Introduction to Rhakhis

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Pteridophyte Phylogeny Group Steering Committee

Outline

- Introduction to WFO (~15 min)
- Introduction to Rhakhis and demo (~30 min)
- Hands-on session (remaining time)

CORRECTION: there was no hands-on session because users must be granted permission to edit data in the Rhakhis sandbox

Goals

- To understand what are **WFO**, **TENs**, and **Rhakhis**, and the relationships between them
- To be able to carry out **basic** taxonomic data editing in Rhakhis
  - We don’t have time to cover all the details. This is to get you started.
- To know where to look for help

Disclaimers

- Disclaimer 1: **I am not a developer of Rhakhis**. I am here to share what I have learned from using it so far. **I cannot guarantee all information will be correct or answer all questions**, but I will do my best!

- Disclaimer 2: This workshop is open to anyone, but it will have a **focus on maintaining data for the Pteridophyte Phylogeny Group**

Please get an ORCID

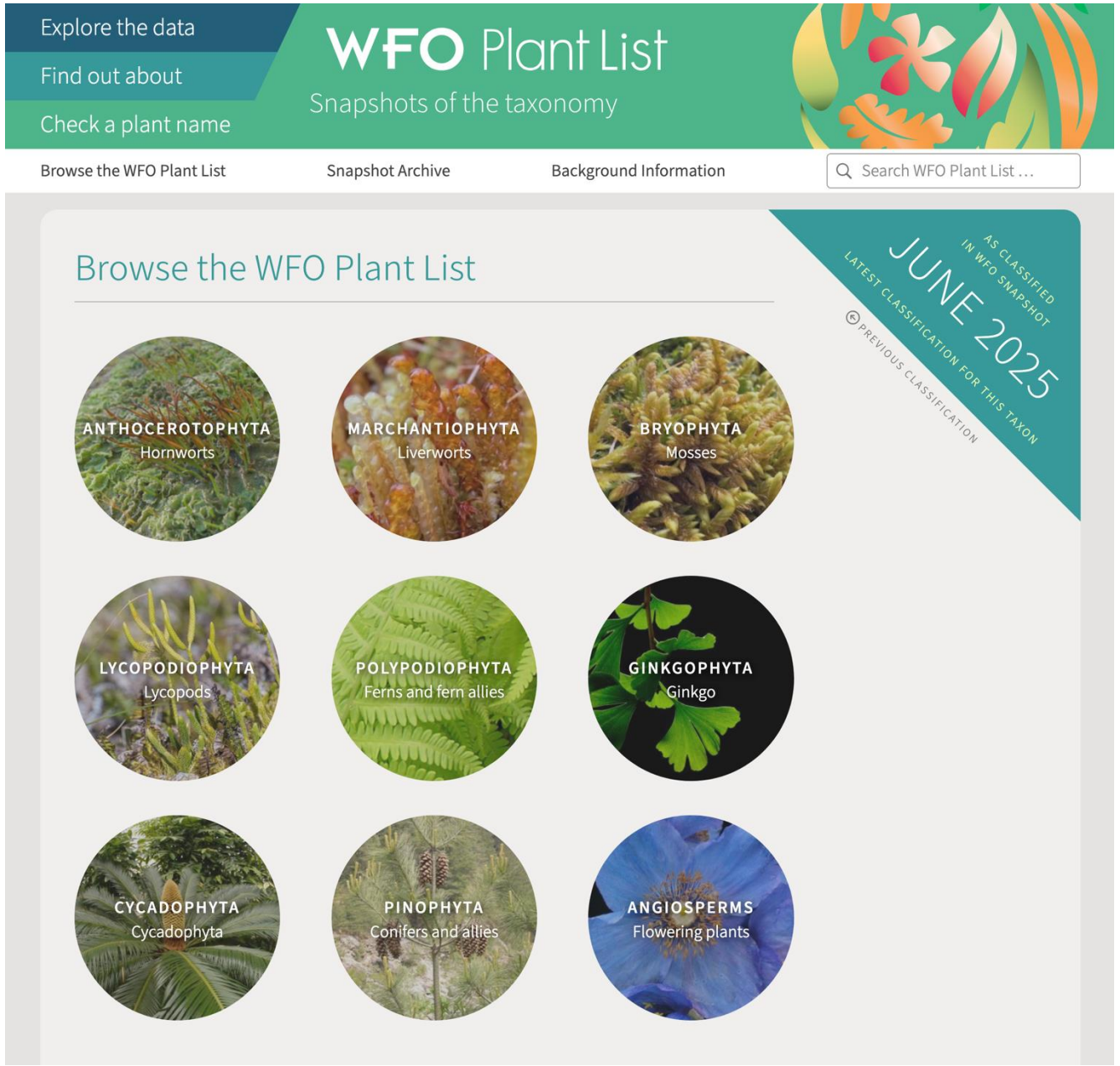
- **You need an ORCID** (unique ID for researchers) to access Rhakhis
- If you do not have one yet, please go to https://orcid.org/ and obtain one before the hands-on session

What is WFO?

- **World Flora Online** (WFO) seeks to provide a **classification system for all plants**
- Based out of Royal Botanic Garden Edinburgh, with a network of 55 partner institutions

https://www.worldfloraonline.org/

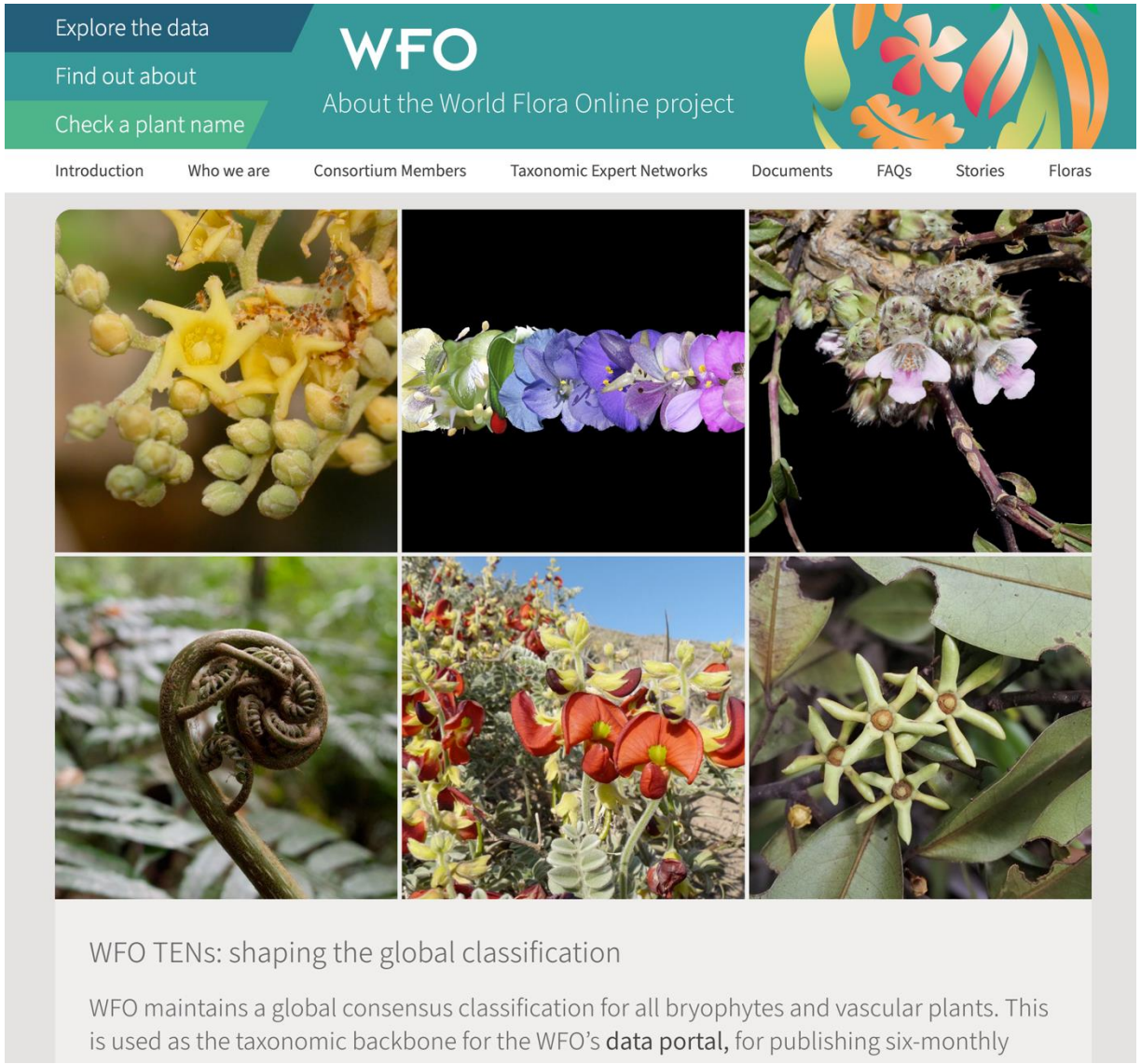
https://wfoplantlist.org/



What are TENS?

- Data in WFO are managed by **Taxonomic Expert Networks** (TENS)
- Currently there are 47 TENS
  - Covers **45% of species** in the WFO classification
  - Conifers
  - Bryophytes
  - Pteridophytes (PPG) ←
  - Within angiosperms, **most TENs are at the family level**
- This system allows for direct management of taxonomic data **by experts on those groups**

https://about.worldfloraonline.org/tens



How PPG handles taxonomic decisions

- **Genus** level and higher: voting by the whole community (once per month)
- **Species** level and below: committees will be set up for each genus (or family / similar level). Individuals will edit the data directly in Rhakhis. “mini-TENs”, if you will.

- We are currently in **Phase I** (only working on names at genus and higher)
- We want to transition soon into **Phase II** (working on names at species level and below)

Where can I access the data?

- Public-facing databases
  - https://www.worldfloraonline.org/
  - https://wfoplantlist.org/
    - These are **versioned** data, released twice per year (on summer and winter solstices)
- **Rhakhis**
  - You can both edit (once given permission) **and** view data on Rhakhis (anyone may view)
  - This is the **live** data
- **PPG website** (overview of classification to the genus level)
- **PPG GitHub repo** (CSV file of data to species level)

All plants

Ferns and lycophytes only

PPG Website

Classification (IN PROGRESS)

Please note that this is a **work in progress**. The official PPG II has not been released yet. **Please do not cite this** as PPG II until it is officially released.

To see details such as synonyms, please browse the data on Rhakhis (most up-to-date version) or World Flora Online (WFO) (biannual snapshots). For more information about WFO, see here.

On this page

Class Lycopodiopsida Bartl.

Order Lycopodiales DC. ex Bercht. & J.Presl

Family **Lycopodiaceae** P.Beauv. ex Mirb.

Subfamily **Huperzioideae** W.H.Wagner & Beitel ex B.Øllg.

Huperzia Bernh.

