

BC HERBARIUM AND PHOTO VOUCHER PROJECT

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Botanic Institute of Barcelona



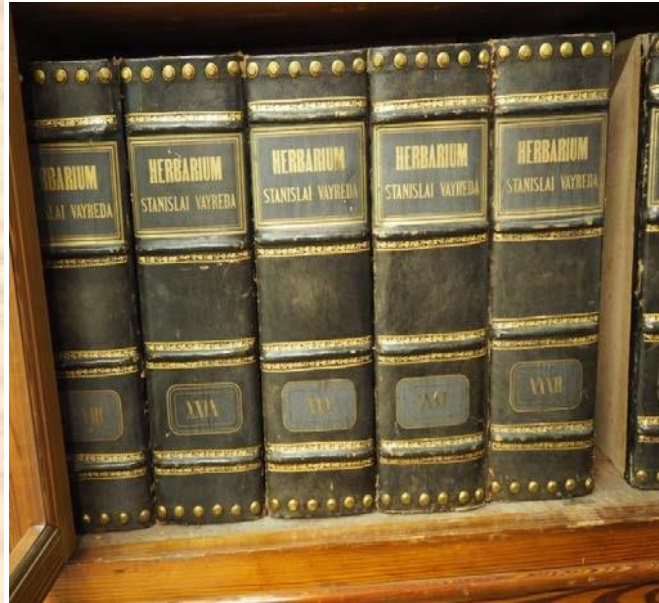
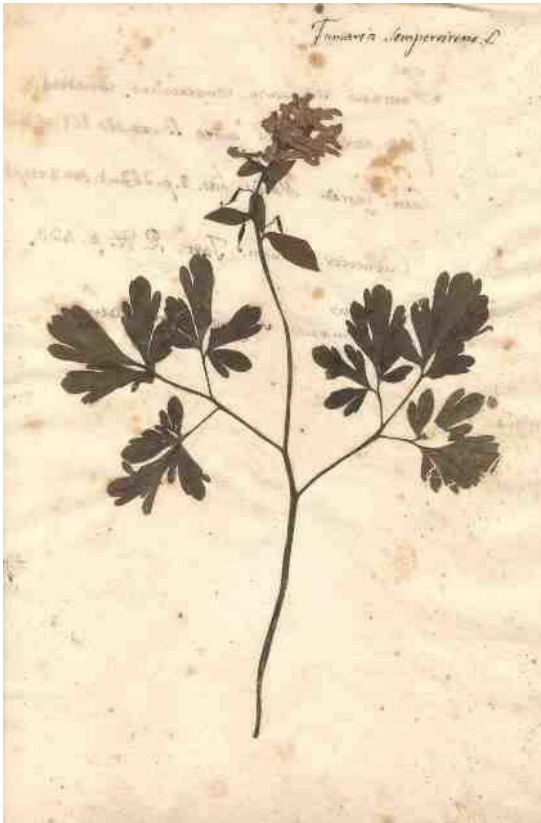
Departments:

- Research: **CSIC (National Council)**
- Herbarium
- Library and Archive
- Salvador Cabinet

City Council of Barcelona- Museum of Natural Science of Barcelona

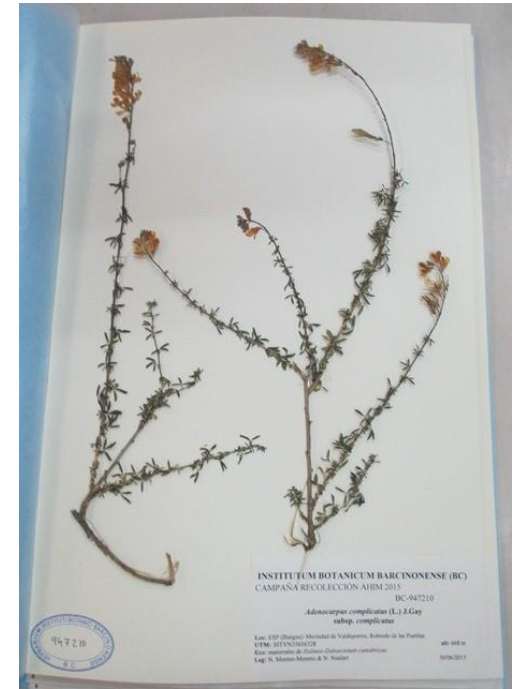
The Botanical Institute was formed in 1934 from the Department of Botany of the Museum of Natural Sciences of Barcelona. Its founder was Pius Font i Quer. A new agreement was signed in 1998 according to which the IBB became a joint center of the *Consejo Superior de Investigaciones Científicas* (CSIC) (National Research Council of Spain) and the City Council of Barcelona.

