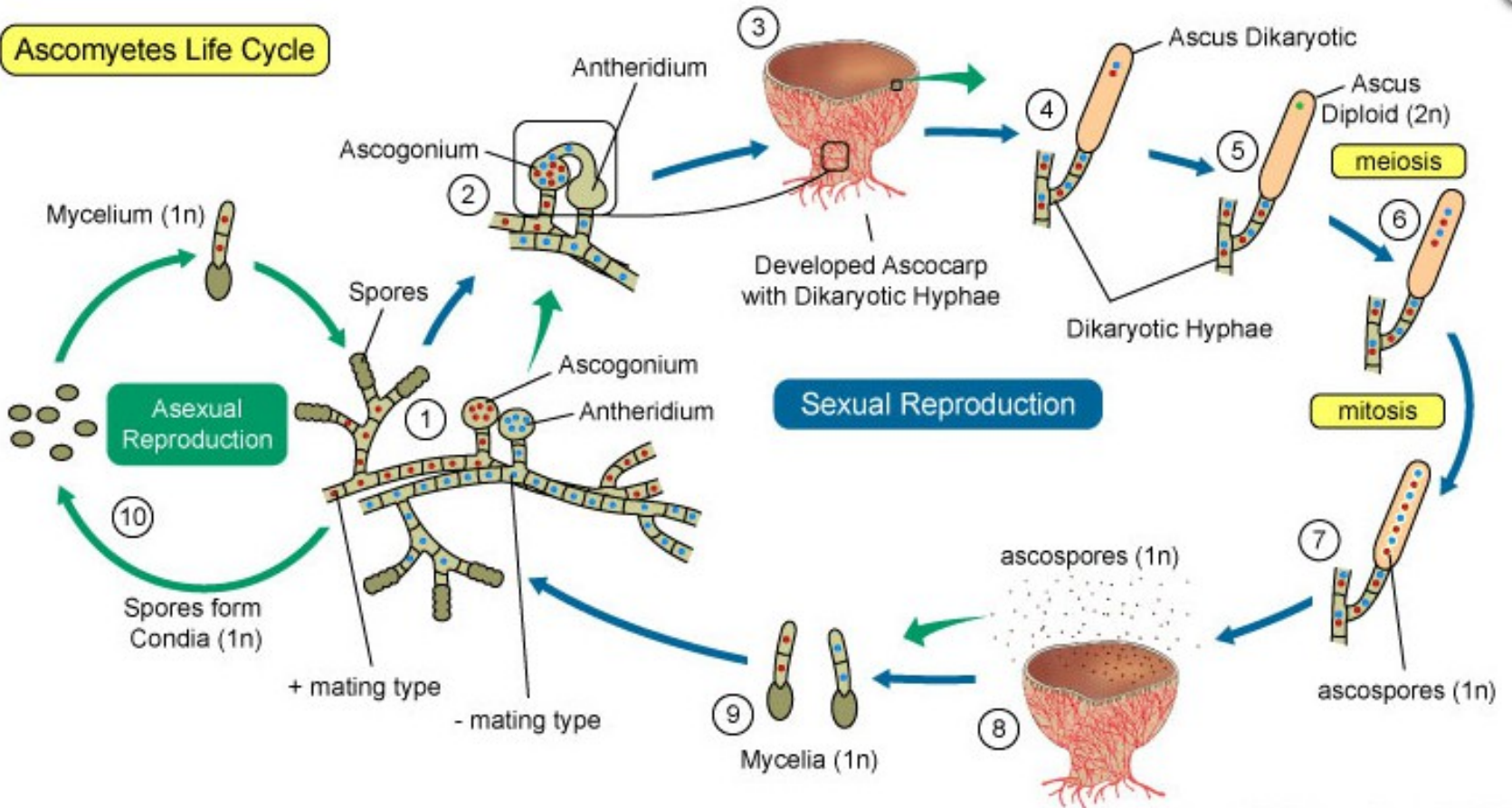


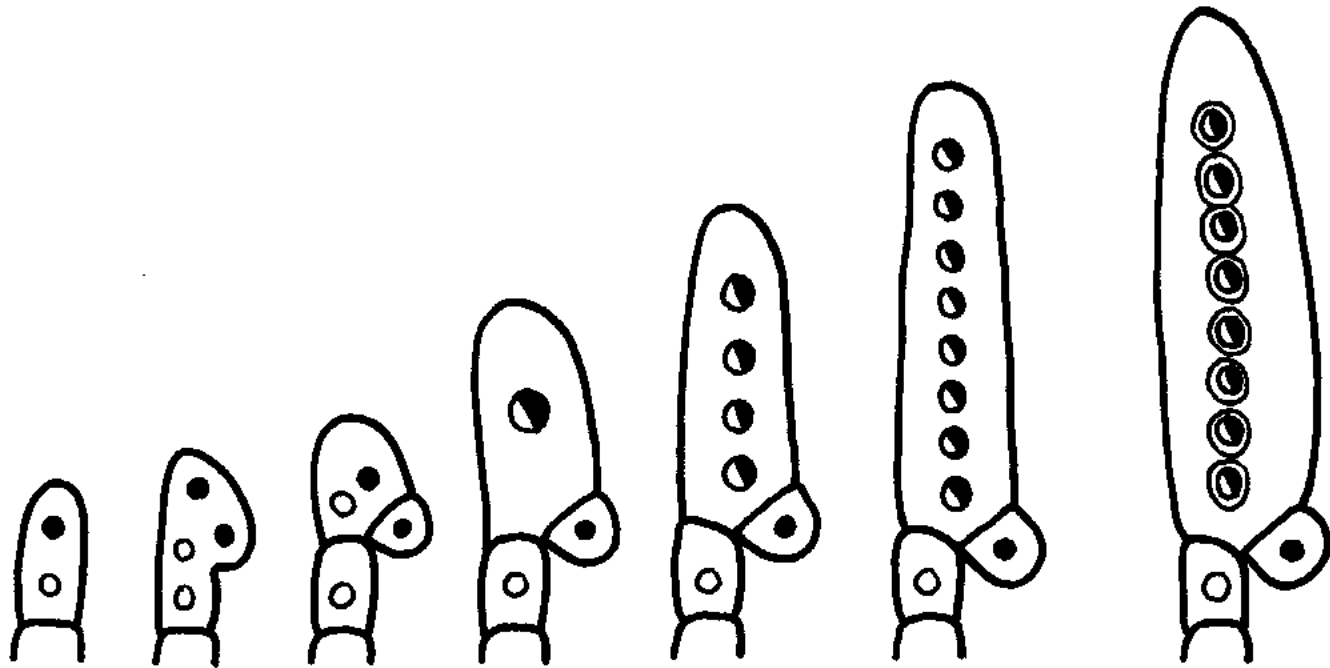
CORSO DI BOTANICA SISTEMATICA

LEZIONE 49

Ascomiceti (incl. Licheni)