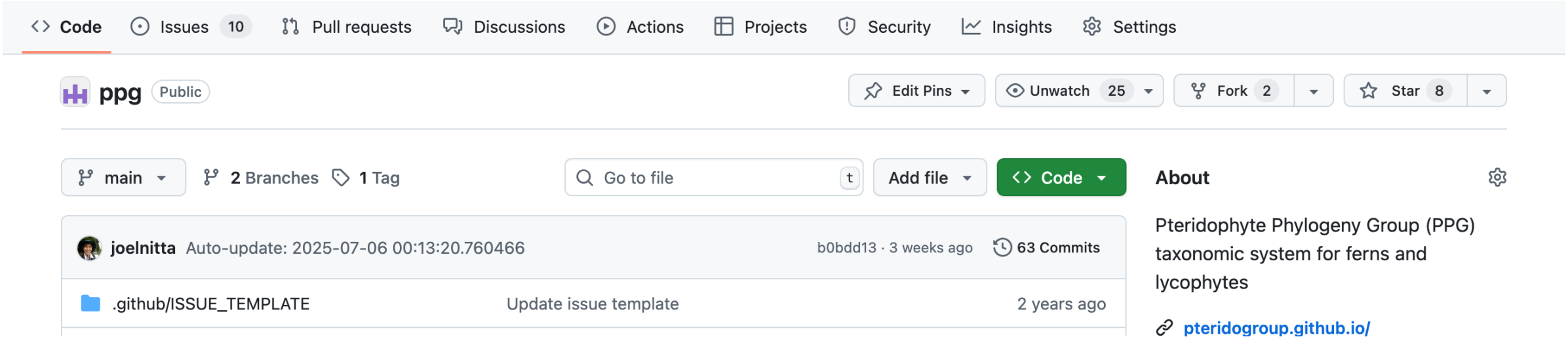
Phlegmariurus (Herter) Holub

Phylloglossum Kunze

https://pteridogroup.github.io/ppg

PPG GitHub Repo

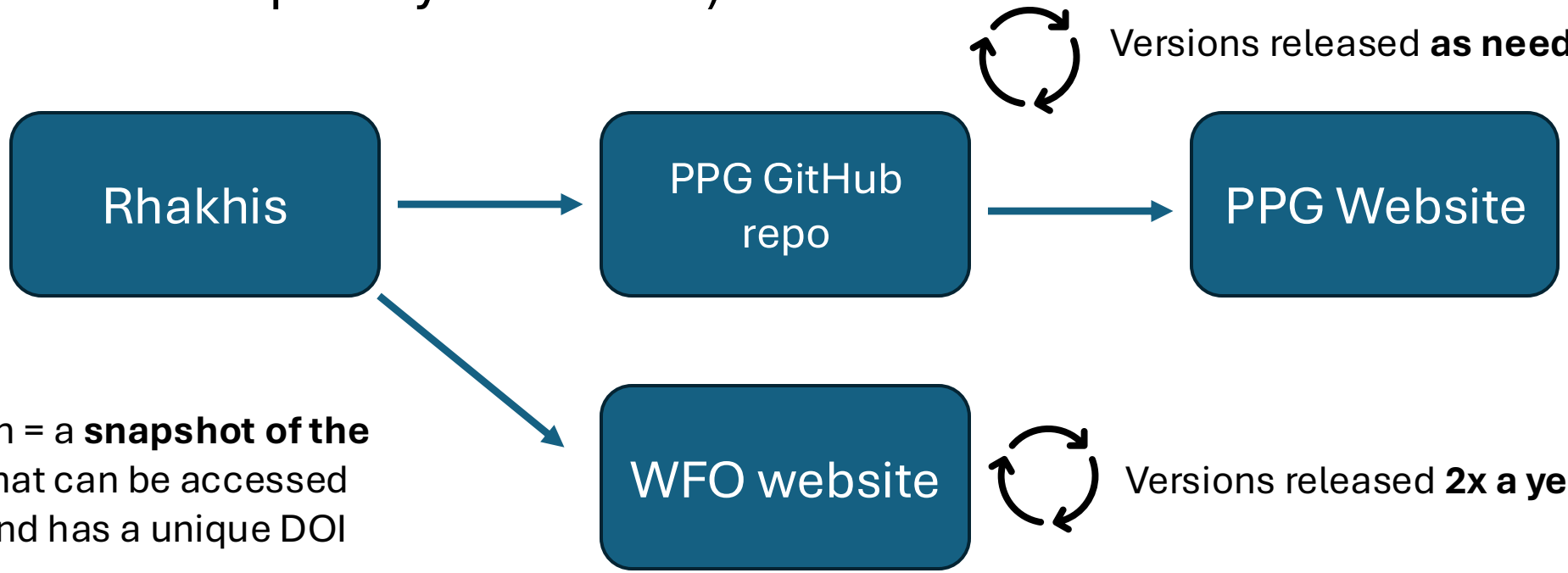
- Where we discuss and vote on taxonomic issues at genus level and higher
- Also where our copy of the taxonomic data “lives”



https://github.com/pteridogroup/ppg

Data versioning in PPG vs. WFO

- Taxonomic data of ferns and lycophytes are automatically imported from Rhakhis every few days into the PPG GitHub repo
- These data are used to generate the classification on the PPG website (and the forthcoming PPG II paper)
- We anticipate releasing versions of PPG data as needed (probably more frequently than WFO)



Version = a **snapshot of the data** that can be accessed later and has a unique DOI

Accessing Rhakhis

- Anybody can log on to Rhakhis using their ORCID
- There are **two versions** of Rhakhis
  - The **actual WFO database**
    - Only users who have been given permission can edit. Anyone can view.
  - The **sandbox** (AKA "staging server"): looks just like the real database, but any changes are erased overnight. **Used for testing.**
- For this workshop, **we will use the sandbox**

"Rhakhis" is an ancient Greek spelling and refers to the taxonomic **backbone**, i.e., the classification

Getting help

Please read the **user manual** first: https://plant-list-docs.rbge.info/rhakhis/

- For **PPG**-specific questions, please ask me (Joel Nitta): joelnitta@gmail.com
- For questions about the **data**, ask Alan Elliott: aelliott@rbge.org.uk
- For questions about the **editor**, ask Roger Hyam: rhyam@rbge.org.uk
- You can also make suggestions or file bug reports on the Rhakhis GitHub repo: https://github.com/worldflora/wfo-backbone-ui/issues

A word about taxonomy vs. nomenclature

- **“Names”** are any taxonomic name that has been published (nomenclature). The International Code of Nomenclature for algae, fungi, and plants (AKA “the Code”) sets the rules for valid publication.
- **“Taxonomy”** (AKA “classification”) is how we use those names (accepted vs. synonym). We (PPG or other TENs) determine what taxonomy to use.

- An analogy: names are points on a map. The taxonomic system draws lines around the points. **The points don’t move, but how the lines are drawn may change.**
- Rhakhis is a database of names. Not all of them are in the classification (some are **“unplaced”**).

IPNI vs. WFO

International Plant Names Index

https://www.ipni.org/

- **IPNI** (International Plant Names Index) is a **nomenclatural** database
  - Stores names, but does not provide any taxonomic decisions
  - Important source of names in a **standardized format**
    - Especially authors and publications
- **WFO** (World Flora Online) is a **taxonomic** database
  - Stores names **and** their relationships and taxonomic status
  - **Relies on IPNI** as an authority for formatting of names
  - Tries not to duplicate information that you could obtain from IPNI (for example, information about the type)

Nomenclatural statuses in Rhakhis

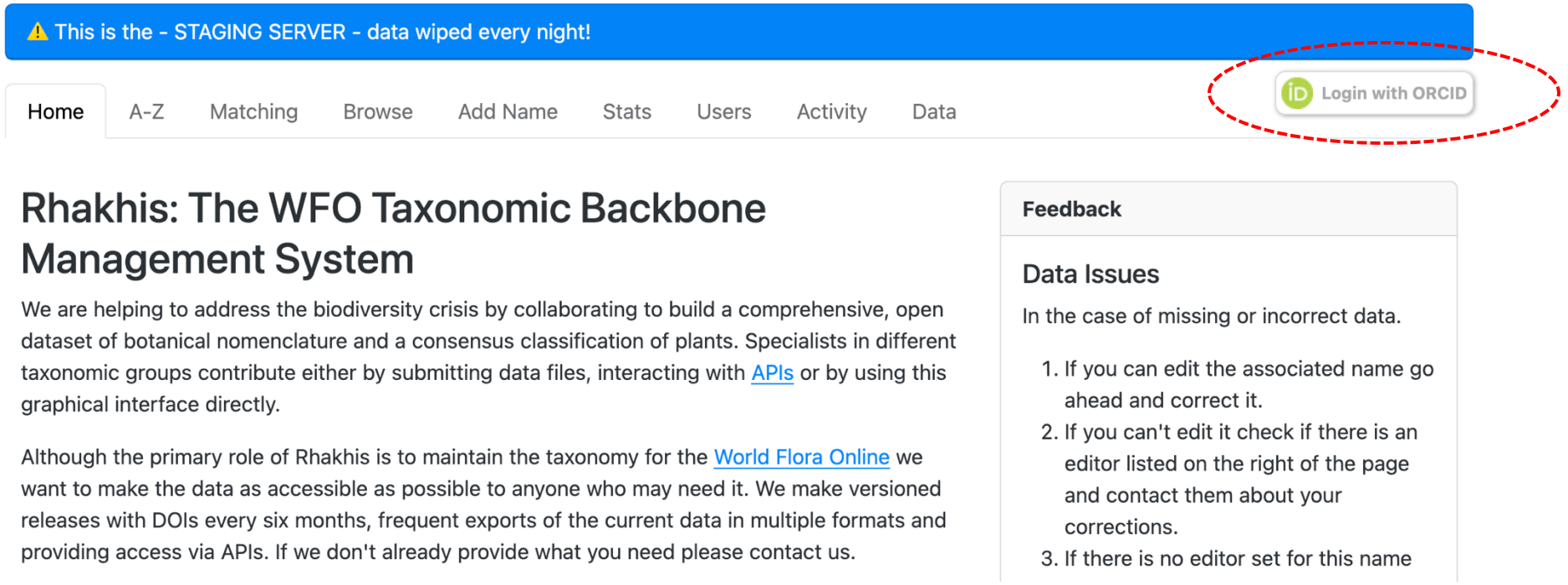
- Conserved: These names have been conserved for continued use to improved nomenclatural stability. See https://naturalhistory2.si.edu/botany/codes-proposals/
- Deprecated: It is unlikely you would use this when creating a new record. If you find a record you want to remove from the public release use this status. Please add a note to the record stating why it has been deprecated.
- Illegitimate: The only placement activity you can do with illegitimate is to make it a synonym.
- Invalid: a name not validly published. The only placement activity you can do with invalid is to make it a synonym.
- Rejected: Name rejected by the Nomenclature Committee of the ICBN. See the lists here https://naturalhistory2.si.edu/botany/codes-proposals/
- Sanctioned**:** fungal name equivalent of conserved. Do not use for names in the WFO.
- Superfluous**:** The only placement activity you can do with unknown is make it a synonym.
- **Unknown: default status. The only placement activity you can do with unknown is make it a synonym.**
- **Valid: use this when you know a name meets the requirements set out in the Code. Only valid names can be placed in the classification as an accepted taxon.**

https://plant-list-docs.rbge.info/rhakhis/

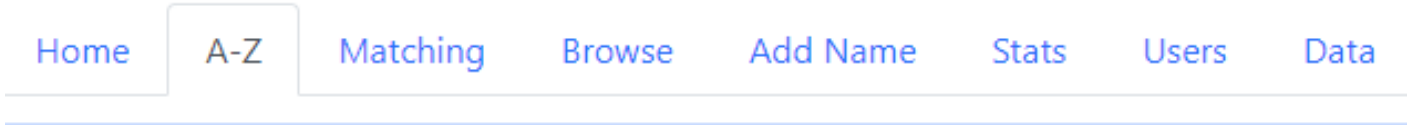
Connecting to Rhakhis

- Navigate to the sandbox: https://rhakhis.rbge.info/rhakhis/ui/
- Click on “Login with ORCID” to login

Note the blue bar with warning that this is the staging server (sandbox)



