
https://linker.bio/line:zip:ha[illegible]	[illegible]	[illegible]678037b99ab
https://linker.bio/line:zip:ha[illegible]	[illegible]	[illegible]678037b99ab Angelica hendersonii voucher Tracey & V. Call 2490 (OBI09031) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735455|GenB Record, Angelica hendersonii Tracey & V. Call 2490 (OBI09031) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765790|GenB Record, Angelica hendersonii Tracey & V. Call 2490 (OBI09031) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765975|GenB Record, Angelica hendersonii Tracey & V. Call 2490 (OBI09031) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766140

derivedFrom	reference	associatedSequences
https://linker.bio/line:zip:hash://sha256/[illegible]	https://doi.org/[illegible]	GenBank Record, [illegible] Angelica hendersonii voucher Tracey & V. Call 2071 (OBI09030) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735454|GenB Record, Angelica hendersonii Tracey & V. Call 2071 (OBI09030) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765781|GenB Record, Angelica hendersonii Tracey & V. Call 2071 (OBI09030) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765974|GenB Record, Angelica hendersonii Tracey & V. Call 2071 (OBI09030) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766139

derivedFrom	reference	associatedSequences
https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Angelica linearioba voucher D. Keil 21070 (OBI071409) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735443|GenB Record, Angelica linearioba D. Keil 21070 (OBI071409) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765841|GenB Record, Angelica linearioba D. Keil 21070 (OBI071409) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766022|GenB Record, Angelica linearioba D. Keil 21070 (OBI071409) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766158

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https://linker.bio/line:zip:hash/sha256:[illegible]	https://[illegible]	Lomatium dissectum voucher D. Keilet al. 30299 (OBI068349) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT707551|GenB Record, Lomatium dissectum D. Keilet al. 30299 (OBI068349) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765778|GenB Record, Lomatium dissectum D. Keilet al. 30299 (OBI068349) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766091|GenB Record, Lomatium dissectum D. Keilet al. 30299 (OBI068349) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766279

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https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Angelica lineariloba voucher Tracey & V. Call 2321 (OBI09033) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735448|GenB Record, Angelica lineariloba Tracey & V. Call 2321 (OBI09033) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765844|GenB Record, Angelica lineariloba Tracey & V. Call 2321 (OBI09033) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766023|GenB Record, Angelica lineariloba Tracey & V. Call 2321 (OBI09033) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766159

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https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Angelica lineariloba voucher Tracey & V. Call 2043 (OBI081607) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735442|GenB Record, Angelica lineariloba Tracey & V. Call 2043 (OBI081607) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765840|GenB Record, Angelica lineariloba Tracey & V. Call 2043 (OBI081607) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766019|GenB Record, Angelica lineariloba Tracey & V. Call 2043 (OBI081607) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766157

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https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Cirsium arizonicum var. tenuisectum voucher OBI 62969 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604445|GenB Record, Cirsium arizonicum var. tenuisectum voucher OBI 62969 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604609|GenB Record, Cirsium arizonicum var. tenuisectum voucher OBI 62969 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604612|GenB Record, Cirsium arizonicum var. tenuisectum voucher OBI 62969 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617214|GenB Record, Cirsium arizonicum var. tenuisectum voucher OBI 62969 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617291

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https://linker.bio/line:zip:ha[illegible]678037b99ab	[illegible]	[illegible] Cirsium ciliolatum voucher OBI 60321 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604450|GenB Record, Cirsium ciliolatum voucher OBI 60321 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604539|GenB Record, Cirsium ciliolatum voucher OBI 60321 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604661|GenB Record, Cirsium ciliolatum voucher OBI 60321 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617219|GenB Record, Cirsium ciliolatum voucher OBI 60321 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617296

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https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Cirsium eatonii var. clokeyi voucher OBI 62978 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604465|GenB Record, Cirsium eatonii var. clokeyi voucher OBI 62978 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604549|GenB Record, Cirsium eatonii var. clokeyi voucher OBI 62978 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604665|GenB Record, Cirsium eatonii var. clokeyi voucher OBI 62978 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617233|GenB Record, Cirsium eatonii var. clokeyi voucher OBI 62978 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617309

