



UNIVERSITÀ
DEGLI STUDI
DI TRIESTE



Dipartimento di
Scienze della Vita



Exploring lichen biodiversity data in ITALIC:

the information system on Italian lichens and its interoperability with
the R programming language

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Webinar outline:

- History of ITALIC
- Exploring the website
- Limitations of the website
- ritalic
- ITALIC public api





Materials:

All materials are available online on Github

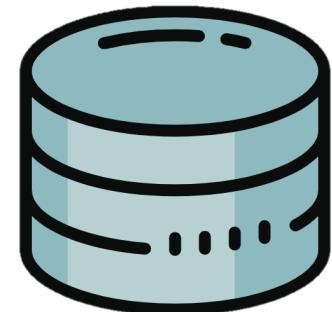
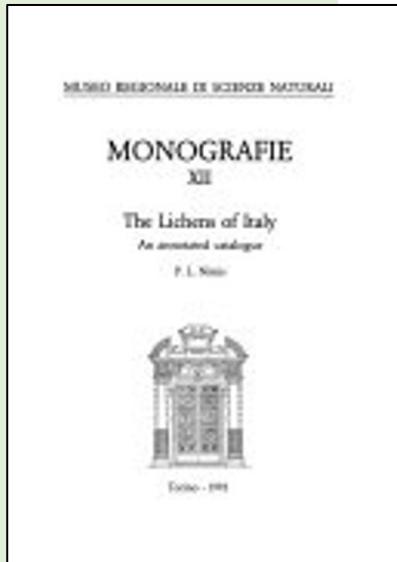
<https://github.com/Mattciao96/italic-webinar>



Creation of ITALIC



- 1993: first version of the checklist of the lichens of Italy
- 1997: digitized into an online database
- 2002: made available online



Following versions

Added data about:

- Systematics
- Ecology
- Distribution



New tools:

- Image archive
- Identification keys
- Name match



ITALIC 7.0

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Cetraria islandica (L.) Ach. subsp. islandica

Meth. Lich.: 393, 1803. Basionym: Lichen islandicus L. Sp. Pl.: 2: 1145, 1753.

Synonyms: Cetraria islandica f. platynoides Samb.; Cetraria islandica var. platyna (Ach.) Ach.

Description: Thallus subfoliose to subfruticose, loosely attached, often forming large tufts, consisting of dorsoventral, flattened, elongate, ascending, 1-3(-4) cm broad and up to 6(-10) cm tall, often sparingly branched laciniae with often in-cult margins bearing short (0.2-1 mm) marginal, pyrenia-bearing spinulose outgrowths. Upper surface dark brown in sunrooms to greyish in shade, or yellow-green, shiny, slightly granular, with large, moniform, irregular, white pycnidia scattered throughout the surface and the margins. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of peripherally arranged hyphae; medulla white. Apothecia extremely rare, lecanorine, mostly subterminal, with a dark brown disc and an often crenulate thalline margin. Epithelium brownish; hymenium and hypothecium colourless. Asc 8-spored, Lecanorin-type. Ascospores 1-celled, hyaline, ellipsoid to oval, 6-10 x 3.5-5 µm. Conidia fusiform, multiseptate, colourless, 6-7 x c. 1 µm. Photobiont chlorococcoid. Spore print colour: K-, C-, KC-, P- yellow to orange or P-, UV- Chemistry: medulla with fumaropropanoic acid, and variable amounts of protocetraric and protocetraricin acids.

Note: an arctic-alpine to boreal-montane, circumpolar lichen found on mineral and organic soil, amongst thick moss carpets, exceptionally on bark or lignum near the ground, with optimum near treeline; common and often abundant throughout the Alps, less frequent in the mountains of southern Italy. The subsp. *cristiformis* (Räsänen) Kärnefelt should be looked for in tree-line.

Growth form: Fruticose

Substrate: soil, terricolous mosses, and plant debris

Photobiont: green alga other than *Trentepohlia*

Reproductive strategy: mainly asexual, by thallus fragmentation

Commonness-rarity: (info)

Alpine belt: very common	1	2	3	4	5	(info)
Subalpine belt: extremely common	1	2	3	4	5	(info)
Overmontane belt: rare	1	2	3	4	5	(info)
Montane belt: very rare	1	2	3	4	5	(info)
Submediterranean belt: absent	1	2	3	4	5	(info)
Padanian area: absent	1	2	3	4	5	(info)
Humid submediterranean belt: absent	1	2	3	4	5	(info)
Humid Mediterranean belt: absent	1	2	3	4	5	(info)
Dry Mediterranean belt: absent	1	2	3	4	5	(info)

pH of the substrate:

1	2	3	4	5	(info)
---	---	---	---	---	--------

Solar irradiation:

1	2	3	4	5	(info)
---	---	---	---	---	--------

Aridity:

1	2	3	4	5	(info)
---	---	---	---	---	--------

Eutrophication:

1	2	3	4	5	(info)
---	---	---	---	---	--------

Paleotolerance:

0	1	2	3	4	(info)
---	---	---	---	---	--------

Altitudinal distribution:

1	2	3	4	5	6	(info)
---	---	---	---	---	---	--------

Map of Italy showing distribution:

Parmotrema A. Massal.