Main menu tabs



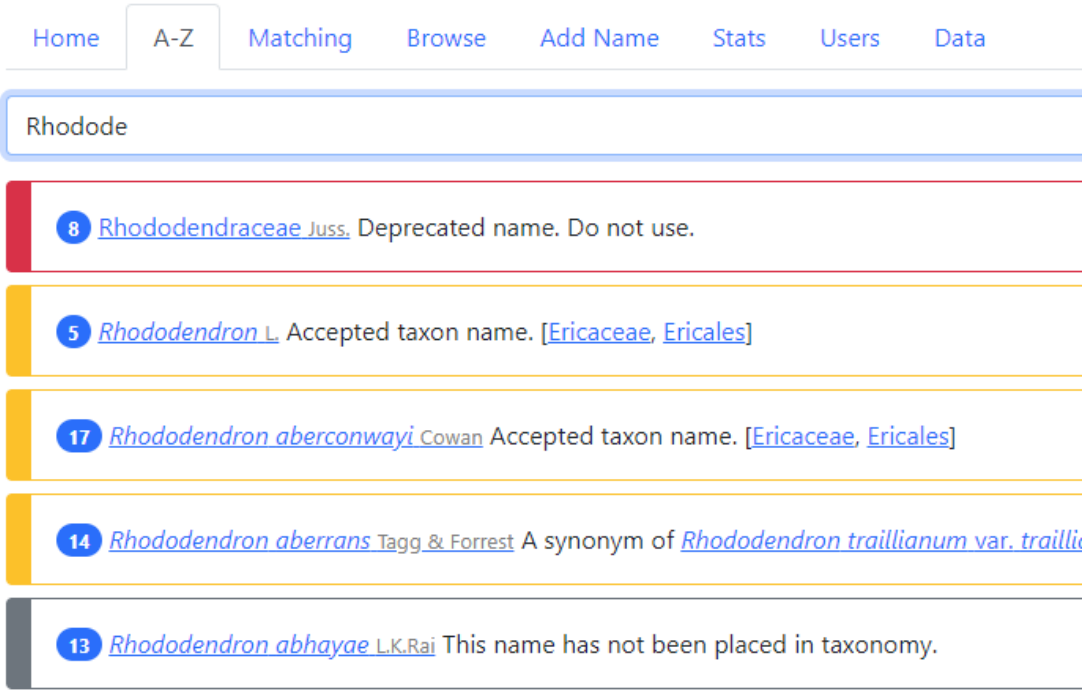
- **A-Z**: Look up a name exactly
- **Matching**: Look up a name using fuzzy matching
  - Handy when you aren't sure of the spelling
- **Browse**: Browse the taxonomic hierarchy

These can also be used to just view the data, without editing

- **Add name**: Add a new name
  - Newly published names get added automatically from IPNI, so it is rare that you will need to do this
- **Stats**: Check current statistics (number of names, etc.)
- **Users**: View users
- **Data**: Export data

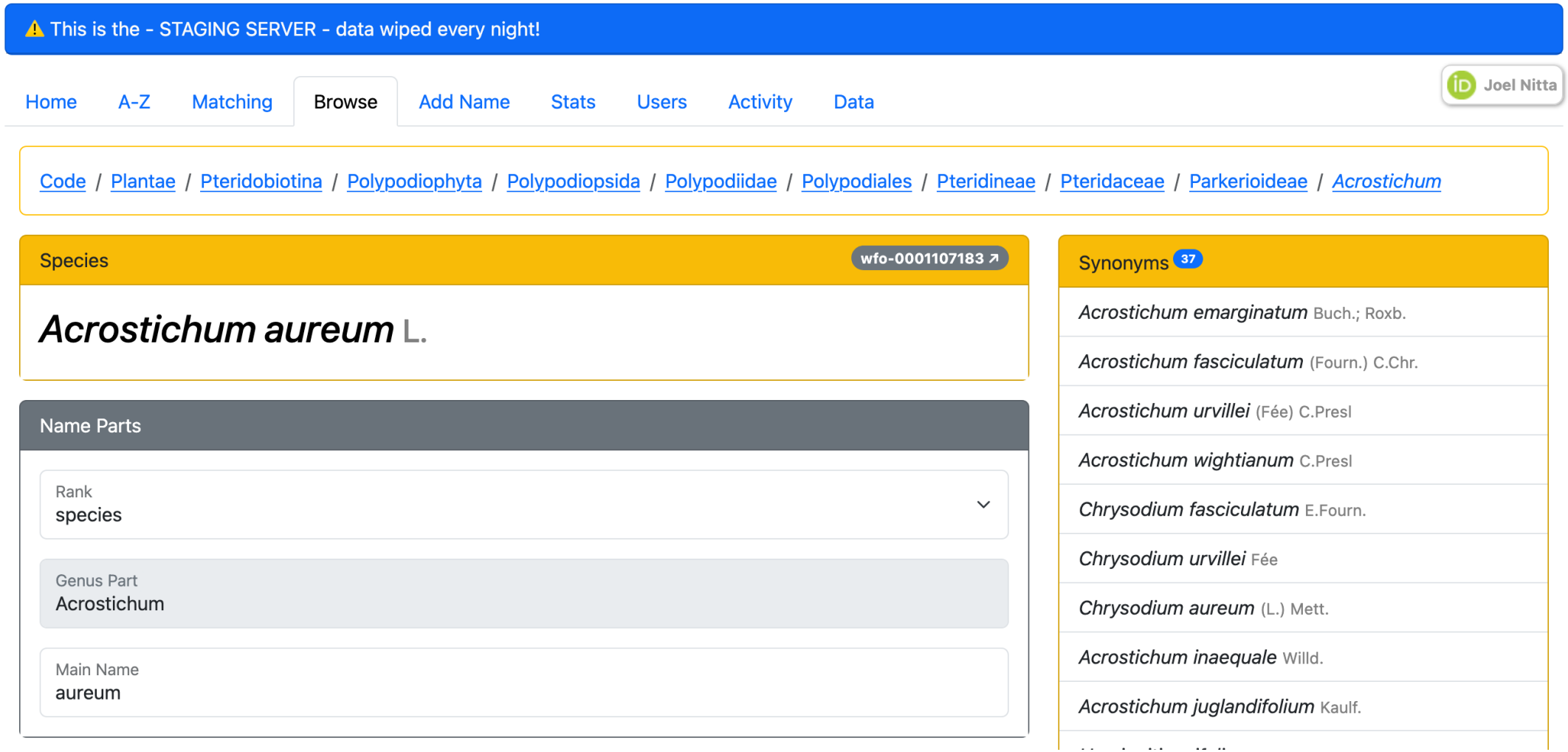
Looking up names (A-Z or matching)

- For infraspecific taxa, don't include rank.
    - Ex: Poa annua supina for *Poa annua* subsp. *Supina*
- Colors
    - **Yellow**: names placed in the classification (accepted or synonym)
    - **Red**: deprecated. DO NOT USE.
    - **Grey**: unplaced. Name is in the data, but not in the classification



Name view

Where most of the action happens (moving, sinking into synonymy, raising to accepted, etc.)



Efficient use of Rhakhis requires “**taxonomic logic**”

- Names that are **not valid** (nomenclatural status) **cannot be accepted** (taxonomic status)
- A name **cannot be synonymized with another synonym**, only an accepted name
- A name **cannot be synonymized if it has synonyms** (they all must be moved to the new accepted name first)

- **You will not see hints to indicate if what you are trying to do is breaking these rules**; those options will just be greyed out!

Raise a name to accepted status

- Let's say we want to make *Acrostichum emarginatum* Buch.; Roxb. an accepted name. Click on it from the list of synonyms under *Acrostichum aureum* L.
- Next, click on **Placement**
  - This is where you can move it to be a synonym of a different name, or raise to an accepted taxon

Synonymous Name wfo-0000150435 ↗

Acrostichum emarginatum Buch.; Roxb.

Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
emarginatum

Nomenclatural Status

unknown

Author String

Buch.; Roxb. Validate

Placement

-- Choose action --
Raise to accepted taxon within ...
Sink into synonymy within ...
Change parent taxon to ...
Change to synonym of ...
Remove from taxonomy.

urn:lsid:ipni.org:names:17002690-1

Based on the initial data import

Database: The Pteridophyte Phylogeny Group (PPG). Edit

Based on data supplied by Pteridophyte Phylogeny Group Nov 2024

Add Source

Homotypic Names

Add Basionym ...

Editors

Carl Rothfels Editor

Eric Schuettpelz Editor

But **we can't click**
on "raise to accepted taxon"
Why not??

Synonymous Name wfo-0000150435 ↗

Acrostichum emarginatum Buch.; Roxb.

Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
emarginatum

Nomenclatural Status

unknown

Author String

Buch.; Roxb. Validate

Placement

-- Choose action --
Raise to accepted taxon within ...
Sink into synonymy within ...
Change parent taxon to ...
Change to synonym of ...
Remove from taxonomy.

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Synonymous Name wfo-0000150435

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Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
emarginatum

Nomenclatural Status

unknown

Author String

Buch.; Roxb. Validate

Placement

-- Choose action --
Raise to accepted taxon within ...
Sink into synonymy within ...
Change parent taxon to ...
Change to synonym of ...
Remove from taxonomy.

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Add Source

Homotypic Names

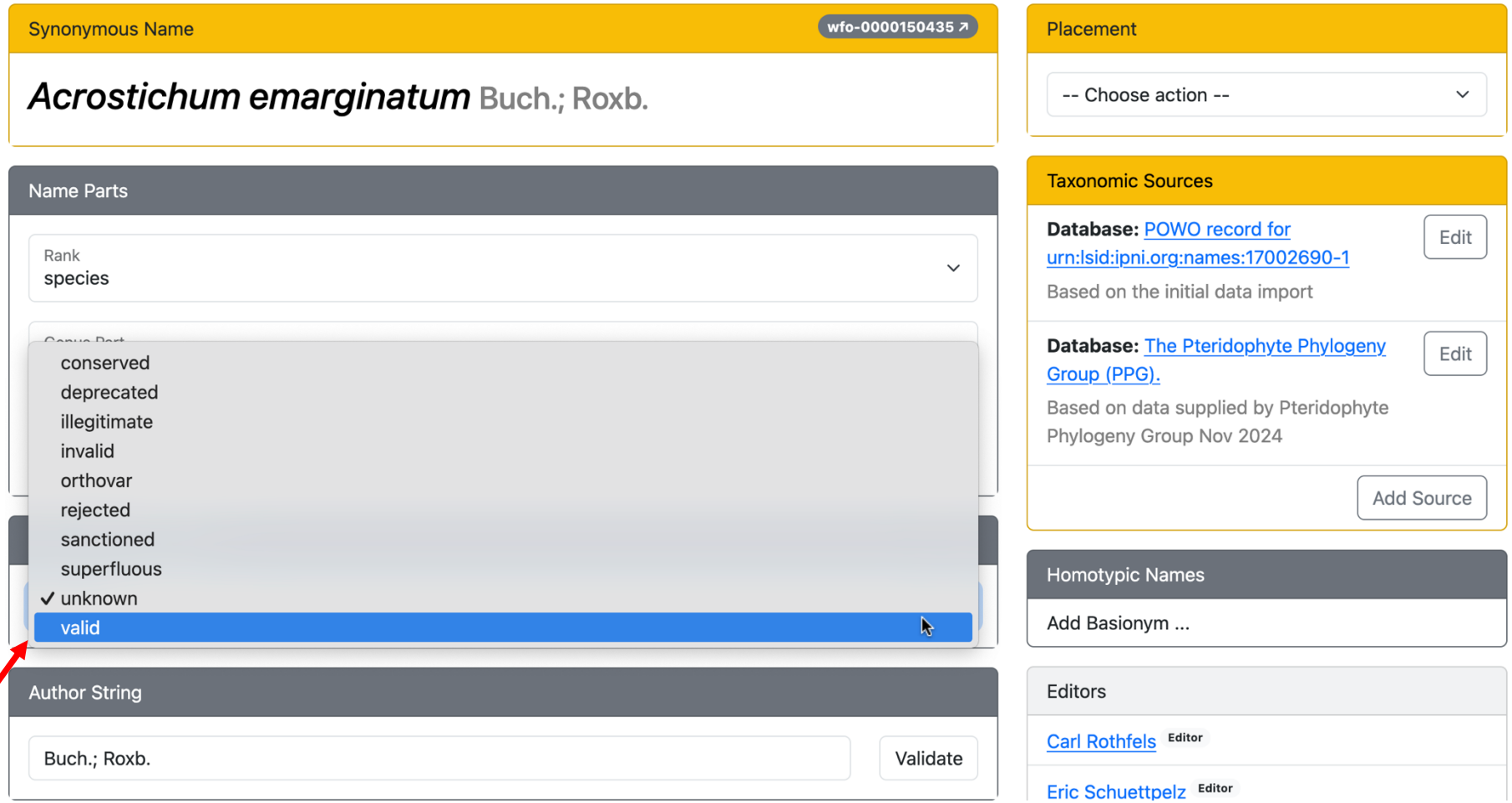
Add Basionym ...