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https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Cirsium cymosum var. canovirens voucher OBI 30302-8 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN230934|GenB Record, Cirsium cymosum var. canovirens voucher OBI 30302-8 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN275314|GenB Record, Cirsium cymosum var. canovirens voucher OBI 30302-8 photosystem II protein D1 (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN275448|GenB Record, Cirsium cymosum var. canovirens voucher OBI 30302-8 tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN314894|GenB Record, Cirsium cymosum var. canovirens voucher OBI 30302-8 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN335114

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https://linker.bio/line:zip:hash/	https://linker.bio/line:zip:hash/	Cirsium eatonii var. eatonii voucher OBI 64116 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604514|GenB Record, Cirsium eatonii var. eatonii voucher OBI 64116 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604550|GenB Record, Cirsium eatonii var. eatonii voucher OBI 64116 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604666|GenB Record, Cirsium eatonii var. eatonii voucher OBI 64116 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617234|GenB Record, Cirsium eatonii var. eatonii voucher OBI 64116 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617310

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https://linker.bio/line:zip:hash/[illegible]	[illegible]	Cirsium fontinale var. campylon voucher OBI 27922 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN230951|GenB Record, Cirsium scariosum var. citrinum voucher OBI 29634F external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN230952|GenB Record, Cirsium fontinale var. campylon voucher OBI 27922 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN275341|GenB Record, Cirsium fontinale var. campylon voucher OBI 27922 photosystem II protein D1 (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN275438|GenB Record, Cirsium fontinale var. campylon voucher OBI 27922 tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN314905|GenB Record, Cirsium fontinale var. campylon voucher OBI 27922 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN335163

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https://linker.bio/line:zip:hash://sha256/[illegible]678037b99ab	https://doi.org/[illegible]	[illegible]GenBank Record, Cirsium ochrocentrum voucher OBI 60392 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604487|GenB Record, Cirsium ochrocentrum voucher OBI 60392 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604571|GenB Record, Cirsium ochrocentrum voucher OBI 60392 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604674|GenB Record, Cirsium ochrocentrum voucher OBI 60392 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617259|GenB Record, Cirsium ochrocentrum voucher OBI 60392 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617341

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https://linker.bio/line:zip:hash/	https://linker.bio/line:zip:hash/	Cirsium scariosum var. toiyabense voucher OBI 60380 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604493|GenB Record, Cirsium scariosum var. toiyabense voucher OBI 60380 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604583|GenB Record, Cirsium scariosum var. toiyabense voucher OBI 60380 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604639|GenB Record, Cirsium scariosum var. toiyabense voucher OBI 60380 psbA (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617273|GenB Record, Cirsium scariosum var. toiyabense voucher OBI 60380 tRNA-Leu (trnL) gene and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN617333

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https://linker.bio/line:zip:hash://sha256/[illegible]78037b99ab…	https://doi.org/[illegible]	GenBank Record, Cirsium scariosum var. citrinum voucher OBI 29634F external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN230952|GenB… Record, Cirsium scariosum var. citrinum voucher OBI 29634F photosystem II protein D1 (psbA) gene, partial cds; psbA-trnH intergenic spacer, complete sequence; and tRNA-His (trnH) gene, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN275437|GenB… Record, Cirsium scariosum var. citrinum voucher OBI 29634F tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN314906|GenB… Record, Cirsium scariosum var. citrinum voucher OBI 29634F internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN335162

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https://linker.bio/line:zip:hash/[illegible]	[illegible]	Cirsium scariosum var. scariosum voucher OBI 60356 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604492|GenB Record, Cirsium undulatum voucher OBI 60365 external transcribed spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604496|GenB Record, Cirsium scariosum var. scariosum voucher OBI 60356 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604582|GenB Record, Cirsium undulatum voucher OBI 60365 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MN604610|GenB Record, Cirsium scariosum var. scariosum voucher OBI 60356 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604638|GenB Record, Cirsium undulatum voucher OBI 60365 maturase K (matK) gene, partial cds; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MN604651|GenB Record, Cirsium scariosum var. scariosum voucher OBI 60356 psbA (psbA) gene, partial cds; psbA-trnH

