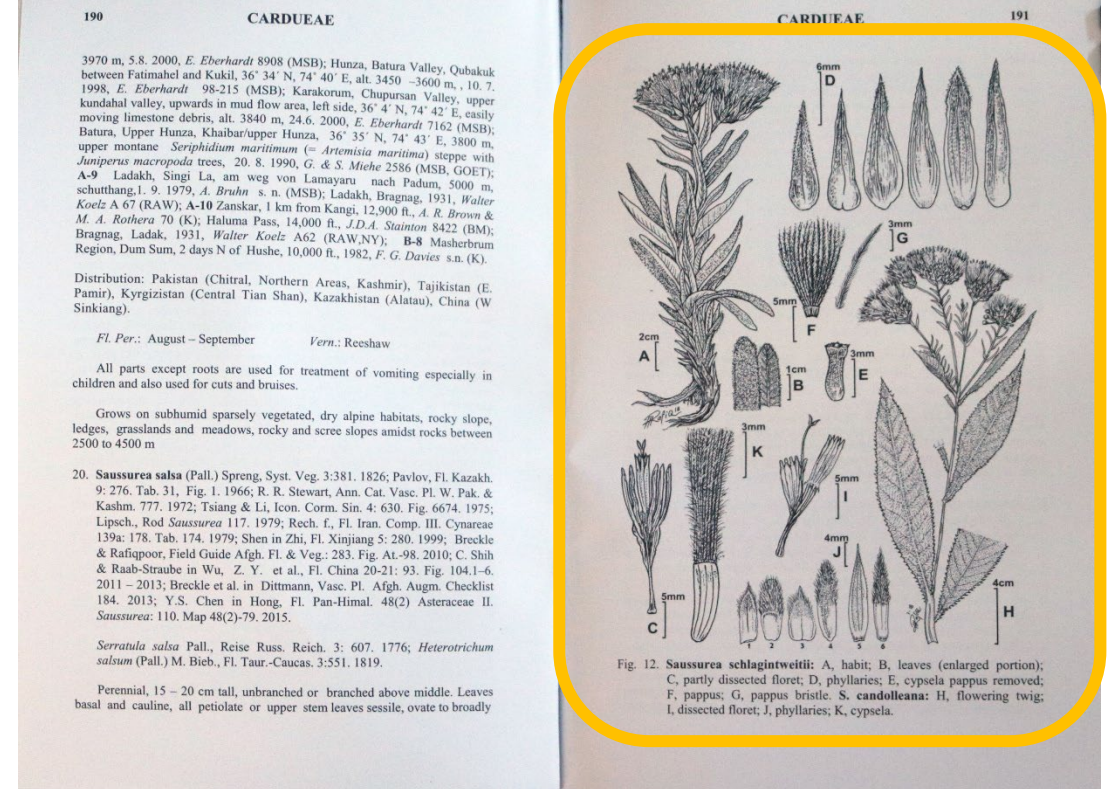
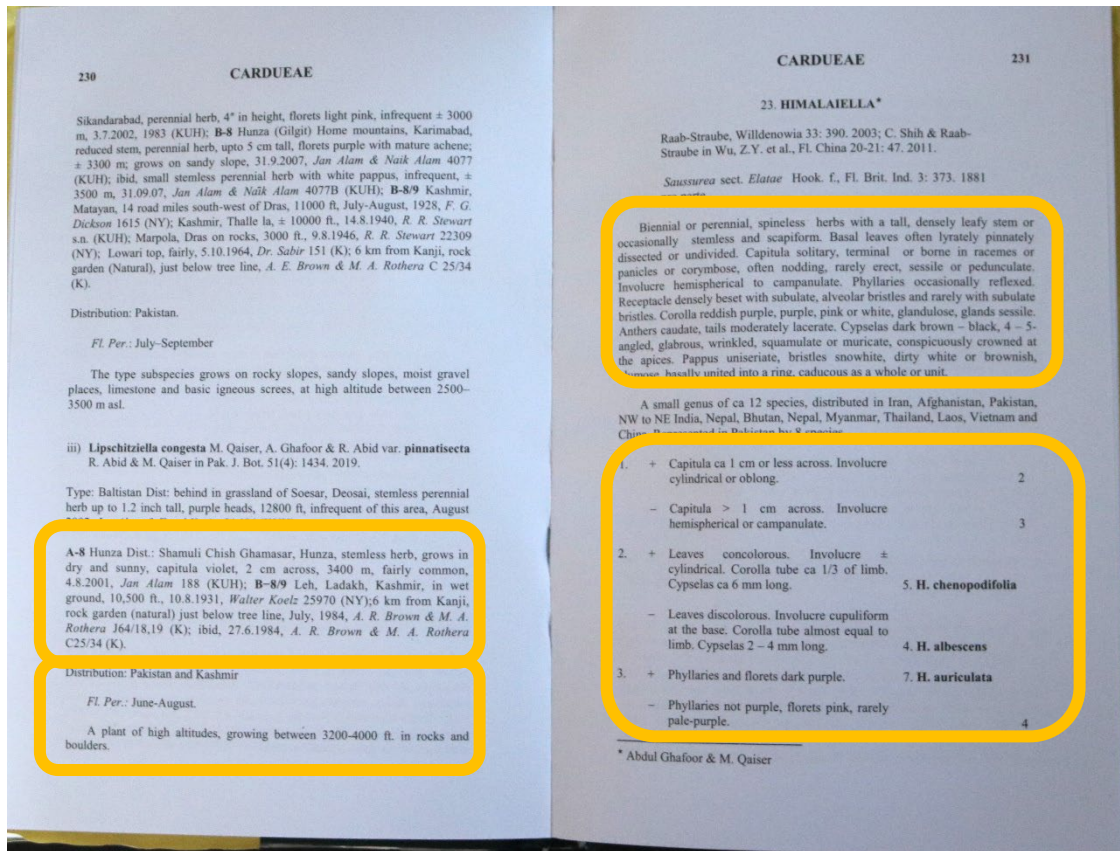