Editors

Carl Rothfels Editor

Eric Schuettpelz Editor

The answer is **here**:
nomenclatural status is still "unknown"



Change this from “unknown” to “**valid**” first, Then click “**Update**”

After clicking “Update”, an error will briefly appear, but you can safely ignore this. Then it will say “Success”.

Now we can raise it to accepted!

Synonymous Name wfo-0000150435 ↗

Acrostichum emarginatum Buch.; Roxb.

Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
emarginatum

Nomenclatural Status

valid

Author String

Placement

-- Choose action --
Raise to accepted taxon within ...
Sink into synonymy within ...
Change parent taxon to ...
Change to synonym of ...
Remove from taxonomy.

urn:lsid:ipni.org:names:17002690-1

Based on the initial data import

Database: The Pteridophyte Phylogeny Group (PPG).

Edit

Based on data supplied by Pteridophyte Phylogeny Group Nov 2024

Add Source

Homotypic Names

Add Basionym ...

Editors

Note that we can only choose *Acrostichum* **(binomials can't be put in a different genus)**

Synonymous Name wfo-0000150435 ↗

Acrostichum emarginatum Buch.; Roxb.

Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
emarginatum

Nomenclatural Status

valid

Author String

Placement

Raise to accepted taxon within ...

Acrostichum L.

Taxonomic Sources

Database: POWO record for urn:lsid:ipni.org:names:17002690-1 Edit

Based on the initial data import

Database: The Pteridophyte Phylogeny Group (PPG). Edit

Based on data supplied by Pteridophyte Phylogeny Group Nov 2024

Add Source

Homotypic Names

Add Basionym ...

Sinking names into synonymy

- Say now that we want to make *Acrostichum aureum* L. a synonym of our newly accepted *Acrostichum emarginatum* Buch.; Roxb.
- Use the “back” button on your browser to get back to the taxon page for *Acrostichum aureum* L.
  - You can also use the A-Z or Matching tabs, but the back button is often easier
  - Any taxonomic changes you have made will be up-to-date

(Note that *Acrostichum emarginatum* no longer appears in the list of synonyms)

Species wfo-0001107183 ↗

Acrostichum aureum L.

Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
aureum

Nomenclatural Status

valid

Author String

L. Validate

Publication

Synonyms 36

- *Acrostichum fasciculatum* (Fourn.) C.Chr.
- *Acrostichum urvillei* (Fée) C.Presl
- *Acrostichum wightianum* C.Presl
- *Chrysodium fasciculatum* E.Fourn.
- *Chrysodium urvillei* Fée
- *Chrysodium aureum* (L.) Mett.
- *Acrostichum inaequale* Willd.
- *Acrostichum juglandifolium* Kaulf.
- *Hemionitis arifolia* (Burm.f.) T.Moore
- *Chrysodium vulgare* Fée
- *Chrysodium inaequale* Fée
- *Asplenium arifolium* Burm.f.

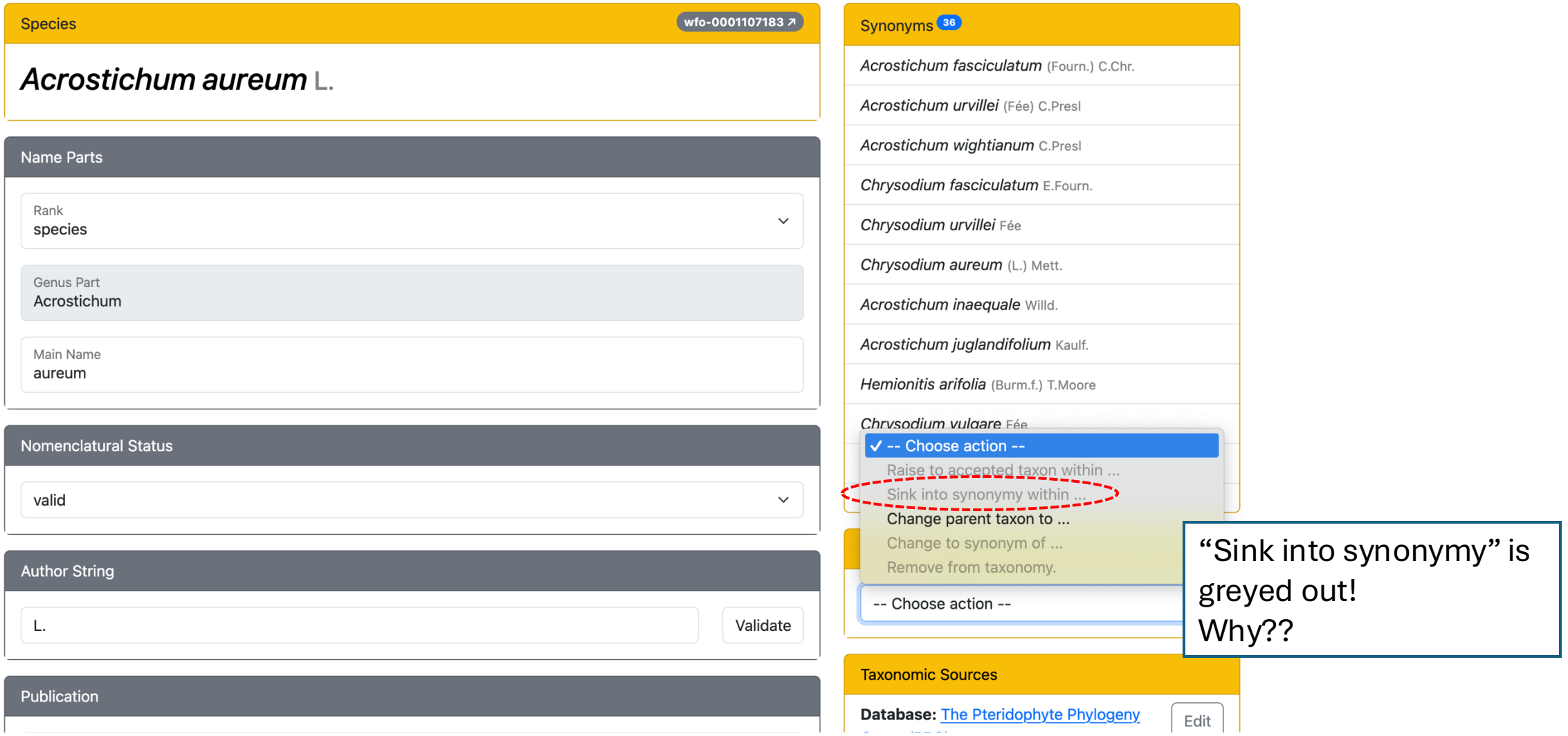
Click on “Placement” menu to sink into synonymy

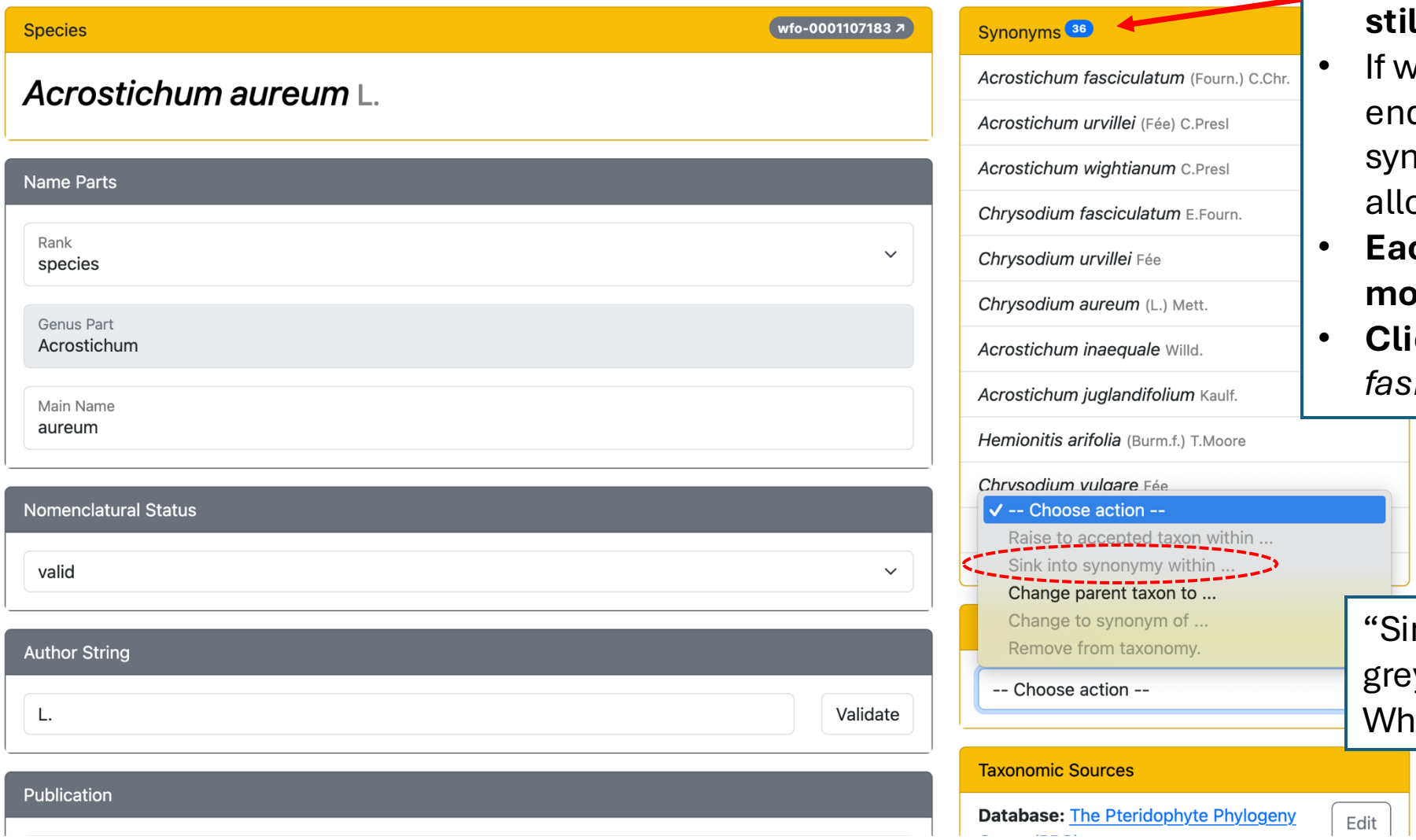
Placement

-- Choose action --

Taxonomic Sources

Database: The Pteridophyte Phylogeny Edit


Species
wfo-0001107183
Acrostichum aureum L.
Name Parts
Rank
species
Genus Part
Acrostichum
Main Name
aureum
Nomenclatural Status
valid
Author String
L.
Validate
Publication
Synonyms 36
Acrostichum fasciculatum (Fourn.) C.Chr.
Acrostichum urvillei (Fée) C.Presl
Acrostichum wightianum C.Presl
Chrysodium fasciculatum E.Fourn.
Chrysodium urvillei Fée
Chrysodium aureum (L.) Mett.
Acrostichum inaequale Willd.
Acrostichum juglandifolium Kaulf.
Hemionitis arifolia (Burm.f.) T.Moore
-- Choose action --
Raise to accepted taxon within ...
Sink into synonymy within ...
Change parent taxon to ...
Change to synonym of ...
Remove from taxonomy.
-- Choose action --
Taxonomic Sources
Database: The Pteridophyte Phylogeny
Edit
"Sink into synonymy" is greyed out!
Why??