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https://linker.bio/line:zip:hash/	https://linker.bio/line:zip:hash/	Fritillaria ojaiensis voucher OBI75168 small subunit ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; and large subunit ribosomal RNA gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MW025106
https://linker.bio/line:zip:hash/	https://linker.bio/line:zip:hash/	Nemacladus secundiflorus var. secundiflorus voucher OBI:DKeil29532 atpB-rbcL intergenic spacer region, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/OK136165|GenB Record, Nemacladus secundiflorus var. secundiflorus voucher OBI:29532 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/OK157416

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https://linker.bio/line:zip:ha[illegible]	[illegible]	[illegible] isolate LEM25383ITS3, internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence, https://www.ncbi.nlm.nih.gov/nuccore/JF951067|GenBa Record, Phalaris lemmonii isolate LEM25383 trnT-trnL intergenic spacer, partial sequence; tRNA-Leu (trnL) gene, complete sequence; and trnL-trnF intergenic spacer, partial sequence; plastid., https://www.ncbi.nlm.nih.gov/nuccore/JF951103

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https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Angelica lucida voucher Tracey & V. Call 2507 (OBI081640) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735480|GenB Record, Angelica lucida Tracey & V. Call 2507 (OBI081640) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765854|GenB Record, Angelica lucida Tracey & V. Call 2507 (OBI081640) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766050|GenB Record, Angelica lucida Tracey & V. Call 2507 (OBI081640) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766205

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https://linker.bio/line:zip:ha[illegible]	[illegible]	[illegible] Angelica scabrida voucher A.C. Sanders et al. 6885 (OBI044899) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735449|GenB Record, Angelica scabrida A.C. Sanders et al. 6885 (OBI044899) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765845|GenB Record, Angelica scabrida A.C. Sanders et al. 6885 (OBI044899) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766024|GenB Record, Angelica scabrida A.C. Sanders et al. 6885 (OBI044899) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766162

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https://linker.bio/line:zip:hash/[illegible]	https://[illegible]	Angelica lucida voucher D. Smith 203 (OBI13881) internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT735479|GenB Record, Angelica lucida D. Smith 203 (OBI13881) ndhF-rpl32 intergenic spacer, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT765849|GenB Record, Angelica lucida D. Smith 203 (OBI13881) tRNA-Asp (trnD-GUC), tRNA-Tyr (trnY-GUA), tRNA-Glu (trnE-UUC), and tRNA-Thr (trnT-GGU) genes, complete sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766044|GenB Record, Angelica lucida D. Smith 203 (OBI13881) rpl32-trnL intergenic spacer and tRNA-Leu (trnL) gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MT766204

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https://linker.bio/line:zip:hash/sha256:[illegible]	https://[illegible]	Megalochlamys marlothii voucher Rodin 9194 (OBI) trnS-trnG intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MF670383|GenB Record, Megalochlamys marlothii voucher Rodin 9194 (OBI) ribosomal protein S16 (rps16) gene, intron; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MF678400|GenB Record, Megalochlamys marlothii voucher Rodin 9194 (OBI) trnT-trnL intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MF768302|GenB Record, Megalochlamys marlothii voucher Rodin 9194 (OBI) trnL-trnF intergenic spacer, partial sequence; chloroplast., https://www.ncbi.nlm.nih.gov/nuccore/MF768361|GenB Record, Megalochlamys marlothii voucher Rodin 9194 (OBI) internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MF768408

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https://linker.bio/line:zip:hash:/sha256/cd9de9735109[illegible]	hash://sha256/cd9de9735109[illegible]	Fritillaria sp. SR-2020 voucher OBI161445 small subunit ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; and large subunit ribosomal RNA gene, partial sequence., https://www.ncbi.nlm.nih.gov/nuccore/MW025115
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