An Integrated Botanical Data Infrastructure in and for Pakistan

Mary E. Barkworth, GBIF Biodiversity Data Ambassador
Utah State University, U.S.A.





Floras –
rich resources

Distribution information
Descriptions
Nomenclatural information
Identification keys
Illustrations

The challenge

- Increase access
 - Number of people
 - Different kinds of people
- Enable rapid updating

The answer

- Share, collaborate
- Digital technology
 - The web
 - Informatics
- Build on what exists
- Strengthen botany

***Prosopis juliflora* (Sw.) DC.** 🌿

Go to Encyclopedia of Life...

Family: Fabaceae



Francisco Manuel Blanco

Flora of Somalia

English short

Somali short

Awale & Jama (2018). Hordhaca dhirta badhtamaha Soomaalilaand.

Geed yar baahsan oo goor-walba-cagaarane ah oo illaa 10 m gaadha. Laamaha wuxu kasoo bilaabaa gunta. Jirridiisu waa bunni khafiif ah, oo qodxo leh. Caleemo talantaalli ah, oo kakan, oo kasii kooban 22 lammaane oo iska soo horjeed u baxay, oo cagaar dhalaalaya ah. Ubax yar, huruud iyo caddaan ah, oo hoos u soo laadlaada. Midho ku jira qolof dheer oo cagaar widhwidhaya ah, oo aad mooddo in ay yara maroorto, oo si kooxo ah u soo laadlaada.

Sabo: Meelaha burciidda iyo quruuruxa leh, ee inta badan dhulka qashinka leh, joog ah illaa 1500 m. Filiqsanaanta: Asal ahaan Meksiko, imika se aad ugu faafay kulaaleyaasha qallalan iyo dhulalka saxare-xigeenka ah.