- The answer is **here: This name still includes synonyms.**
- If we synonymized it, we would end up with a synonym having synonyms, and that is not allowed!
- **Each of these needs to be moved first.**
- **Click on the first one** (*A. fasiculatum)*

"Sink into synonymy" is greyed out!
Why??

We can synonymize **each** of these names

Synonymous Name wfo-0000150439 ↗

Acrostichum fasciculatum (Fourn.) C.Chr.

Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
fasciculatum

Nomenclatural Status

unknown

Placement

✓ -- Choose action --
Raise to accepted taxon within ...
Sink into synonymy within ...
Change parent taxon to ...
Change to synonym of ...
Remove from taxonomy.

urn:lsid:ipni.org:names:17002780-1

Based on the initial data import

Database: The Pteridophyte Phylogeny Group (PPG).

Edit

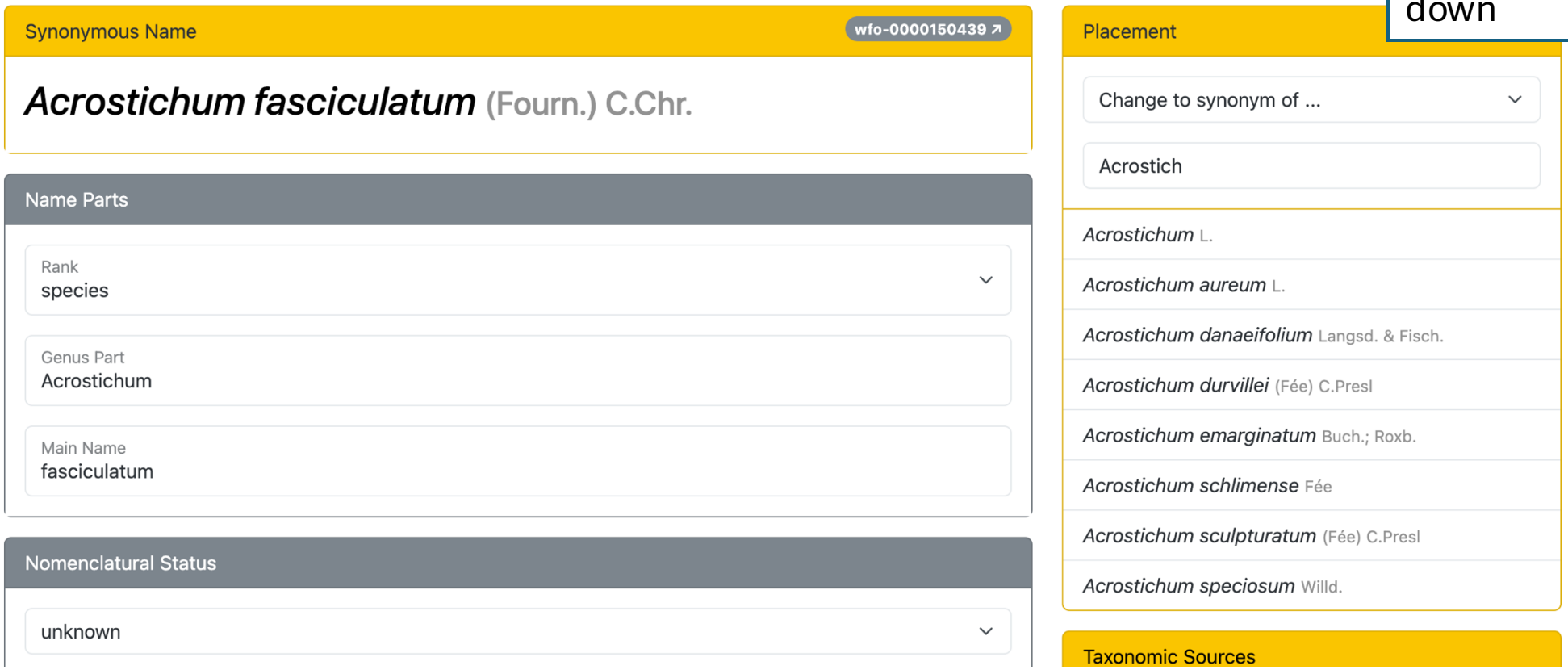
Based on data supplied by Pteridophyte Phylogeny Group Nov 2024

Add Source

Homotypic Names

Add Basionym ...

Start typing the accepted name and the choices will narrow down



If the name you are looking for is not accepted, it will not appear!

Note that the taxonomic hierarchy now reflects the new accepted name (*A. emarginatum*)

Code / Plantae / Pteridobiotina / Polypodiophyta / Polypodiopsida / Polypodiidae / Polypodiales / Pteridineae / Pteridaceae / Parkerioideae / *Acrostichum* / *A. emarginatum*

Synonymous Name

wfo-0000150439 ↗

Acrostichum fasciculatum (Fourn.) C.Chr.

Name Parts

Rank
species

Genus Part
Acrostichum

Main Name
fasciculatum

Nomenclatural Status

unknown

Placement

-- Choose action --

Taxonomic Sources

Database: POWO record for urn:lsid:ipni.org:names:17002780-1
Based on the initial data import
Edit

Database: The Pteridophyte Phylogeny Group (PPG).
Based on data supplied by Pteridophyte Phylogeny Group Nov 2024
Edit

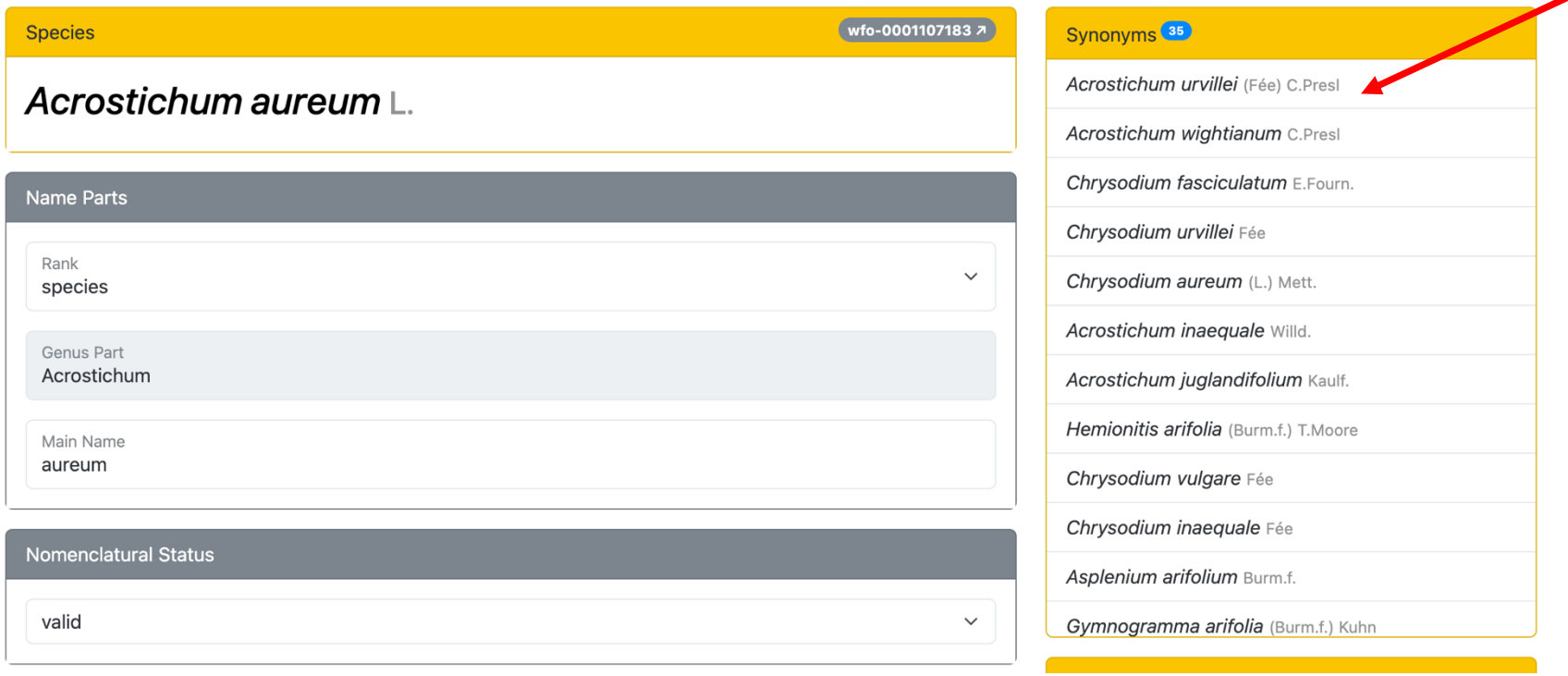
Add Source

Homotypic Names

Add Basionym ...

Bulk editing of synonyms

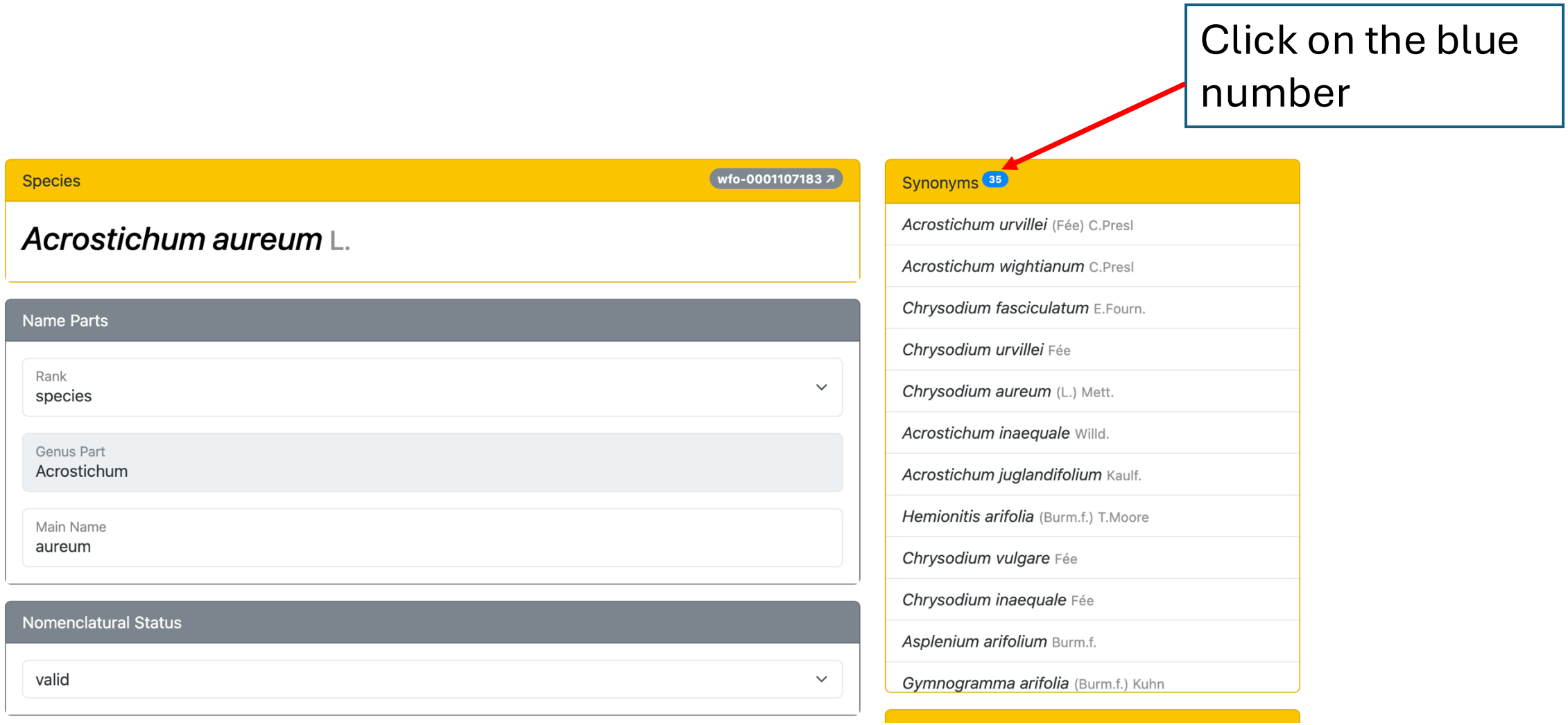
- Click on the “back” button in your browser to get back to *A. acrostichum*
- We need to move the rest of the synonyms **before** we can synonymize *A. acrostichum*



We are down to 35 synonyms (from 37 when we started)…

Do I have to do this for every name one a time?