Ascomyetes Life Cycle





Ivy Livingstone ©BIODIDAC

Suy/97





Apotecio



Peritecio



Ascomiceti non lichenizzati: *Morchella*



Ascomiceti non lichenizzati: *Peziza*

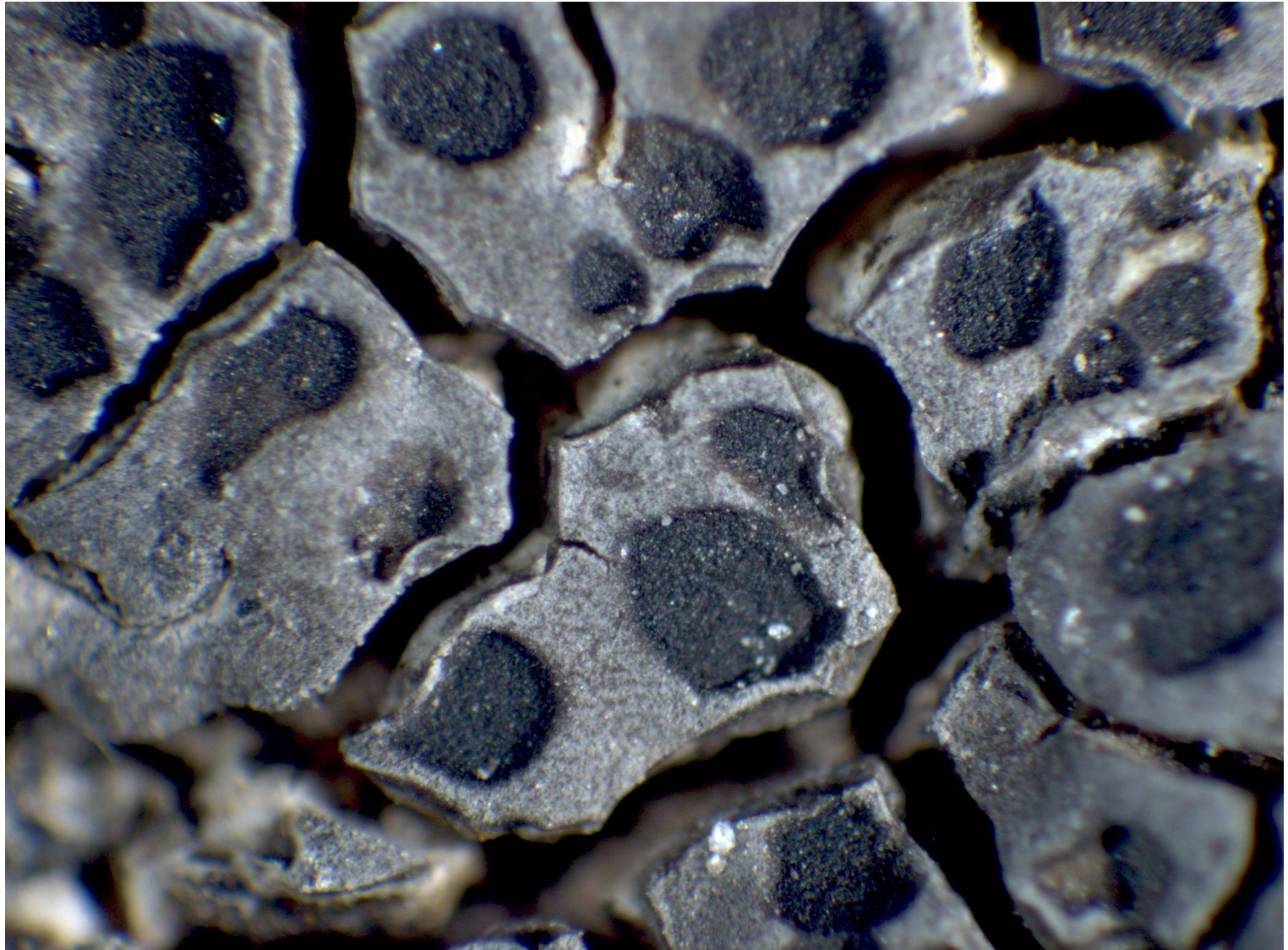
ALLA SCOPERTA DEI LICHENI: UN'INTRODUZIONE

Pier Luigi Nimis





© Stephen Sharnoff/Sylvia Duran Sharnoff





The symbiosis...

THE PHOTOBIONT



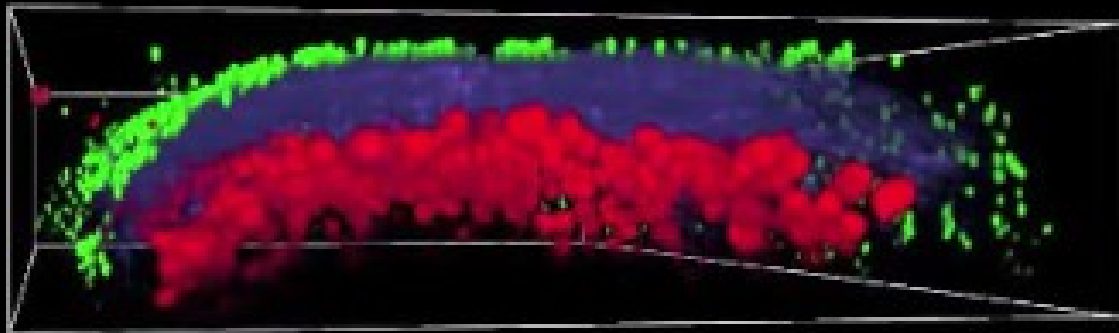
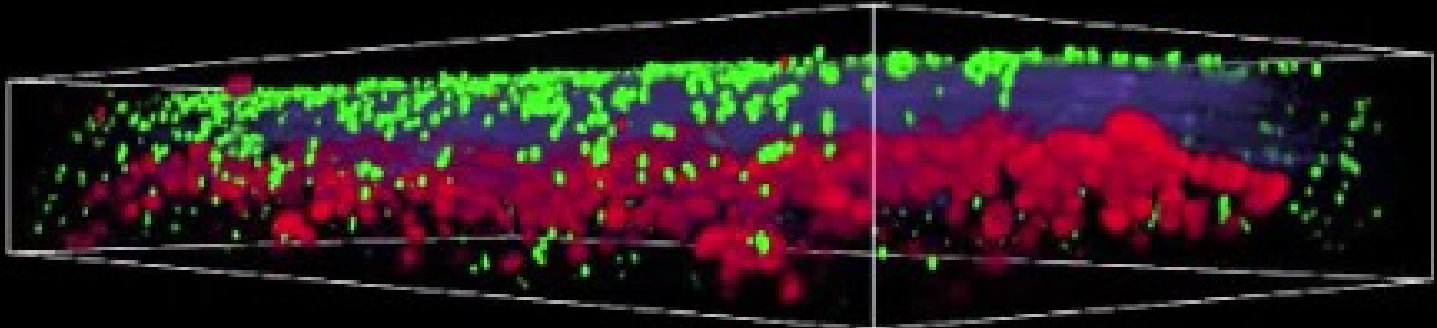
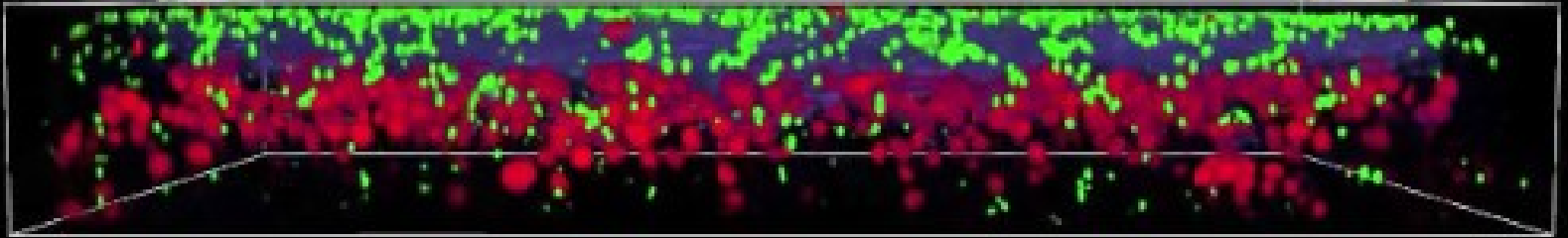
THE LICHEN