Fiiro: Waa geed u adkaysta abaaraha iyo milixda, oo si halis ah u faafaya, oo aad ula wareegay inta badan Berbera iyo dhulka xeebta ku teedsan.

Multiple tabs permitted



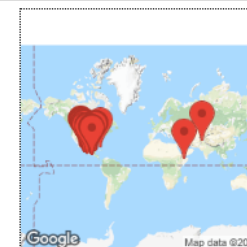
Vilaiti Keekar



Alia Ahmed

SHARING: Images & specimen data (see map) AUTOMATICALLY shared

Easy to send message if errors



Open Interactive Map



KeyBase

Teaching old keys new tricks...

[Barkworth](#) | [Manage account](#) | [Log out](#)

Modifying keys is simple ...

Mujahid, I. & A. Shabbir. 2017. Pakistan Journal of Botany 49(4):1327-1333.

51	Achenes with myxogenic cells (mucilage-slime producing cells); pappuses of several scales; receptacles flat	Xylanthemum
51:	Achenes without myxogenic cells; pappuses coronas of small scales or an auricle; receptacles usually convex or hemispherical	Tanacetum
52	Heads ligulate, outer flowers pistillate and disc flowers bisexual	Dendranthema
52:	Heads disciform with the outer flowers pistillate or discoid with all flowers bisexual	53
53	Heads disciform with the outer flowers pistillate	54
53:	Heads discoid, all flowers bisexual	56
54	Heads solitary, sessile	Soliva ▶
54:	Heads in paniculate clusters, pedunculate	55
55	Heads in corymbose panicles; anthers with more or less triangular apical appendages; achenes faintly 4-6-ribbed	Ajania
55:	Heads usually in ordinary panicles; anthers with lanceolate-linear to subulate apical appendages; achenes not ribbed	Artemisia
56	Achenes slender and somewhat arcuate, obtusely tuberculate; heads in dense corymbose panicles	Pseudohandelia: Pseudohandelia umbellifera
56:	Achenes obovoid-oblong, straight or somewhat oblique, smooth or ribbed but not tuberculate	58
58	Heads small, in small or large panicles	Seriphidium
58:	Heads medium-sized to moderately large, solitary or aggregated in dense or open panicles	59
59	Receptacles conical, with bracts; anthers tailed; pappuses composed of short coronas	Handelia: Handelia trichophylla
59:	Receptacles flat to convex, glabrous; anthers not tailed; pappuses not present	61



Flora of Pakistan: Soliva species

By: Mary E. Barkworth and Iram Mujahid

[Interactive](#) [Bracketed](#) [Indented](#) [About](#)

Current node

- Disc florets 3-merous; achenes longer than wide, tops conspicuously hairy, margins thick, corky
- Disc florets 4-merous; achenes wider than long, glabrous, margins with thin papery wings

Remaining items (2)

- *Soliva anthemifolia*
- *Soliva sessilis*

- Display in 3 formats
- Link taxa to taxon pages
- Download existing key
- Write as spreadsheet
- Modify leads
 - Convert to csv for upload

openherbarium.org/taxa/index.php?taxon=275420

Open Herbarium
An Open Vascular Plant Herbarium Network

Home Search Flora Projects Agents Interactive Tools Images Other Networks Symbiota Welcome Maryl My Profile Logout Sitemap

***Soliva sessilis* Ruiz & Pav.**
Go to Encyclopedia of Life...
Family: Asteraceae

Plants (1-12-5(-25+) cm (high or across), more or less villous, glabrescent (not stoloniferous, stems purplish, prostrate to ascending, often rooting at nodes). Leaves basal and cauline; blades ± oblanceolate, 1-2(-3)+ cm, 2(-3)-pinnati-palmately lobed. Heads mostly scattered along stems. Involucres 2-4(-5) mm diam. Florets without pappuses; pistillate florets 5-8(-17+) in 1-2+ series; disc florets 4-8+, corollas 1.5-2.5 mm. Achenes: bodies more or less obovate to lanceolate, (1.5-12.5-3+ mm, usually winged, wings entire or ± sinuate to incised, each shoulder usually distally projecting as spinelike tooth, faces glabrous or more or less scabrelous to hirtellous; persistent stylar sheaths indurate, spinelike, 1-2+ mm, erect or slightly inflexed. 2n = ca. 92 (as *S. pterosperma*), 110+ (from Portugal), 118-120.