No - **fortunately, there is a shortcut!**


Click on the blue number
Species
wfo-0001107183
Acrostichum aureum L.
Name Parts
Rank
species
Genus Part
Acrostichum
Main Name
aureum
Nomenclatural Status
valid
Synonyms 35
Acrostichum urvillei (Fée) C.Presl
Acrostichum wightianum C.Presl
Chrysodium fasciculatum E.Fourn.
Chrysodium urvillei Fée
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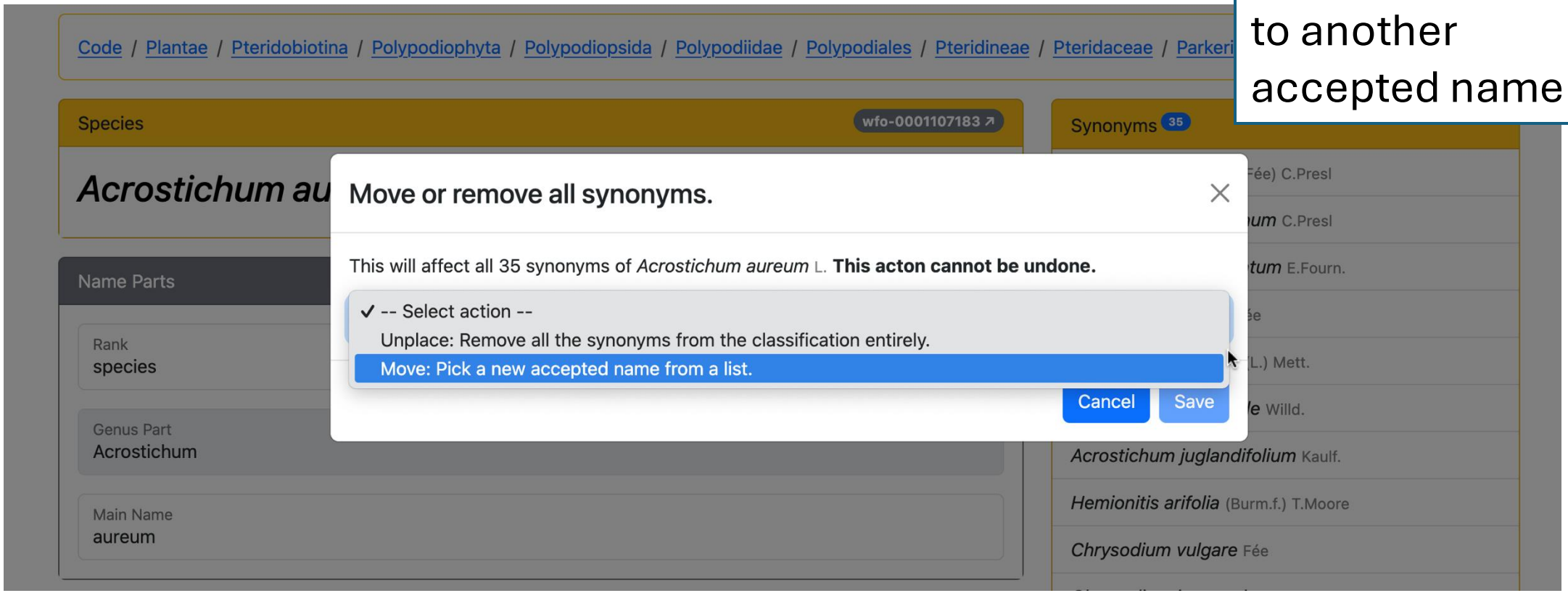
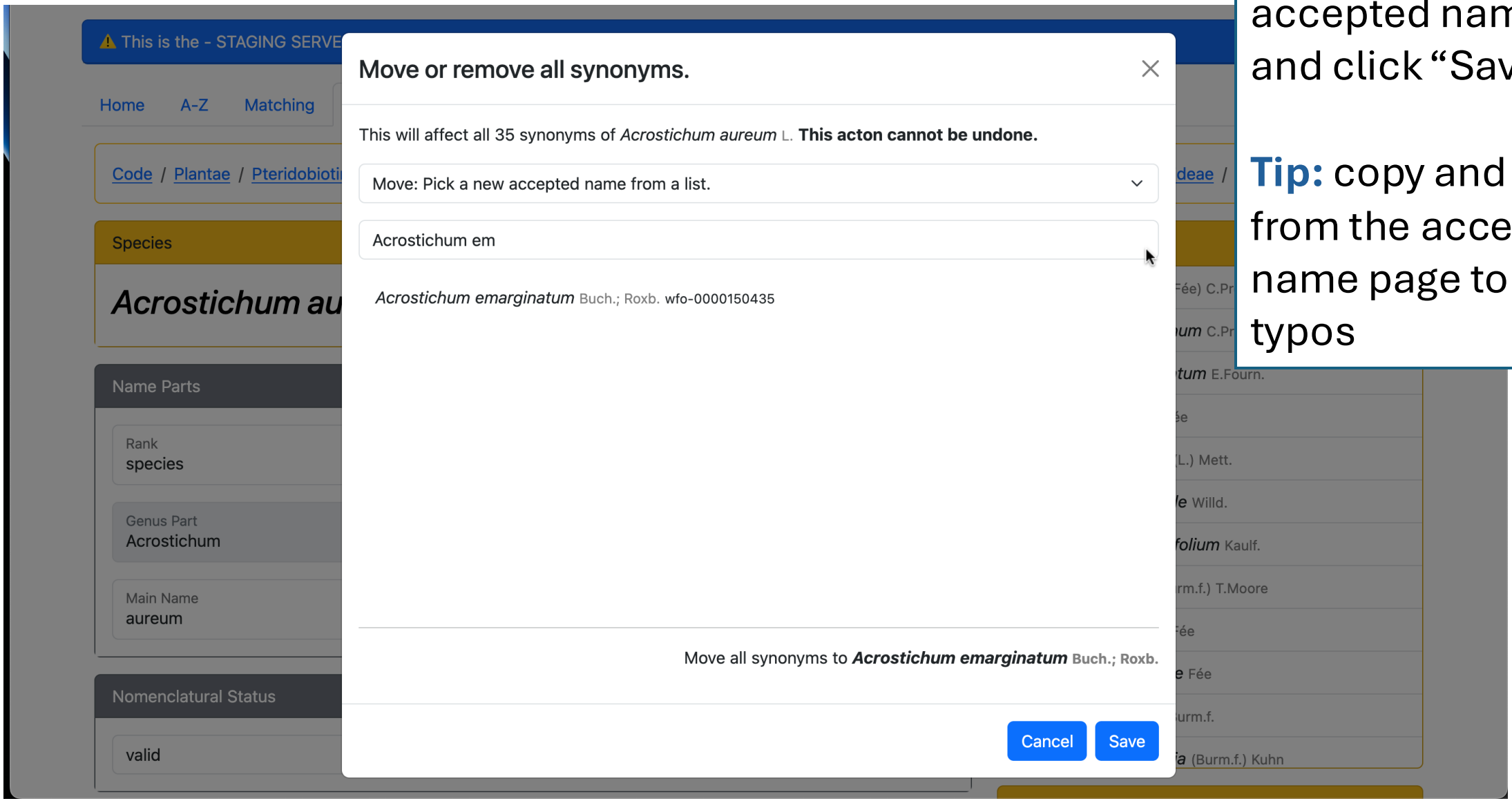
Acrostichum inaequale Willd.
Acrostichum juglandifolium Kaulf.
Hemionitis arifolia (Burm.f.) T.Moore
Chrysodium vulgare Fée
Chrysodium inaequale Fée
Asplenium arifolium Burm.f.
Gymnogramma arifolia (Burm.f.) Kuhn

Brings up menu to move all names to another accepted name



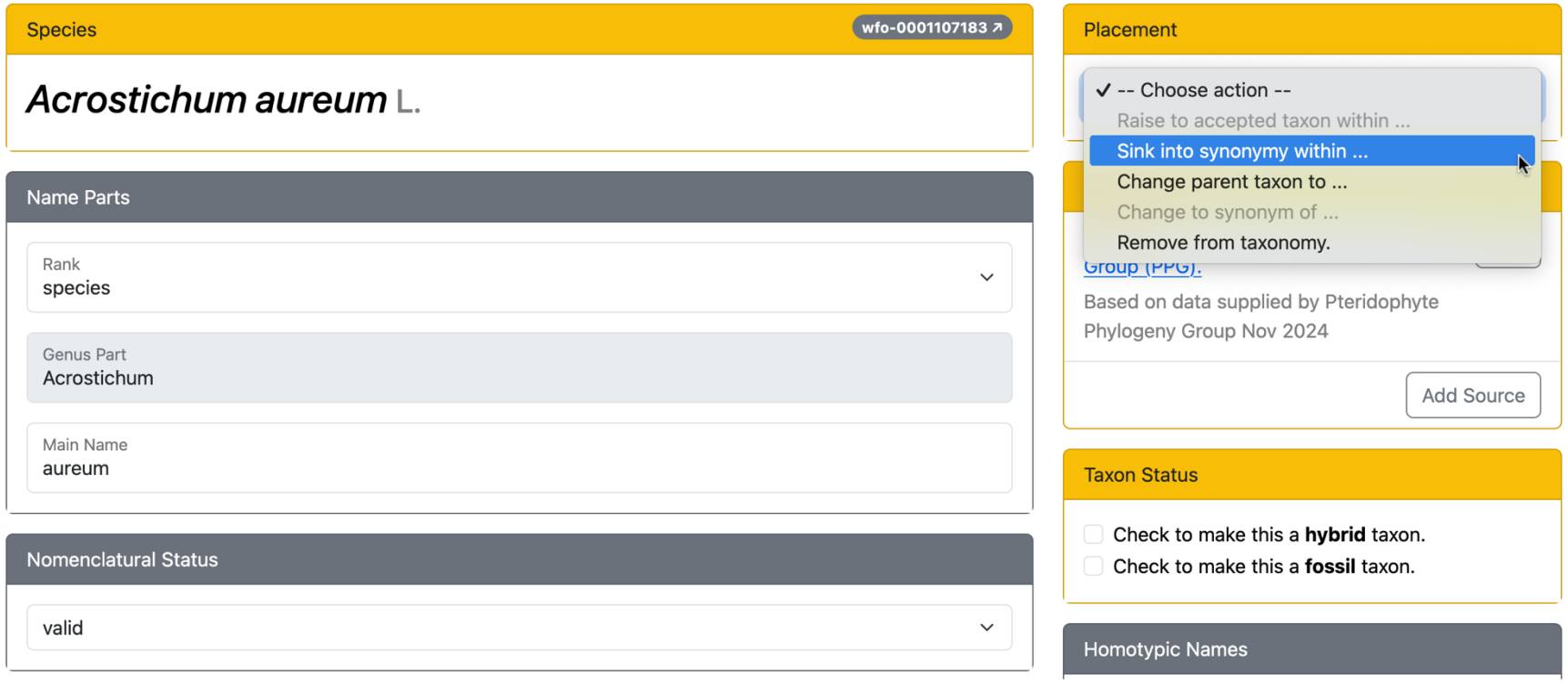
There is no “Undo” button, so use these bulk editing options with caution!