Atti Ist. Ven. Sc. Lett. Arti, 5, 3: 4, 1860.

Systematics:

Phylum: Ascomycota Caval-Sm.

Subphylum: Pezizomycotina O.E.Erikss. & Winka

Class: Lecanoromycetes O.E.Erikss. & Winka

Subclass: Lecanoromycetidae P.M.Kirk, P.F.Cannon, J.C.David & Stalpers ex Miadl., Lutzoni & Lumbsch

Order: Lecanorales Nannf.

Family: Parmeliaceae Zenker

This genus of the Parmeliaceae is characterised by foliose thalli forming short and broad, often ciliate lobes, a pored epicortex, cylindrical conidia, a usually wide bare marginal zone on the lower surface, and the intermediate type of lichenan between Cetraria- and Xanthoparmelia-type lichenan. Currently the genus comprises c. 300 species which occur mostly in the tropics, especially in the Pacific Islands and South America. The genera Canomaclina, Concamerella, Rimelia, and Rimeliella were synonymised with Parmotrema by Blanco & al. (2005). Type: *P. perforatum* (Jacq.) A. Massal.

[KEY TO ITALIAN SPECIES](#)

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Dryads Home

Lichens of the Italian Alps occurring near and above tree-line: an interactive guide

Back

Remaining records

Thallus grey, brown or black, without usnic acid

Thallus green to yellowish green when dry, with usnic acid

Start again

Key to remaining taxa

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IMAGES OF LICHENS

Abrothallus parmeliacarum (Sommerf.) Arnold

Allantoparmelia almqvistii (Vain.) Essl.

Allantoparmelia alpicola (Th. Fr.) Essl.

Arctoparmelia centrifuga (L.) Hale

Arctoparmelia incurva (Pers.) Hale

Arctoparmelia separata (Th. Fr.) Hale

Arctoparmelia subcentrifuga (Oxner) Hale

Arthrorhaphis arctoparmeliae Kocourk. & van den Boom

Canoparmelia amabilis Heimian & Elix

Occurrence data from Italian herbaria

Herbarium	Index Herbariorum Code	Number of Records
Erbario del Museo Civico di Storia Naturale Giacomo Doria	GDOR	2782
Erbario Lichenologico Fiorentino	FI	416
Erbario Lichenologico Università della Calabria	CLU	16,956
Flora Montis Oropae	ORO	320
Herbarium Gheza		948
Herbarium Lucanum	HLUC	600
Herbarium Nascimbene		7871
Herbarium Ravera		5363
Herbarium Universitatis Genuensis	GE	831
Herbarium Universitatis Senensis	SI	3460
Herbarium Universitatis Taurinensis	TO	3428
Herbarium Universitatis Tergestinae	TSB	40,908
Herbarium von Brackel		3943



Let's explore the website



<https://italic.units.it>



ITALIC 7.0, THE INFORMATION SYSTEM ON ITALIAN LICHENS

P.L. Nimis & S. Martellos

ITALIC 7.0, the latest version of the Information System on Italian Lichens, has been published online on June, 28th, 2022. The system makes available information and resources about the lichens known to occur in Italy. It is maintained and updated by the Research Unit of Professor Pier Luigi Nimis, at the University of Trieste (NE Italy), Department of Life Sciences. Most of the data are derived from the Checklist of the Lichens of Italy by Nimis (2016), but nomenclatural and distributional data are being continuously updated online, and complete identification keys for some areas of the country, as well as for genera or groups of genera, are published online for testing.

In addition, species descriptions are available in ITALIC 7.0 for more than 3.200 infrageneric taxa (several of which are not known from Italy but do occur in neighbouring countries, e.g. in the Alps and in the Mediterranean Region). Further, a searchable archive of images curated by P.L. Nimis and F. Schumm, not limited to taxa occurring in Italy, presently includes more than 45.000 images for more than 6.000 taxa. Additionally, a project for georeferencing all samples collected in Italy from thirteen, mainly modern herbaria was started and completed in the first half of 2022. These herbaria are now searchable online, and dot-maps of herbarium samples are visible in the taxon pages of ITALIC 7.0, and are downloadable in Darwin Core format.