Soliva sessilis is native to South America but is now found in tropical and semi-tropical regions in many parts of the world, including North America, Pakistan, and China. As treated here, it includes 3 variants that are sometimes treated as species. They differ in their achene morphology and may grow together. Their treatment as a single species was recommended by Webb (1986) based on examination of plants growing in lawns in New Zealand.

Mujahid, I. & A. Shabbir. 2017. A new generic record of Asteraceae (*Soliva anthemifolia* from 1. *Soliva* & *Soliva anthemifolia* from 1. Addition to the alien flora in the form of

Richard Spellenberg Bert and Susan Eisenberg Richard Spellenberg Richard Spellenberg

floragelb/imgdetails.php?imgid=90871

Checklists in OpenHerbarium

- Metadata names authors and sources
- Show documentation
- Include notes on habitat, value
- Tools for checking quality
- Link to taxon pages
- For any group
- Parent-child relationships
- CAN HIDE

The screenshot displays the OpenHerbarium website interface. At the top, the logo for OpenHerbarium is visible, along with navigation links: Home, Search, Flora Projects, Agents, Interactive Tools, Images, Other Networks, and Symbiota. A welcome message for 'Mary!' is shown in the top right corner. The main content area is titled 'Pakistan, Sindh Checklist' and includes the following information:

- Families:** 104
- Genera:** 561
- Species:** 1215 (species rank)
- Total Taxa:** 1284 (including subsp. and var.)

Below this, a list of plant families and species is provided, each with its source and distribution information. The list includes:

- ACANTHACEAE**
- Asystasia gangetica*
- Avicennia marina* (SOURCE: Jafri, S.M.H. 1966. The flora of Karachi. The Book Corporation, Karachi, Pakistan.)
- Avicennia officinalis* (SOURCE: Jafri, S.M.H. 1966. The flora of Karachi. The Book Corporation, Karachi, Pakistan.; Zaid bin 1962-01-12 [SINDH])
- Barleria acanthoides* (A.karim [SINDH])
- Barleria cristata*
- Barleria hochstetteri* (A.M Khan 1955-11-15 [SINDH] , Hadi 1963-10-10 [SINDH])
- Barleria prionitis* (Afzal 2999 [SINDH])
- Blepharis linearifolia* (Arshad Jamil [SINDH])
- Blepharis scindica* (SOURCE: Jafri, S.M.H. 1966. The flora of Karachi. The Book Corporation, Karachi, Pakistan.)
- Blepharis sindica* (A.Sattar 22 [SINDH])
- Crossandra infundibuliformis*
- Dicliptera bupleuroides*
- Dicliptera verticillata*
- Dipteracanthus longifolius*
- Dipteracanthus patulus*
- Eranthemum pulchellum*
- Justicia adnata*
- Justicia bicalyculata*
- Justicia gendarussa*
- Justicia heterocarpa* (Izhar Hussain 1965-03-12 [SINDH])
- Justicia spicigera* (From OpenHerbarium 2019-09-18; Muhammad Zafar 1961-12-01 [SINDH])

On the right side of the page, there is an 'Options' panel with a search bar and checkboxes for 'Common Names' and 'Synonyms'. Below this is a 'Filter' section with a dropdown menu for 'Original Checklist' and checkboxes for 'Common Names', 'Display as Images', 'Notes & Vouchers', 'Taxon Authors', and 'Show Taxa Alphabetically'. A 'Rebuild List' button is also present. At the bottom right, there is a map of Sindh, Pakistan, with a red dot indicating the location of Karachi. The map is labeled 'Simple Map' and 'Advanced Map'.