Type in the accepted name and click “Save”

Tip: copy and paste from the accepted name page to avoid typos

The bulk move does not move the accepted name. The last step is to now sink *A. acrostichum* into synonymy



Adding names

- Most names are already in the data (newly published names are automatically imported from IPNI), so you rarely need to add a new name yourself
- There is a check to make sure the name does not already exist
  - If it does, you must acknowledge that you are adding a homonym

If homonyms are detected, you must acknowledge these

⚠ This is the - STAGING SERVER - data wiped every night!

Home | A-Z | Matching | Browse | Add Name | Stats | Users | Activity | Data

Add Name

Proposed New Name String

Acrostichum aureum

Enter the full name without rank or authors. It should just be 1, 2 or 3 words.

Homonyms Found

- ☐ *Acrostichum aureum* L. (wfo-0001107183)
- ☐ *Acrostichum aureum* Cav. (wfo-1000067762)

You must confirm you wish to create a homonym by checking the boxes next to the existing names.

Create

Instructions

This form is used to add new names to the database. The priority is not to create duplicated records and therefore mint new WFO IDs that will later need to be merged. Only the minimum information needed to create an unplaced name is collected initially. Further details can be added by editing the new record.

Similar Names

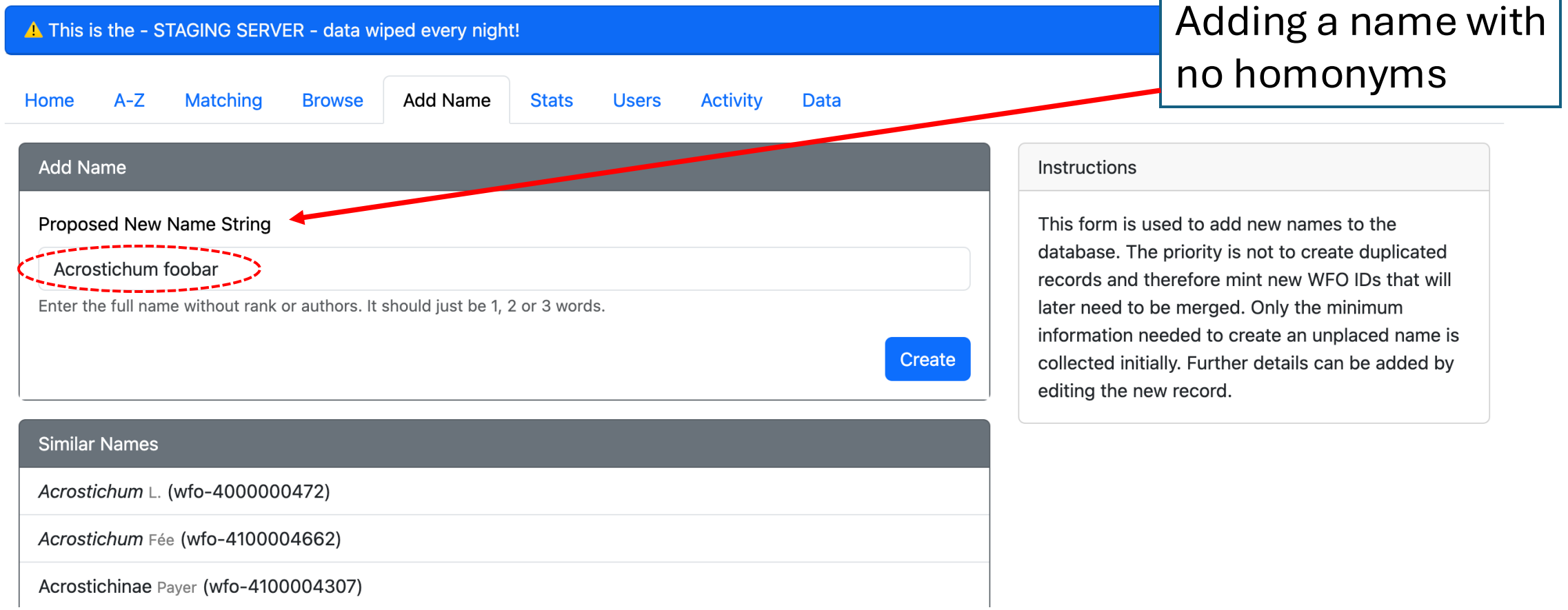
Acrostichum aureum L. (wfo-0001107183)

Acrostichum aureum Cav. (wfo-1000067762)

Acrostichum aureonitens Hook. (wfo-0001112300)

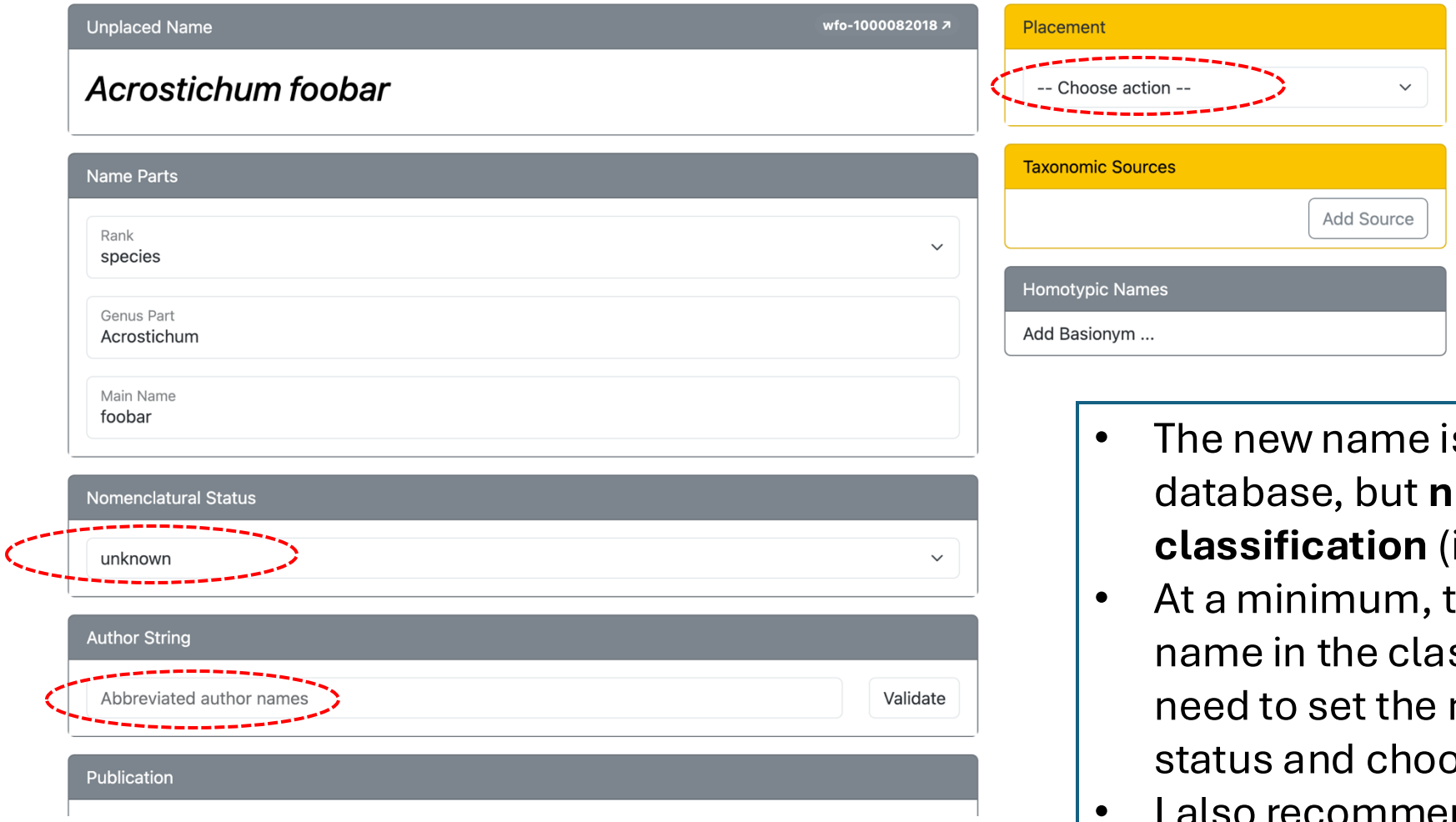
Please do not duplicate data!

Adding a name with no homonyms



Do not include rank or author
in the name (that will be done later)

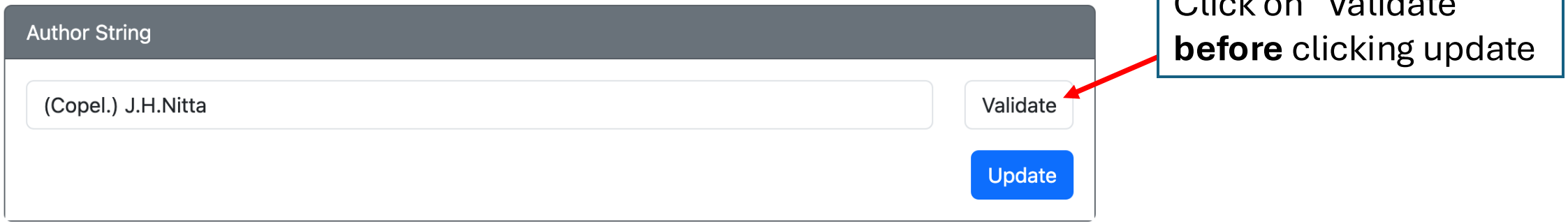
Adding data for a new name



- The new name is in the database, but **not yet in the classification** (it is “unplaced”)
- At a minimum, to **place** the name in the classification, you need to set the nomenclatural status and choose a placement.
- I also recommend adding the author (next slide)

Adding an author

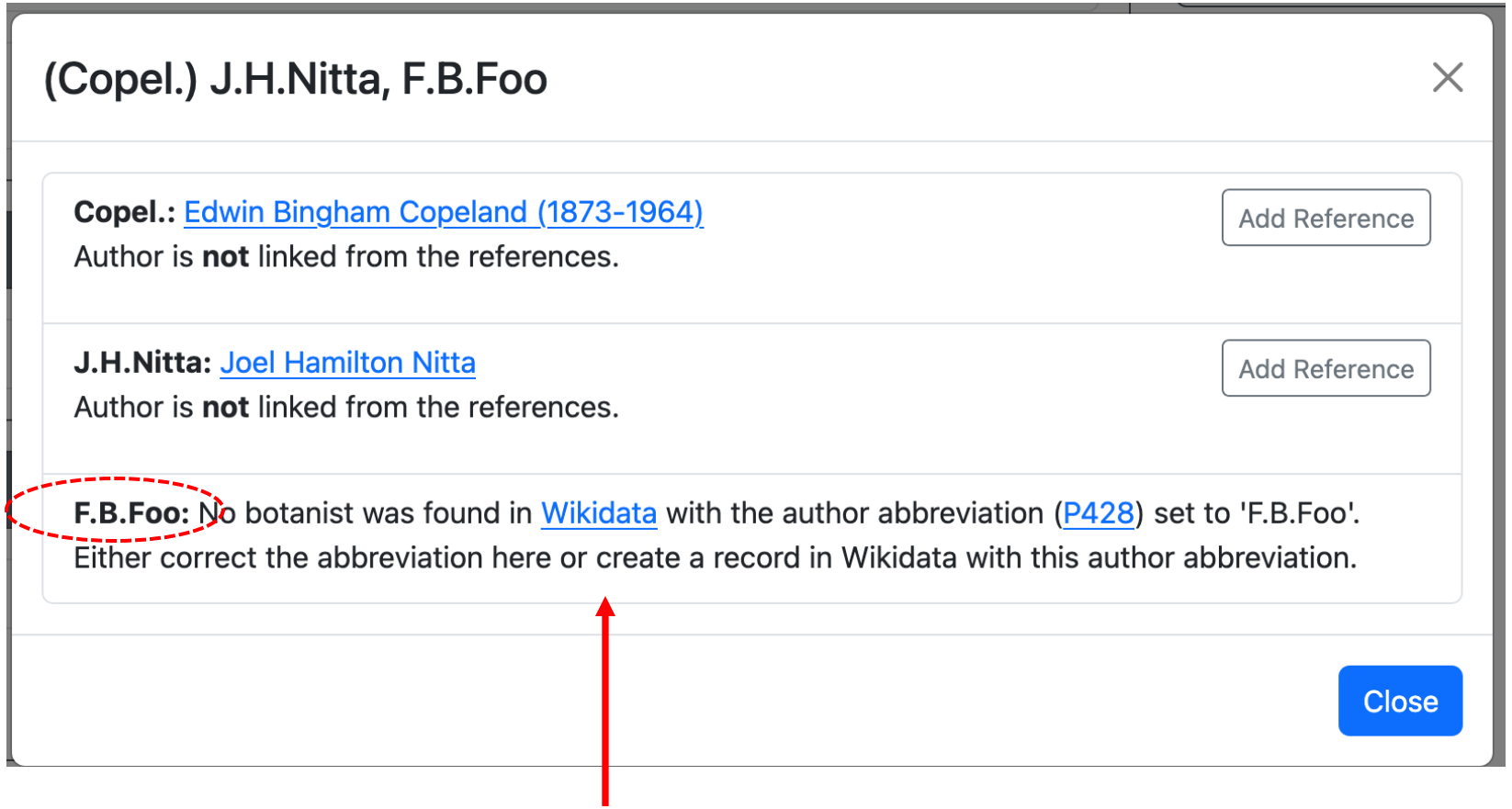
- You should enter the author name(s) **in** IPNI format
- **No spaces within a name**
- Rhakhis aims for maximally inclusive data, so include “ex.” authors