Herbarium



- BC Herbarium specializes in western Mediterranean flora and is the most important collection of plants in Catalonia, and the second in the Spain (800,000 specimens).
- It was a key reference for the *Flora dels Països Catalans*, *Flora Iberica* and other botanical studies on Mediterranean floras.
- The core of the general herbarium consists of the materials initially collected by Pius Font i Quer that enlarge it exponentially, thanks to the materials collected by him and his desire to incorporate the main herbaria of Catalonia.

Herbarium



Currently, the herbarium BC is the destination of voucher sheets used in scientific research carried out by the IBB and also incorporates donations or exchange materials with other herbaria (at 7.000 sheets by years, approximately).

General Herbarium



Historical Herbaria

Salvador Herbarium (17th- 18th century)



F.X. Bolòs Herbarium (18th century)

Bernades Herbarium (18th century)



Evonimus europæus. L.
E. floribus plenis quadrifidis.
 Carr. Bonifacio. Franc. le foin.
 Cat. matagay
 Virtus cathartica, emetica,
 aperit cordem.

Papaver somniferum. L.
radix et semina dactylis, pili amari
caulis dactylis. Fr. dactylis.
 C. larva. Lar. Mordax opimal.
 flos et capsula narcotica, anti. spasmodica.
 semina by lillanum. et anethum.

Papaver rhæas. L.
capitula glabris dactylis, radice prima multi
capite pili pinnatifidis incisa
 Fr. dactylis. Cat. Bonifacio.
 Lar. amari. catob.

Trèmols Herbarium (19th century)



DIGITALIZATION PROJECT (HERBSCAN) (for general herbarium)



Special scanner for sheets:

- HerbScan (JSTOR project) (<https://plants.jstor.org/>) (3000 images from BC)
- Only types and loan images
- Contain standard elements: label, rule, color chart (pantone), bar code, registration number
- 600 dpx, 200 MB

DIGITALIZATION PROJECT (COPY BOOK). FOR HISTORICAL HERBARIA



- 3.263 images of FX Bolòs herbarium
- 1930 specimens typed
- Contain standard elements: label, rule, color chart (pantone), bar code, registration number
- 300 dpi

DIGITALIZATION PROJECT (COPY BOOK). FOR HISTORICAL HERBARIA

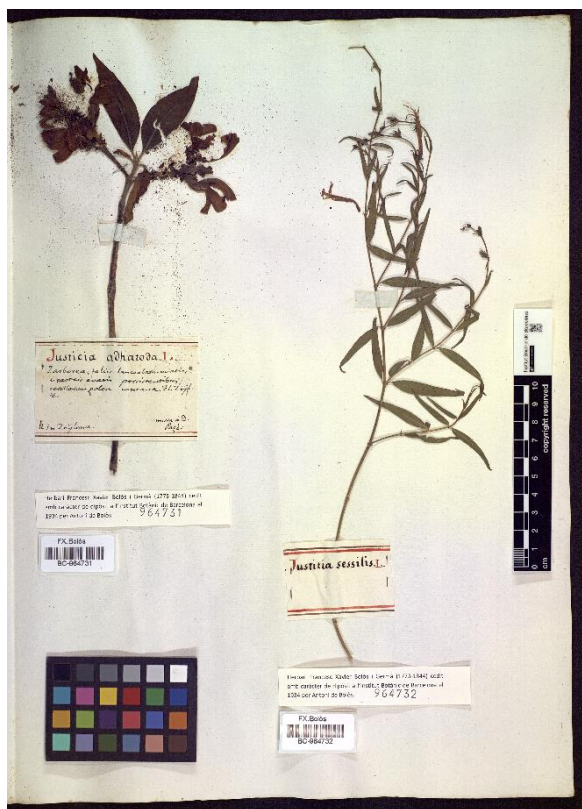


PHOTO VOUCHERS PROJECT, new methodology in herbaria

Photo vouchers: an alternative to traditional vouchers? Yes, but only for some cases (Gómez-Bellver et al., in press)