Limits of the website



- Not easy to move the data into scripts, spreadsheets, ...
- Data in ITALIC is regularly updated

	A	B	C	D	E
1	pH of the substrata:				
2		1		4	5
3					
4					
5	(info)				
6	Solar irradiation:				
7		1		4	5
8					
9					
10	(info)				
11	Aridity:				
12		2	3	4	5
13					
14					
15	(info)				
16	Eutrophication:				
17			3	4	5
18					
19					
20	(info)				
21	Poleotolerance:				
22		1	2	3	
23					

The solution

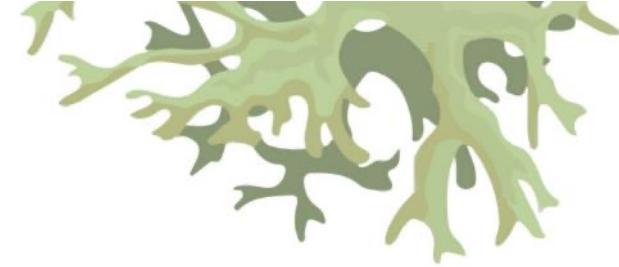


ritalic



Get italic data directly from R





ITALIC APIs

What is an API?



moz://a Is a set of commands and functions that allows an application to communicate and exchange data with other applications

Servers

`https://italic.units.it/api/v1`

Documentation of the APIs:

<https://italic.units.it/?procedure=api>

Example using ITALIC APIs:

<https://italic-api-example.vercel.app>

match

`GET /match/{name}``match a scientific name`

taxon data

`GET``/data/{acceptedName}``get taxon data`

description

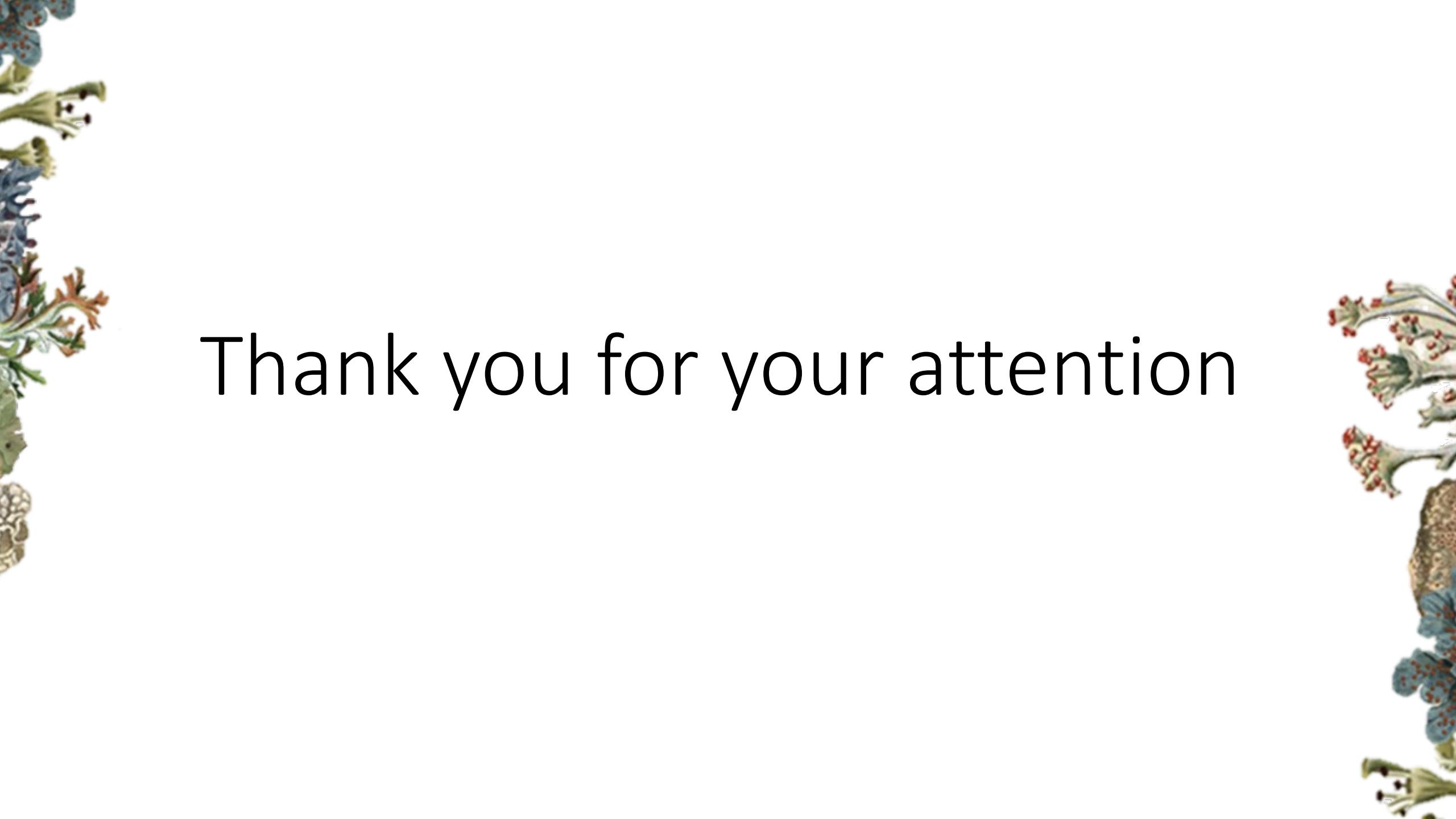
`GET``/description/{acceptedName}``get description`

rarity

`GET``/rarity/{acceptedName}``get commonness-rarity values`

distribution

`GET``/distribution/{acceptedName}``get distribution`



Thank you for your attention