THE MYCOBIONT



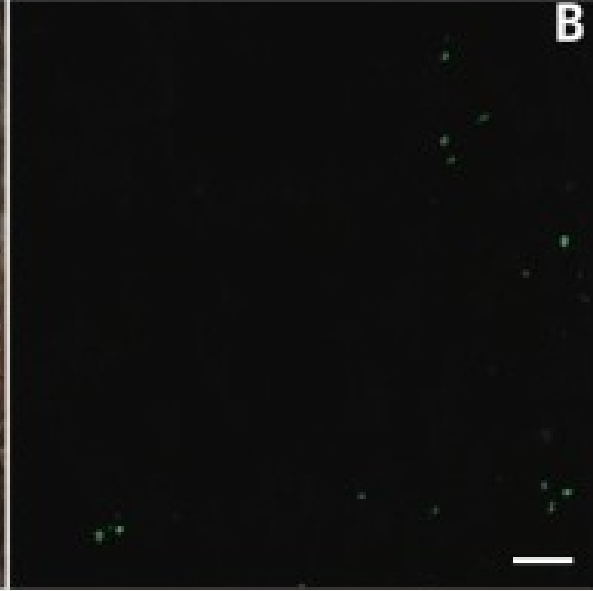




Bryoria fremontii



A

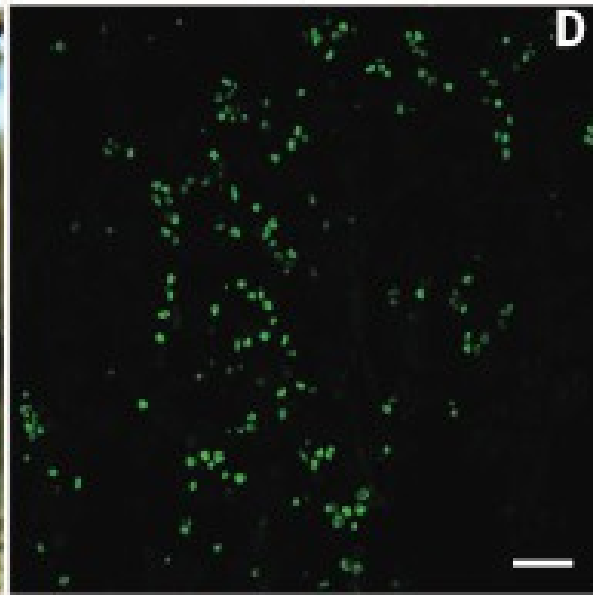


B

Bryoria tortuosa



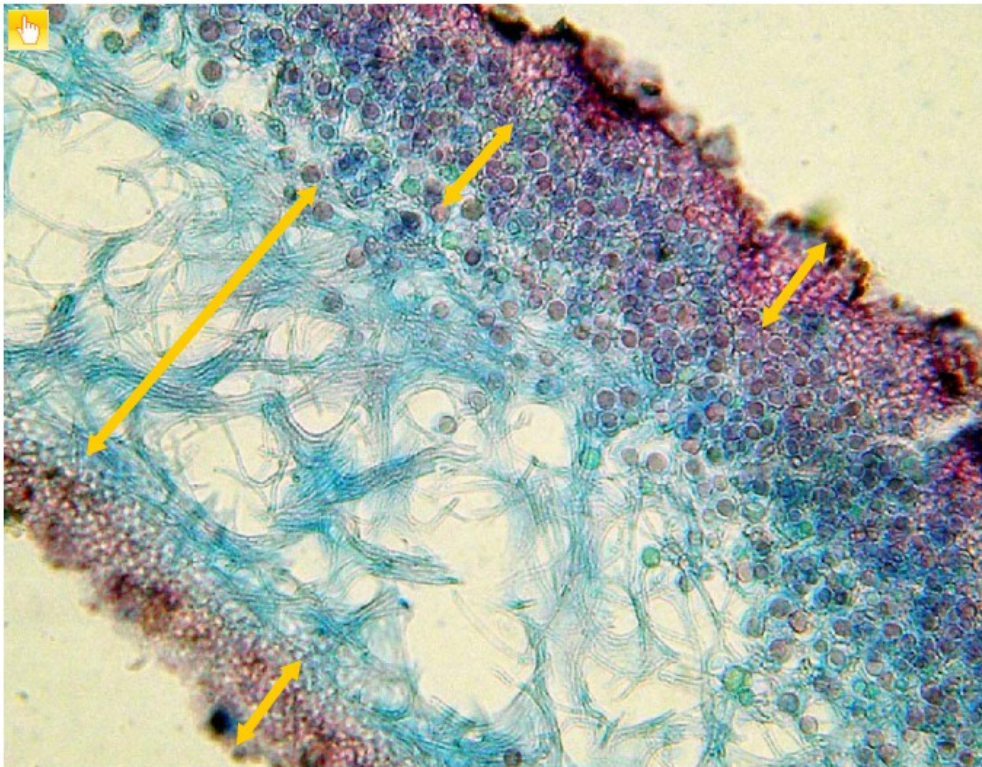
C



D

Anatomy of leafy lichens

A cross-section of a leafy lichen under the microscope shows several layers:



UPPER CORTEX

A skin-like layer of tightly packed hyphae

PHOTOSYNTHETIC LAYER

A layer with algae that need to be exposed to sunlight

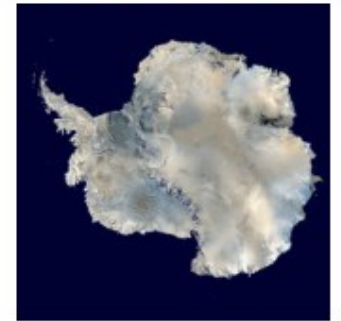
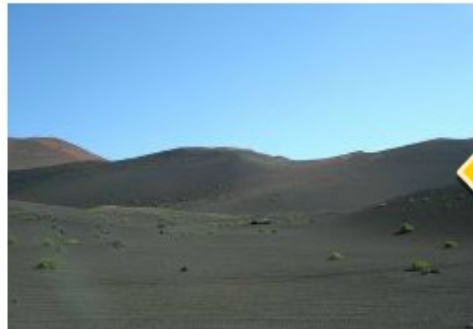
MEDULLA

A layer of loosely packed hyphae which favour gas exchange

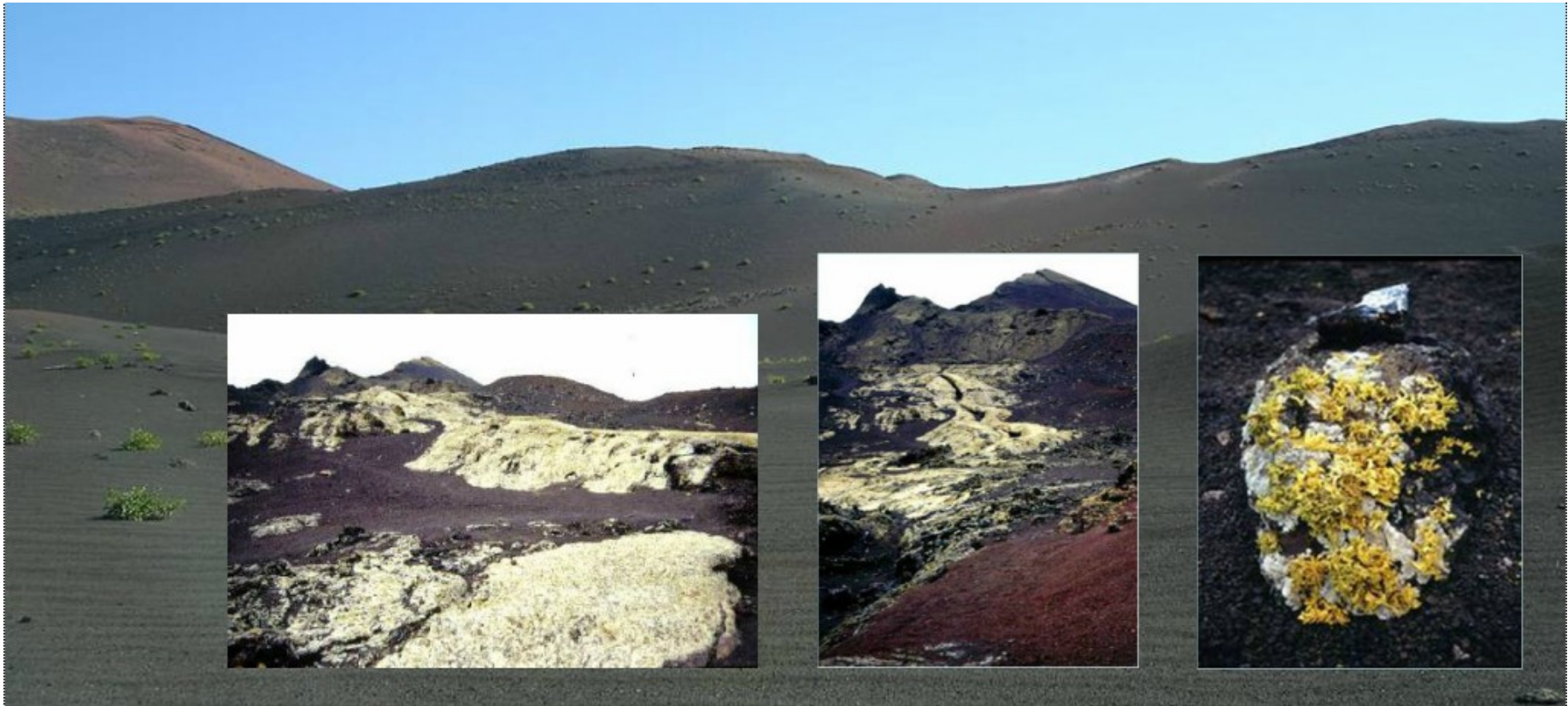
LOWER CORTEX

A skin-like layer of tightly packed hyphae that sometimes develops root-like structures