Adding an author

Click on “Add Reference” **before** clicking “Close”

Note that if names have been correctly entered in IPNI format, the full name will also appear



You will see this warning message if no matching author name could be found in the database

Author String

(Copel.) J.H.Nitta

Validate

Success

Name integrity check

Publication

Citation, abbreviated

Year

Nomenclatural References

Person: Edwin Bingham Copeland (1873-1964)

Based on occurence of 'Copel.' in the author string.

Edit

Person: Joel Hamilton Nitta

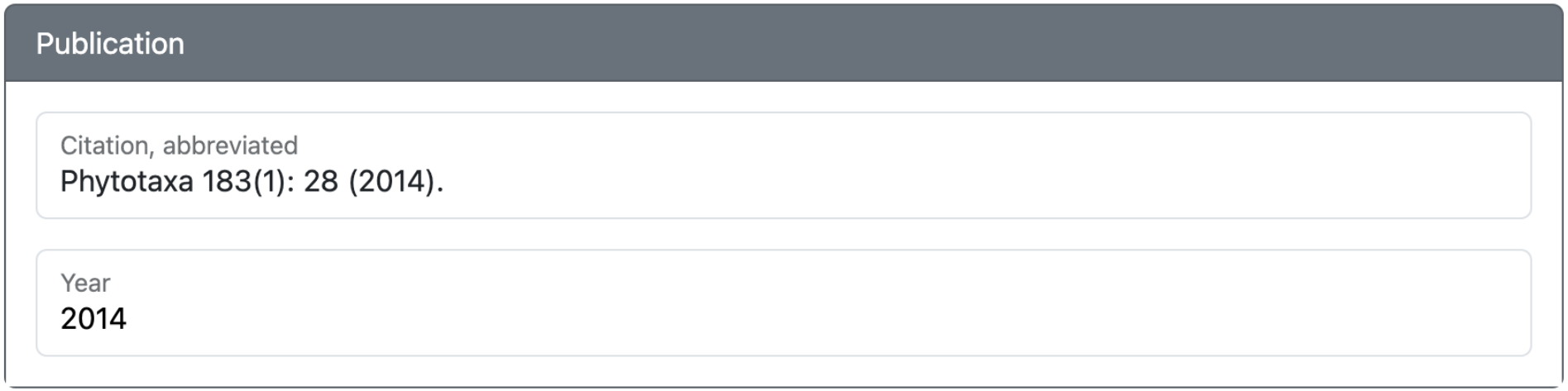
Based on occurence of 'J.H.Nitta' in the author string.

Edit

Add Reference

Adding publication

- Enter the publication **in IPNI format**
- Enter the year (even though it may be in the publication already)



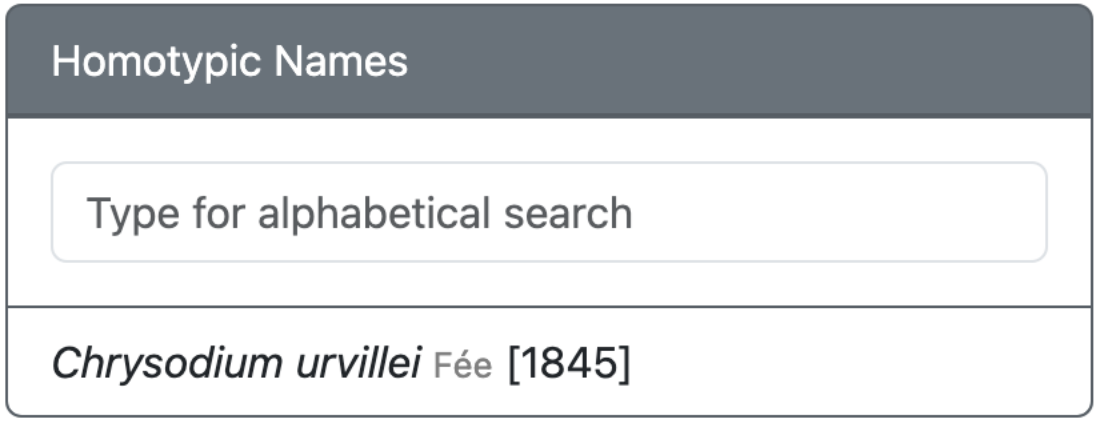
Getting the format correct is tricky… that is why it is better to use names that have already been automatically added to Rhakhis from IPNI (they already have this data)

Adding a basionym

- Click on a name that looks like it has a basionym, for example *Acrostichum urvillei* (Fée) C.Presl
- Click on “Add basionym” under “Homotypic names”

Adding a basionym

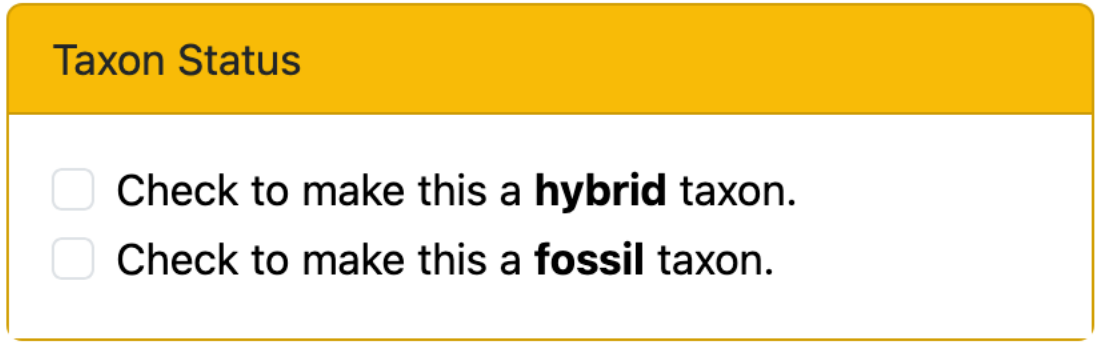
- Rhakhis will automatically find a likely basionym. If incorrect, you can use the search bar to look for another name.



Basionym chains are not allowed (a name with a basionym cannot be the basionym of another name). Such names will not appear in the search results.

What about hybrids?

- “Hybrid” is a taxonomic status, not a nomenclatural status
- **You don’t need to enter “ × ” in the name**
- Just click on the “Is this a hybrid taxon?” box
  - The “ × ” will automatically appear



“Taxon Status” only appears for accepted names

Your turn…

- You can either start browsing names **in your taxon of expertise** and try editing them **(recommended)**

- Or, have a look at the list of recently imported, unplaced names: https://github.com/worldflora/wfo-tens/tree/main/IPNI/2025/PPG

- Or, start working from a recently accepted taxonomic change in PPG (example: https://github.com/pteridogroup/ppg/issues/97)

We are all editing the same database simultaneously,
so **try to avoid working on the same name at the same time.**
(you shouldn't need to worry about this outside of the workshop)

Recently imported, unplaced names

wfo-tens / IPNI / 2025 / PPG / **PPG_May.csv**

AlanElliott82 May IPNI records commit

Preview | Code | Blame | 11 lines (11 loc) · 1.72 KB

Search this file

1	WFOID	IPNID	scientificName	authorship
2	wfo-1000081440	urn:lsid:ipni.org:names:77361326-1	Danaea × deltoidea	Keskiniva & Tuomist
3	wfo-0001128852	urn:lsid:ipni.org:names:77362106-1	Polystichum braunii var. kamtschaticum	C.Chr. & Hultén
4	wfo-1200101813	urn:lsid:ipni.org:names:77362117-1	Arthropteris orientalis var. humblotii	(Baker) Pic.Serm.
5	wfo-1200104030	urn:lsid:ipni.org:names:77362132-1	Pellaea boivinii var. tripinnata	C.Chr.

https://github.com/worldflora/wfo-tens/tree/main/IPNI/2025/PPG

A recently accepted change to PPG

- “A phylogenetically informed generic reclassification of the hemionitid ferns” (Schuettpelz et al. 2025)
- https://github.com/pteridogroup/ppg/issues/97
- Seven new genera, other changes

sticum (Balb.) L.Sáez & Aymerich in Orsis 31: 33. 2017 ≡ *Hemionitis acrostica* (Balb.) Mosyakin in Phytotaxa 373 (2): 165. 2018.

Aleuritopteris belangeri (Bory) Windham & Schuettp., **comb. nov.** ≡ *Pteris belangeri* Bory in Bélanger, Voy. Indes Or. 2: 44. 1833 ≡ *Pteridella belangeri* (Bory) Mett. ex Kuhn in Kersten, Reis. Ost-Afr. 3(3): 16. 1879 ≡ *Cheilanthes belangeri* (Bory) C.Chr., Index Filic. 3: 172. 1905 ≡ *Cheilosoria belangeri* (Bory) Ching & K.H.Shing, Gloss. Terms Names Ferns: 39. 1982 ≡ *Oeosporangium belangeri* (Bory) Fraser-Jenk. in Fraser-Jenkins & al., Annot. Checkl. Ind. Pterid. 1: 255. 2016 ≡ *Hemionitis belangeri* (Bory) Christenh. in Christenhusz & al., Global Fl. 4: 10. 2018.

Aleuritopteris ×duriensis (Mendonça & Vasc.) Windham & Schuettp., **comb. nov.** ≡ *Cheilanthes ×duriensis* Mendonça & Vasc. in Anais Inst. Vinho Porto 15(4): 47. 1956.

Aleuritopteris elegans (Poir.) Windham & Schuettp., **comb. nov.** ≡ *Pteris elegans* Poir. in Lamarck, Encycl. 5: 718. 1804 ≡ *Oeosporangium elegans* (Poir.) Fraser-Jenk. & Pariyar in Fraser-Jenkins & al., Annot. Checkl. Ind. Pterid. 1: 256. 2016.

Aleuritopteris erythraea (Pic.Serm.) E.A.Hooper, **comb. nov.** ≡ *Cheilanthes erythraea* Pic.Serm. in Webbia 27: 420. 1973 (“1972”) ≡ *Hemionitis erythraea* (Pic.Serm.) Christenh. in Christenhusz & al., Global Fl. 4: 13. 2018.

Taxonomic treatment in the paper can be used as basis for editing

Acknowledgements

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