The importance of **vouchers**:

1. Vouchers are critical for authenticating the identification of a taxon
2. Herbarium collections constitute permanent and often well-documented records of the distribution of taxa through space and time
3. Vouchers form a valuable database that can be used for additional research
 - ⇒ Funk (2004) lists a total of 72 possible uses of herbarium collections, including:
 - *Systematics and taxonomy*
 - *Introduction of alien species*
 - *Community ecology studies*
 - *Population ecology studies*
 - *Ecological niche modelling*
 - *Conservation biology*
 - *Phenological studies / climate change studies*
4. Vouchers can provide biological material for:
 - *Genetic / molecular studies*
 - *Viability of seeds/propagules*

Vouchers, however, are hard (or EVEN IMPOSSIBLE) to be obtained under the following circumstances:

1. **Protected species** (by law or because they are located within a protected area)
2. **Threatened species** (those listed as threatened according to the IUCN criteria)

► **CR, EN**



Acer yangbiense (**CR**)

- Only 5 individuals left
- Endemic to Yunnan (China)



Coristorpermum huteri (**CR**)

- Only 115 individuals left
- Endemic to the Balearic islands (Spain)

3. **Species** that have very large individuals

⇒ *whose voucher specimens are unusually large*



Palms



Tropical species with big leaves (e.g. *Colocasia*)



Arboreal ferns

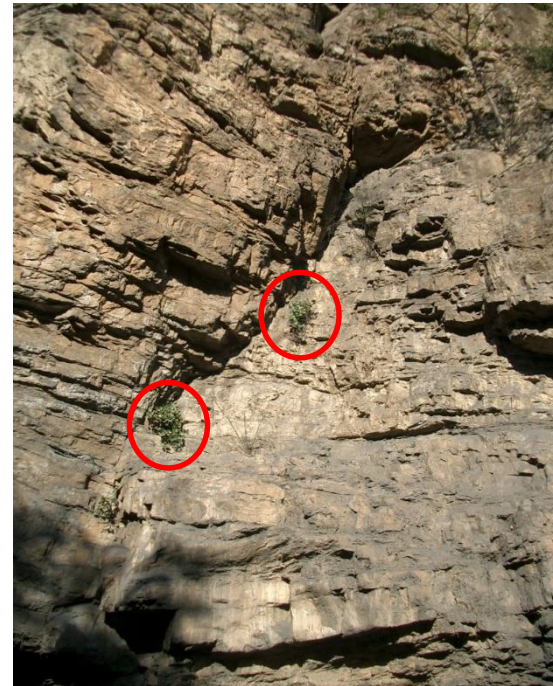
4. Succulent species

- ▶ Very hard or even impossible to dessicate
- ▶ They are often thorny, prickly, or spiny



5. Individuals are located in inaccessible places

- ▶ Cliffs
- ▶ Caves
- ▶ Roofs
- ▶ Trees (e.g. epiphytic orchids)



6. Special cases:

- ▶ Dry individuals whose seeds are collected to be stored in germplasm banks
 ⇒ *dry individuals cannot be vouchered*
- ▶ When the specimen to be vouchered is the only individual of a given locality
- ▶ ‘Sacred’ species or species located in ‘sacred’ sites for the local communities



In such cases, a solution can be a **PHOTOGRAPHIC VOUCHER** = **PHOTOVOUCHER**

1. To be valid vouchers, however, they must meet several technical requirements (STANDARD IN BC HERBARIUM):

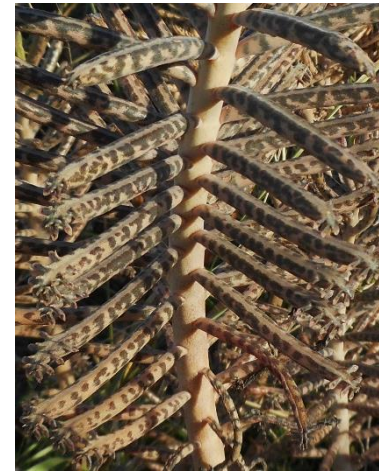
- ▶ They must enable plant identification:
 - *Detailed photos of all organs should be taken (leaves, inflorescences, flowers, fruits).*
- ▶ A picture showing the whole plant must be included
- ▶ Pictures showing the species' habitat must be included