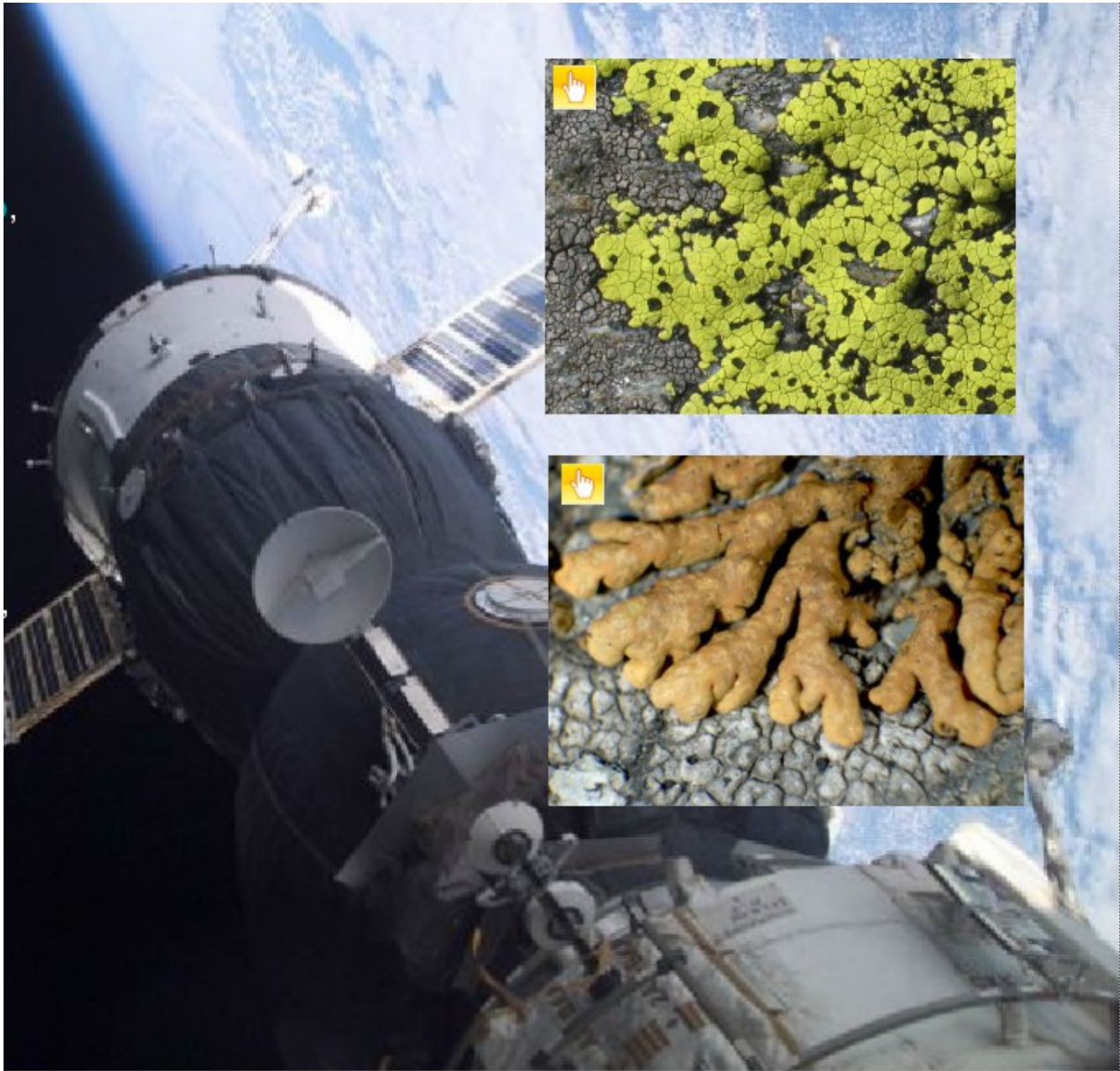






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Formula

L'unico dentifricio cosmetico naturale a base di licheni artici

BlanX è l'unico dentifricio cosmetico, coperto da Brevetto Internazionale, naturale a base di licheni artici, che restituisce giorno dopo giorno il bianco naturale dei denti.

Le sostanze attive presenti nel dentifricio aiutano a prevenire il formarsi della placca e **proteggono dall'attacco dei batteri**. In più, BlanX elimina le macchie di alimenti, caffè, nicotina e altri inquinanti con un'azione assolutamente naturale. La sua azione **sbiancante non è abrasiva per lo smalto** e i suoi

effetti si misurano dopo appena due settimane. Un'efficacia dimostrata da diversi **studi e test clinici**.

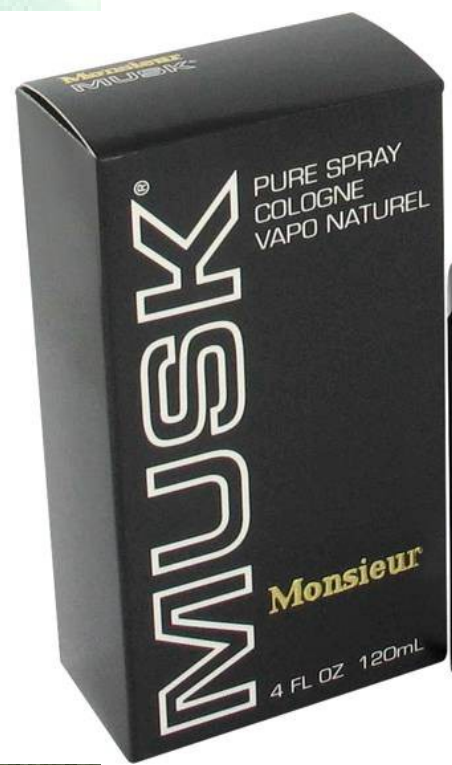














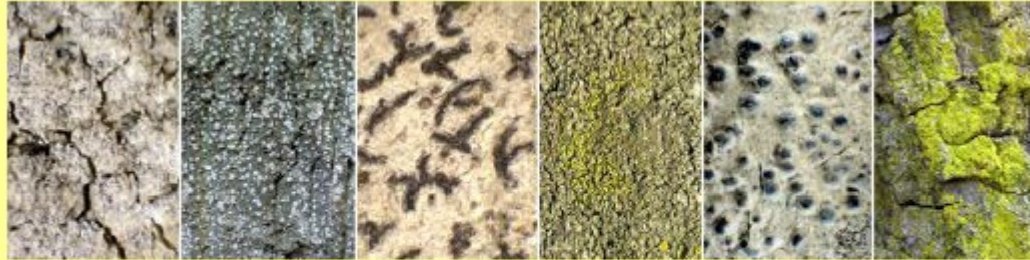




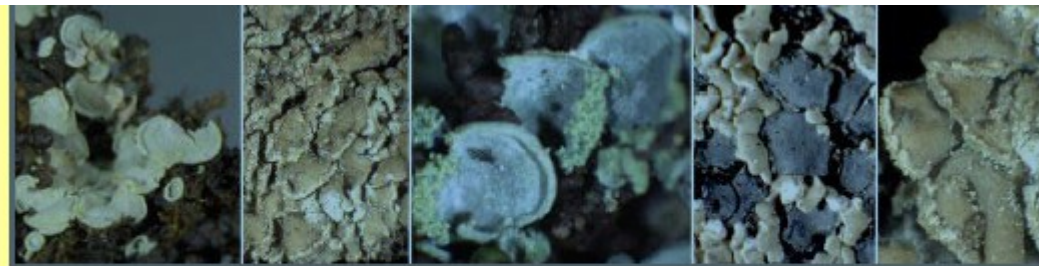
Licheni fruticosi: si sviluppano in 3 dimensioni, con forme variabilissime (filamentosi e pendenti, a forma di coppa, bastoncino, cespuglietto).



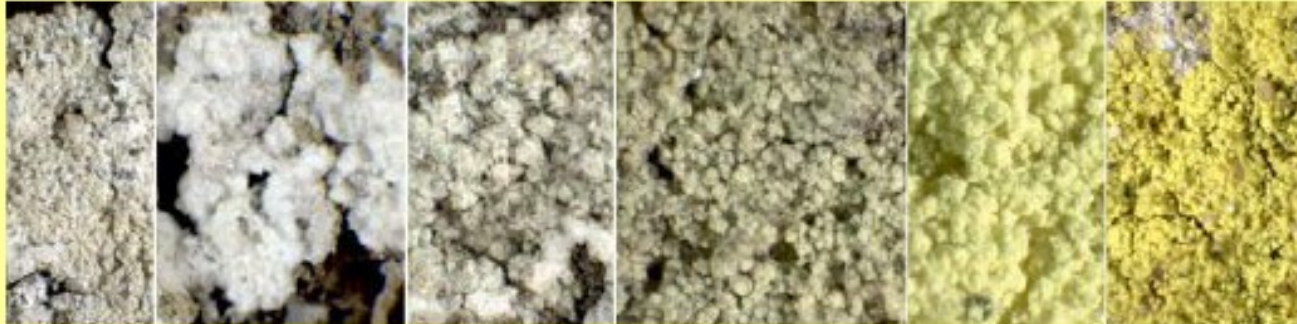
Licheni fogliosi: si sviluppano in 2 dimensioni (come una foglia) e la faccia inferiore è attaccata al substrato tramite organi simili a radichette (rizine). I lobi sono sollevabili dal substrato almeno all'apice.