Checklists: research checklists need vouchers

OpenHerbarium can list with vouchers, help locate vouchers, and list missing taxa with vouchers

SHARING: Changes in child checklist **AUTOMATICALLY** applied to parent checklist.



Home Search Flora Projects Agents Interactive Tool

Home >> Return to Checklist >> Checklist Administration

Pakistan, Sindh Checklist

Pakistan; Sindh

New Vouchers Missing Taxa Voucher Conflict

Taxa without Vouchers: 845 (excludes taxa from)

Listed below are species from the checklist that c for possible voucher occurrences. Use the pulldo

ACANTHACEAE

Asystasia gangetica
Barleria cristata
Blepharis linariifolia
Blepharis sindica
Crossandra infundibuliformis
Dicliptera bupleuroides
Dicliptera verticillata
Eranthemum pulchellum
Justicia adhatoda
Justicia gendarussa
Justicia heterocarpa
Justicia spicigera
Justicia vahlii
Lepidagathis cuspidata
Lepidagathis lutea
Lepidagathis trinervis



Home Search Flora Projects Agents Interactive Tools Images Other

Home >> Return to Checklist >> Checklist Administration

Pakistan, Sindh Checklist

Pakistan; Sindh

New Vouchers Missing Taxa Voucher Conflicts Reports

Possible Missing Taxa: 24

Listed below are species name not found in the checklist but are

Alysicarpus bupleurifolius
Avena sativa
Capparis himalayensis
Cenchrus setaceus
Crotalaria mysorensis
Crotalaria trichotoma
Dianthus caryophyllus
Eleusine compressa
Indigofera hebeptala
Indigofera paniculata
Lathyrus odoratus
Lotus corniculatus
Luffa acutangula
Najas graminea
Phaseolus vulgaris
Pistacia khinjuk
Rhynchosia albissima
Scrophularia striata
Sesbania pachycarpa

Home Search Flora Projects Agents Interactive Tools Images Other Networks Symbiota

Home >> Return to Checklist >> Checklist Administration

Pakistan, Sindh Checklist

Pakistan; Sindh

Write keys!

New Vouchers Missing Taxa Voucher Conflicts Reports

- Full species list (CSV)
- Full species list (Print Friendly)
- Full species list with vouchers (CSV)
- Full species list with vouchers (Print Friendly)
- Pensoft Excel Export
- Occurrence vouchers only (DwC-A, CSV, Tab-delimited)
- Possible species additions based on occurrence vouchers
 - Specimens of taxa missing from checklist (CSV)
 - Specimens with misspelled, illegal, and problematic scientific names (CSV)

Checklists: teaching

enherbarium.org/checklists/checklist.php?cl=139&proj=7&dynclid=0

Pakistan, Sindh Checklist

Authors: Rabia Memon and Mary E. Barkworth
Citation: Memon, R. and M.E. Barkworth. Checklist of the vascular plants of Sindh, Pakistan.
[Less Details](#)

Locality: Pakistan, Sindh Province

Abstract: This checklist is being developed from a combination of records in OpenHerbarium, including several from the Flora of Pakistan, Jafri's Flora of Karachi. Data in records in from the Global Biodiversity Information Facility will be added. Tools in OpenHerbarium will be used to locate voucher specimens.

Notes: Started with names from grid squares in the Flora of Pakistan. There are some names derived from parts of Islamabad Capital Territory, as well as neighboring provinces that are included in grid squares that include a part of Sindh Province.



Families: 104
Genera: 557
Species: 1191 (species rank)
Total Taxa: 1260 (including subsp. and var.)