Habitat



Whole plant



Detail of the leaves



Inflorescence



Detail of flowers and fruits

2. We strongly recommend that photovouchers:

- ▶ Use a ruler as a size reference
- ▶ Use a colour chart (e.g. Pantone ©) as a colour reference

[EXCEPTIONS: inaccessible individuals]



3. To be valid vouchers, photovouchers must meet several requirements regarding its deposit:

- ▶ They must be deposited in a public herbarium or in a public collection

- They will carry a unique register number: **BC-PSV-XXXXX**

Herbarium code

Accession number

Photo Specimen Voucher

- ▶ Ideally, they should be accessible via internet
- ▶ A herbarium label should be provided, with the same information than classical photovouchers: *scientific number, collector (i.e. photographer), details of the locality (including geolocation), habitat, date of the photographs*

4. Storage conditions may vary depending on the institution. In our herbarium (BC), we do:

- ▶ Pictures are printed and mounted on a sheet of herbarium paper (just as the classical vouchers), including a complete label.
- ▶ Pictures are stored as electronic files (accessible via internet)

5. Photovouchers have a series of advantages with respect to classical vouchers:

► In the absence of classical vouchers, photovouchers will allow to have a valid “voucher” for article publication (necessary for taxonomic works, molecular studies)

► They can help to solve the underrepresentation in herbaria of the species more difficult to collect:

- *Plants that would result in very large specimens (Schmidt-Lebuhn et al., 2013; Daru et al., 2018)*
- *Spiny, thorny or prickly plants (Schmidt-Lebuhn et al., 2013)*
- *Threatened species (Daru et al., 2018)*



6. Photovouchers should **never** been considered as an alternative to classical vouchers when the latter can be done, because:

- ▶ Certain morphological characters can often be hidden, be too small or even invisible in two-dimensional images
- ▶ Because they cannot provide plant tissues (that can be of great relevance for research) as in the case of classical vouchers.

7. Photovoucher, however, can be a good complement to classical vouchers

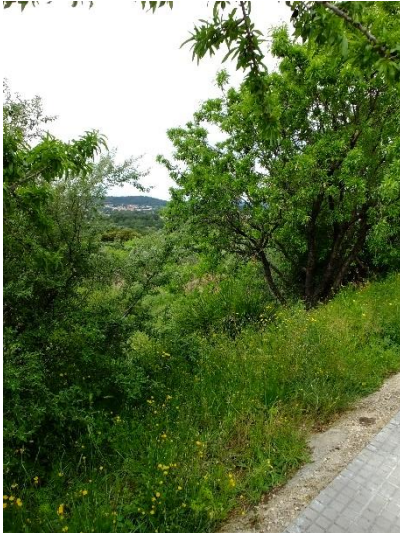
CLASSICAL VOUCHER + PHOTOVOUCHER = “**HYBRID VOUCHER**”

▶ Recommended when:

- *When classical vouchers can be incomplete (e.g. large plants, such as Agave), and thus, taxonomic identification could be problematic*
- *When physical characteristics of classical vouchers may be lost (e.g. colours of flowers)*

- ▶ Printed pictures are added to the specimen, and also stored as electronic files.
- ▶ Same technical specifications as photovouchers.

Examples of photovouchers (1):



Protected species:

CHAMAEROPS HUMILIS
Collbató (Barcelona, Spain)
3 May, 2018

► The photovoucher contain 5 pictures

Examples of photovouchers (2):



Species with large individuals:

AGAVE SALMIANA VAR. FEROX (Teià,
Barcelona Prov., Spain; 18 April, 2018)

► The photovoucher contain 7 pictures

Examples of photovouchers (3):



2. Population with only 1 individual:

GASTERIA CARINATA
Sitges (Barcelona, Spain)
12 May, 2018

► The photovoucher contain
5 pictures

Examples of photovouchers (4):



Inaccessible individuals:

KALANCHOE TUBIFLORA (Chengdu, Sichuan Prov., China; 24 Aug, 2017)

► The photovoucher contain 4 pictures

THANK YOU !!