Licheni crostosi: si sviluppano in 2 dimensioni come i licheni fogliosi, ma la faccia inferiore aderisce strettamente e completamente al substrato (si possono raccogliere solo assieme ad esso).



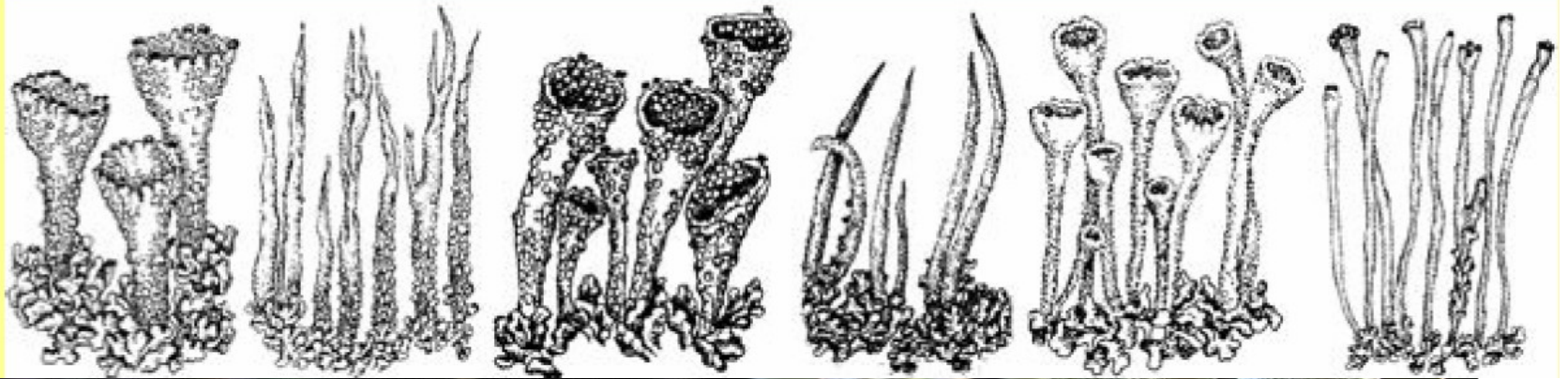
Licheni squamulosi: il tallo è composto da piccole squamette, a volte embriciate (disposte come le tegole di un tetto).



Licheni leprosi: il lichene è ridotto ad una soffice massa pulverulenta facilmente asportabile dal substrato.



Licheni gelatinosi: questo gruppo include sia licheni fogliosi che licheni crostosi. Contengono cianobatteri ed hanno tallo indifferenziato (omeomero). Allo stato umido diventano fortemente gelatinosi, allo stato secco sono neri e duri.



fruticosa a forma di trombetta, bastoncino o cespuglietto (**podezi**) ed una squamulosa nella parte basale.



Hanno un tallo intermedio tra la forma crostosa e quella fogliosa, con una parte centrale crostosa e lobi raggianti al margine. A differenza dei licheni fogliosi, non hanno mai rizine.