Page 1 of 13: [1](#) | [2](#) | [3](#) | [4](#) | [5](#) | [6](#) | [7](#) | [8](#) | [9](#) | [10](#) | [11](#) | [12](#) | [13](#)

Options


Search:

☐ Common Names
☒ Synonyms

Filter:
Original Checklist ▾
☐ Common Names
☒ Display as Images
☐ Show Taxa Alphabetically
Rebuild List  

	Image not yet available	Image not yet available			Image not yet available	
<i>Asystasia gangetica</i> [ACANTHACEAE]	<i>Avicennia marina</i>	<i>Avicennia officinalis</i>	<i>Barleria acanthoides</i>	<i>Barleria cristata</i>	<i>Barleria hochstetteri</i>	<i>Barleria prionitis</i>
	Image not yet available	Image not yet available				Image not yet available

© Ori Fragman-Sapir



[Skip This One](#) Image 1 of 4 [Next Images](#) ➔

1 out of 385 Species Identified
0 Identified Correctly on First Try

Tell Me What It Is!

Options

Filter Quiz by Taxonomic Group ▾
☐ Display Common Names

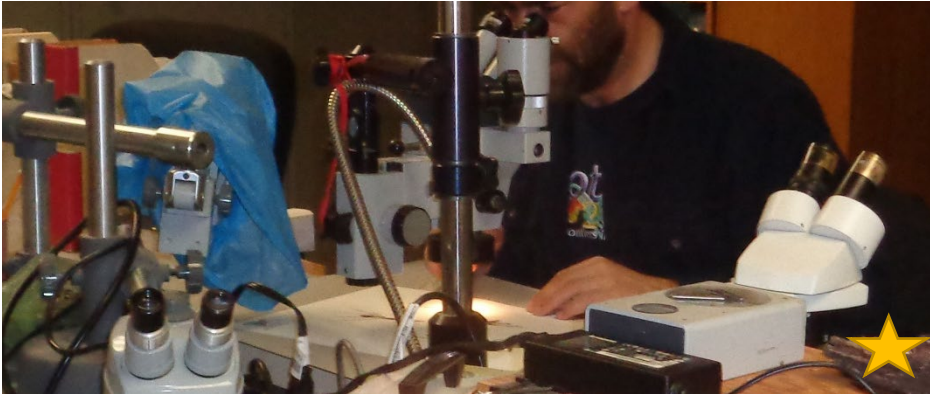
[Reset Game](#)

Ask WHY?
WHY that family?
WHY that genus?

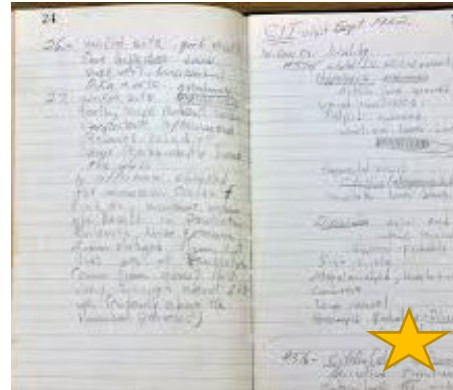
Specimens

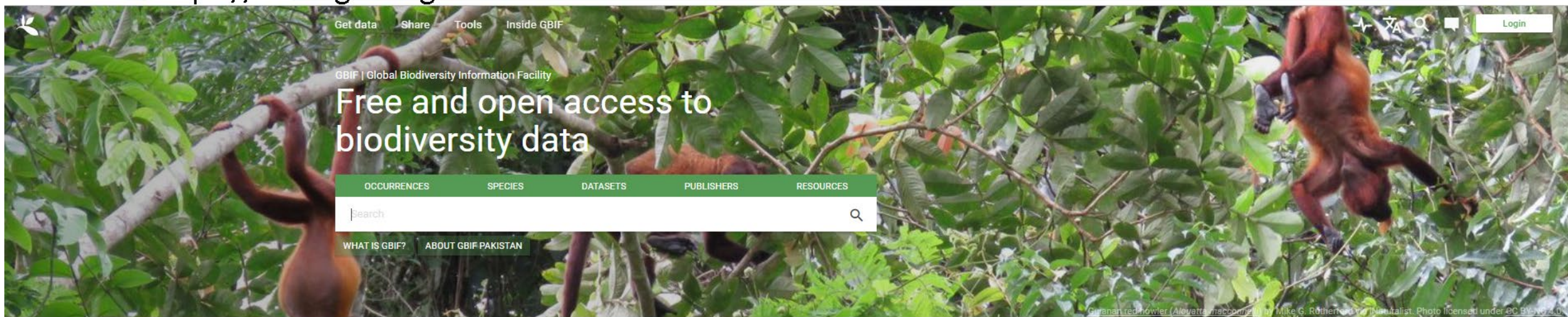
- Initially
 - Research
 - Educate
 - Develop descriptions
 - Check identification
 - Prepare lists
- Today
 - Effects of weather and climate
 - Invasiveness
 - Medicinal properties
 - Assessments of invasiveness
 - Quantitative assessment of species and phylogenetic diversity





It starts in the field





Get data Share Tools Inside GBIF

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Free and open access to biodiversity data

OCCURRENCES SPECIES DATASETS PUBLISHERS RESOURCES

Search 🔍

WHAT IS GBIF? ABOUT GBIF PAKISTAN

Occurrence records
1,038,662,673

Datasets
41,728

Publishing institutions
1,313

Species
Learn more about the number of species covered by data in GBIF.org.



New call promoting data mobilization in European Russia
27 November 2018



Not just a numbers game: Small collections with big impact
27 November 2018

November
26
2018

BID Caribbean Capacity Enhancement workshop: Data use for decision-making
26 - 30 November 2018



New call to promote the mobilization and use of biodiversity data in Asia
19 November 2018



Job opportunity for software developer at the GBIF Secretariat



Expanding local engagement and biodiversity data use through

2018 Ebbe Nielsen Challenge

Six winners top the 2018 Ebbe Nielsen Challenge




Cameroon and Liberia boost GBIF Africa membership to 20 countries

Global Biodiversity Information Facility

The World's Promoter of Data Sharing

Global resources: benefit from, help build

GBIF – Global Biodiversity Information Facility

[Get data](#)[How-to](#)[Tools](#)[Community](#)[About](#)

GBIF | Global Biodiversity Information Facility

Free and open access to biodiversity data

OCCURRENCES

SPECIES

DATASETS

PUBLISHERS

RESOURCES

Search

Q

WHAT IS GBIF?

ABOUT GBIF PAKISTAN

Candle sponge (*Aplysina fistularis*) observed off the coast of Fitts Village, Barbados by Julian Walcott. Photo via iNaturalist (CC-BY-NC 4.0)