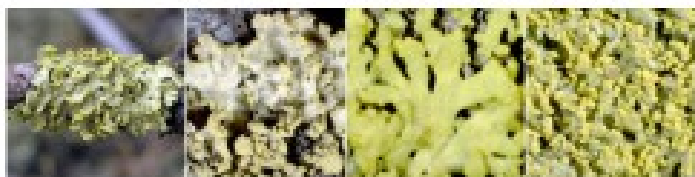




giallo o arancione



arancione



giallo



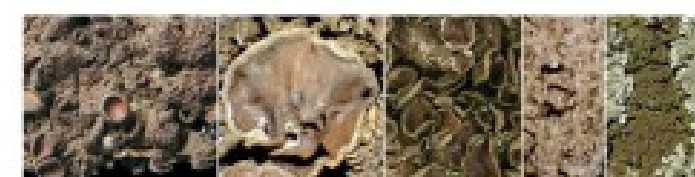
verde-giallastro



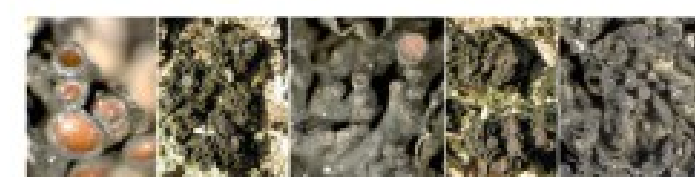
verdastro



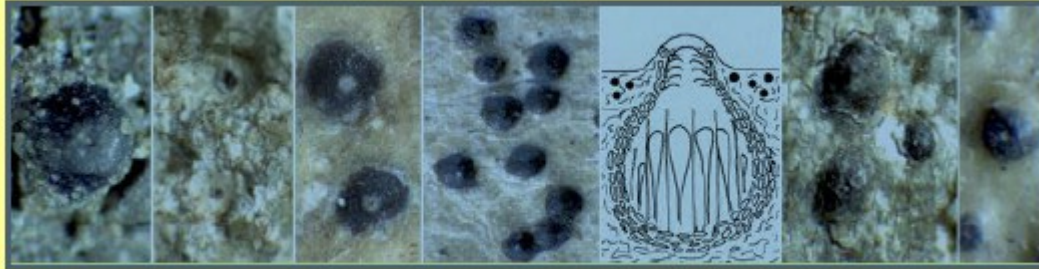
bianco o grigio chiaro



marrone



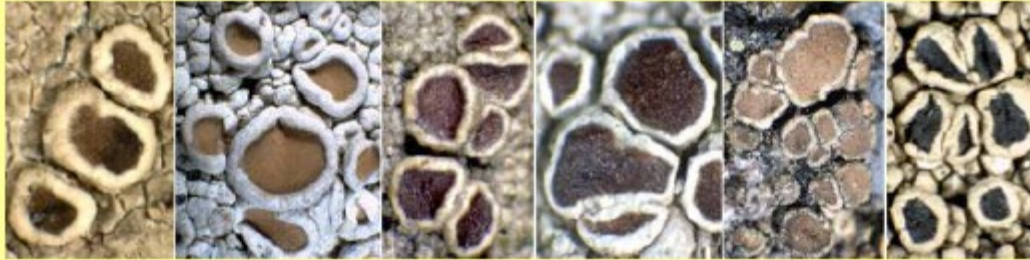
nero o grigio scuro



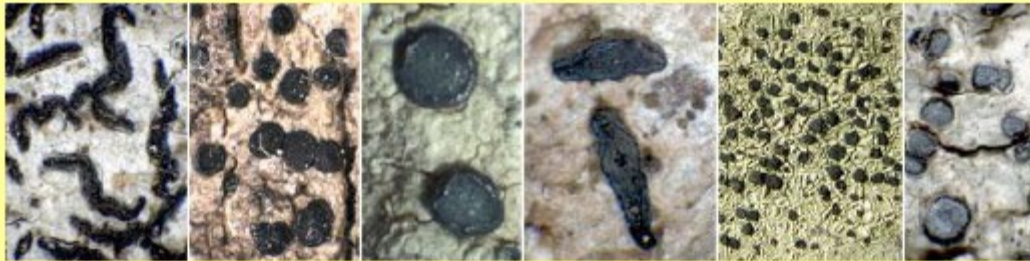
Periteci: organi a forma di fiasco, con una piccola apertura all'apice da cui escono le spore.



Apoteci: organi in cui le spore vengono liberate da una superficie esposta all'aria. Hanno forma diversa, solitamente a forma di disco. Si distinguono 2 tipi principali di apoteci, illustrati di seguito.



Apoteci lecanorini: il margine dell'apotecio contiene alghe. Normalmente disco e margine degli apoteci sono di colore molto diverso.



Apoteci lecideini: il margine dell'apotecio non contiene alghe. Normalmente disco e margine degli apoteci sono dello stesso colore.



Apoteci di forma particolare – lirelle: sono apoteci non lecanorini di forma allungata, a volte ramificati (*Graphis*, *Opegrapha* etc.).



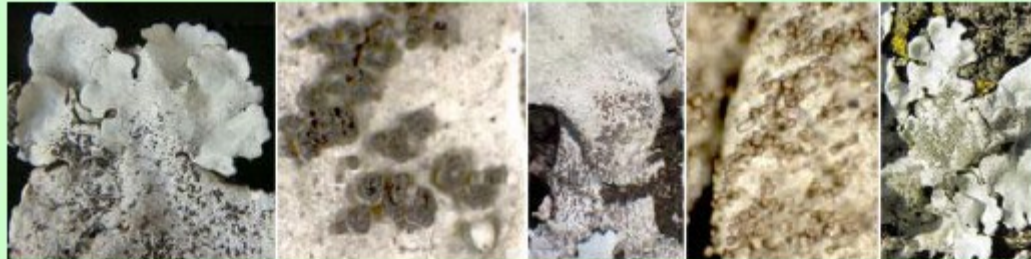
Apoteci di forma particolare – licheni 'a spillo': in molte *Caliciales* gli apoteci sono portati all'apice di lunghi peduncoli. Gli aschi liberano una quantità illimitata di spore, per cui l'apice degli 'spilli' è coperto da una massa sporale nera, bruna o verdastra.



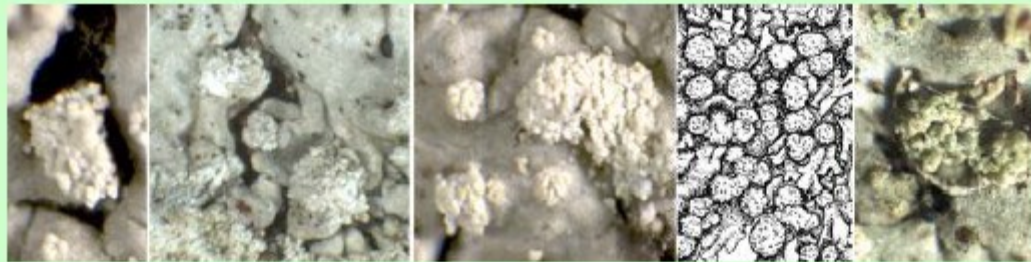
Apoteci di forma particolare - gli apoteci 'a sella' di *Peltigera*: in questo genere gli apoteci si formano all'apice dei lobi, e spesso si ripiegano a mo' di sella.



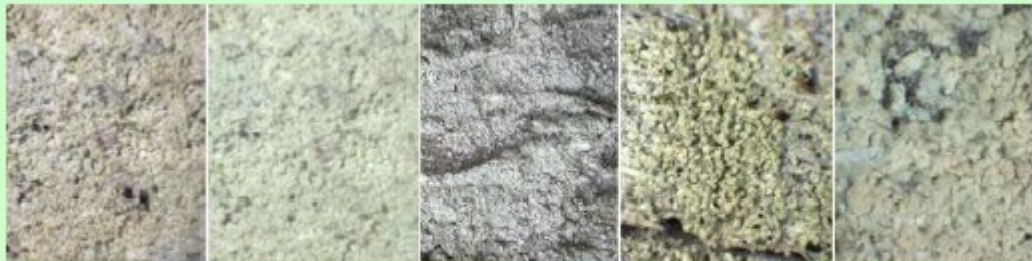
Apoteci di forma particolare – gli apoteci verrucosi: nel genere *Pertusaria* alcune specie hanno apoteci immersi in verruche del tallo, che liberano le spore per un piccolo poro apicale. Si possono facilmente confondere con periteci, che però normalmente non sono coperti dal tallo.



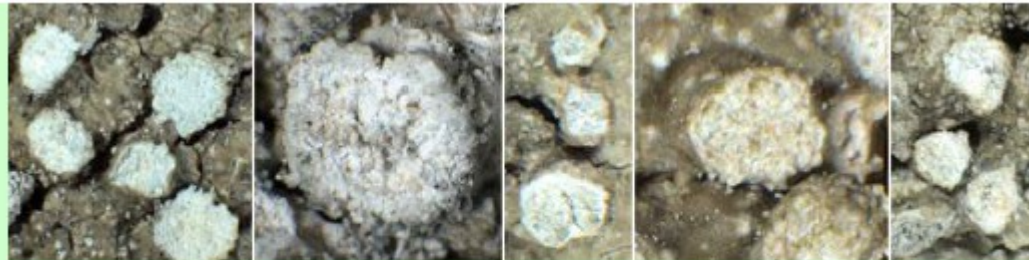
Isidi: sono estroflessioni della faccia superiore del tallo, coperte dal cortex, che contengono anche cellule del fotobionte e si staccano dalla parte basale. Sono piuttosto 'pesanti' ed hanno forma diversa (cilindrici, ramificati, appiattiti, sferici).



Soredi: sono minutissimi gomitoli di ife contenenti al cento alcune cellule del fotobionte. Sono molto più leggeri degli isidi e si originano dalla medulla. Hanno l'aspetto di una sottile polverina. Importante è il modo in cui i soredi sono disposti sul tallo. Seguono alcuni esempi.



Soredi diffusi: i soredi si formano su tutta la superficie del tallo, che assume un aspetto pulverulento.