Occurrence records

1,387,490,017

Datasets

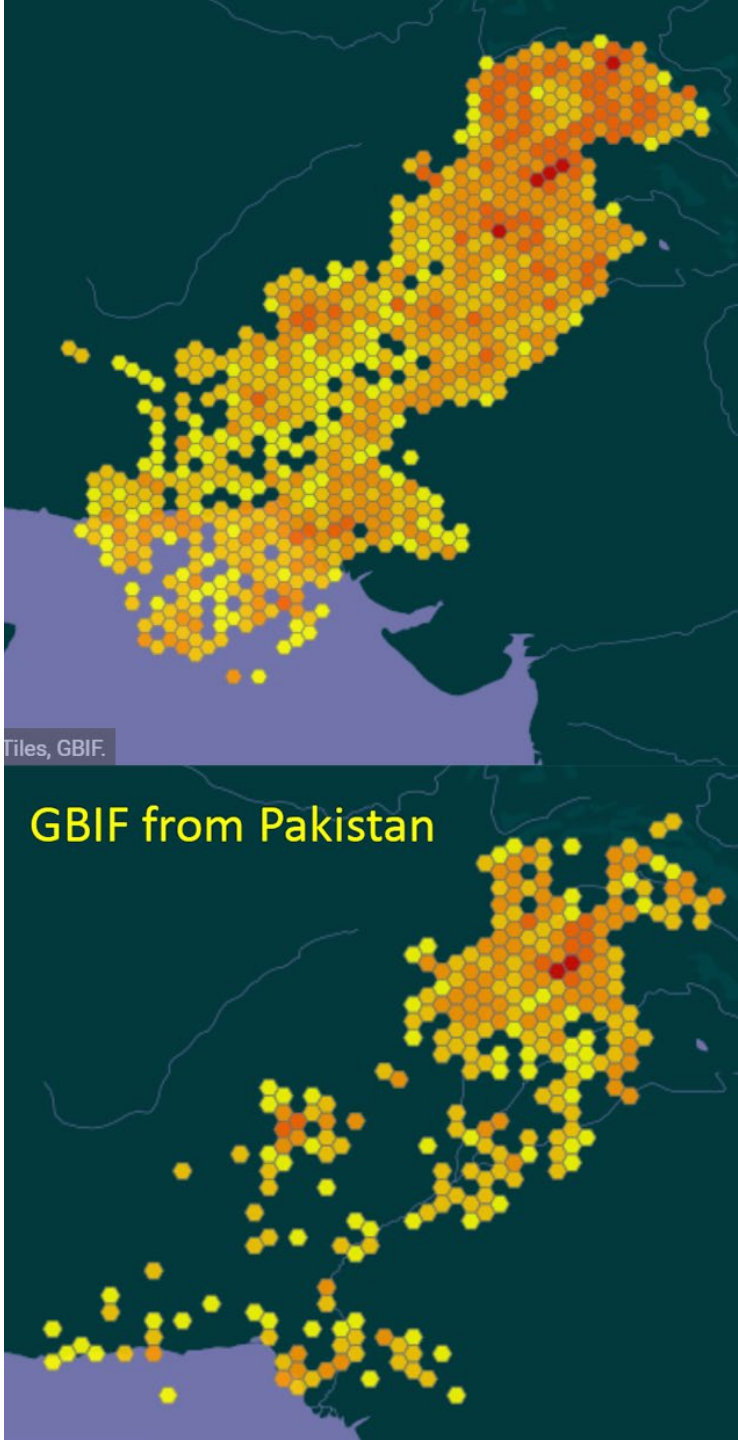
50,717

Publishing institutions

1,569

Peer-reviewed papers using data

4,277



GBIF – occurrence data and more

Checklists Sampling event datasets

How to choose a dataset class on GBIF?

Marie Grosjean

2019-12-04 · GBIF · Publishing

If you are a (first time) publisher on GBIF and you are trying to decide which type of dataset would best fit your data, this blogpost is for you.

All the records shared on GBIF are organized into datasets. Each dataset is associated with some metadata describing its content (the classic “what, where, when, why, how”). The dataset’s content depends strongly on the dataset’s class. GBIF currently support four types of dataset:

- Resource datasets (e.g. metadata-only datasets)
- Checklists
- Occurrence datasets
- Sampling-event datasets

These classes are described in detail on our [Dataset classes page](#) along with links to examples and documentation. As mentioned on this page:

The four classes of datasets supported by GBIF start simply and become progressively richer, more structured and more complex.

In other words, the distinction between the different classes is not always very obvious. This is why I tried to put together a quick guide to help you choose the class that fits best your data.

Five questions to help you decide

Need – high quality data

Old

- Locality – nearest town
- Coordinates – latlon or absent
- Scientific name
- Habitat, associated species, elevation, reproductive condition brief or absent.

New

- Where in town
- Georeference – latlon, datum, uncertainty, remarks
- Scientific name and ID reference
- Habitat, associated species, elevation, reproductive condition – most present with detail.



Education about fieldwork is key

Become a doer!

- OpenHerbarium
- KeyBase
- Become a doer
 - Data capture (At least 10 records)
 - Checklist creator (At least 25 species)
 - Image provider (At least 5)
 - Collector (5 high quality specimens)
- Choose one species
 - Download data from GBIF for world
 - Which institutions provide most records for Pakistan? Georeferenced records?

Thank You

mary.barkworth@usu.edu