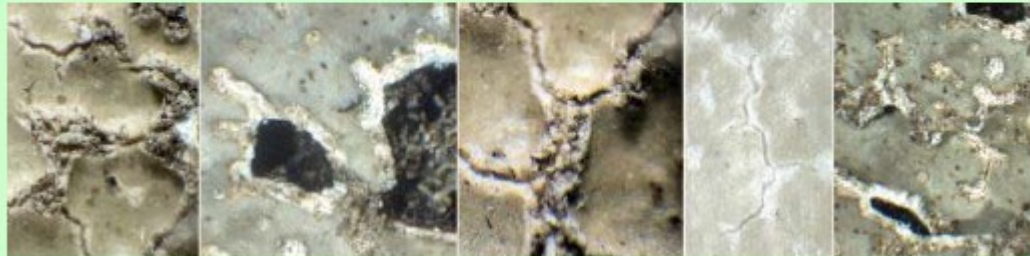


Soredi in sorali maculiformi: i soredi si formano in aree ben delimitate alla superficie del tallo (soralia), di forma circolare.

(sorali), di forma circolare.



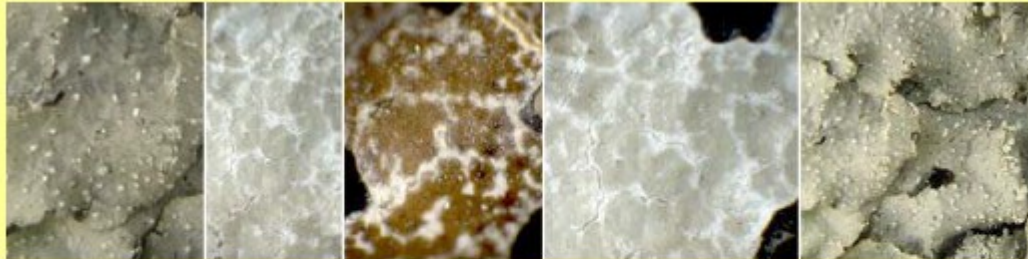
Soredi in sorali labriformi: i soredi si formano in aree ben delimitate alla superficie del tallo (sorali), disposte all'apice dei lobi ed a forma di labbro.



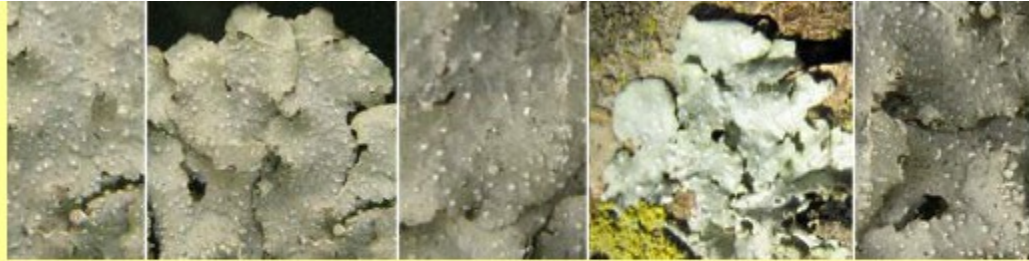
Soredi in sorali lineari: i sorali sono molto più lunghi che larghi. Possono formarsi alla superficie del tallo o al margine dei lobi.



Cifelle: grandi perforazioni sulla faccia inferiore del tallo in *Sticta*.



Pseudocifelle: sono piccole interruzioni della faccia superiore del tallo che lasciano intravedere la medulla (che di solito è di colore bianco). Si presentano come piccoli punti o linee chiare, più visibili all'apice dei lobi. Di seguito due esempi di forme diverse.



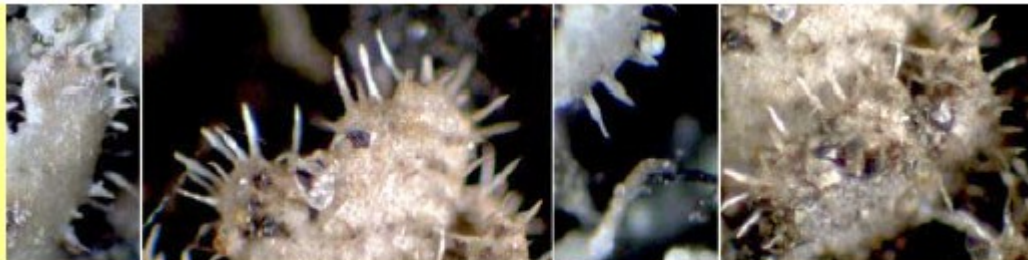
Pseudocifelle puntiformi: piccoli punti bianchi da cui spesso originano sorali maculiformi.



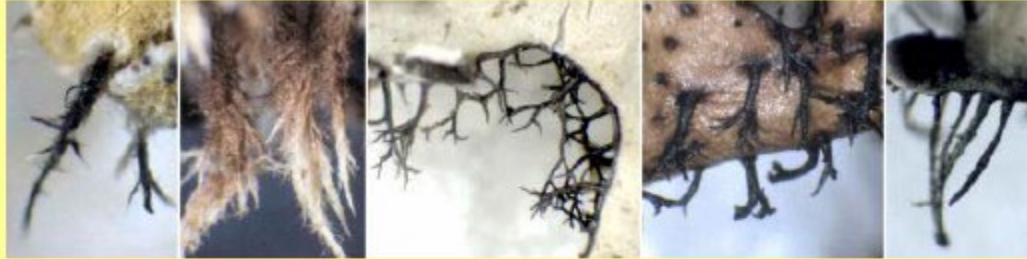
Pseudocifelle allungate: piccole linee bianche, a volte disposte a rete, da cui spesso originano sorali allungati.



Fibrille e ciglia: disposte al margine dei lobi. Possono essere nere o di colore chiaro.



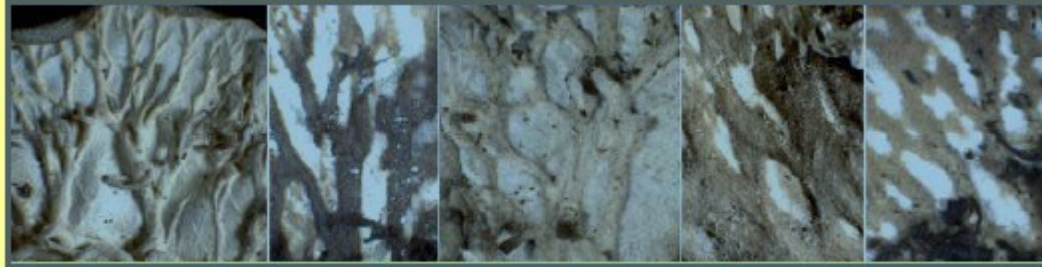
Peli: sottili peli trasparenti, a volte visibili soltanto con una forte lente.



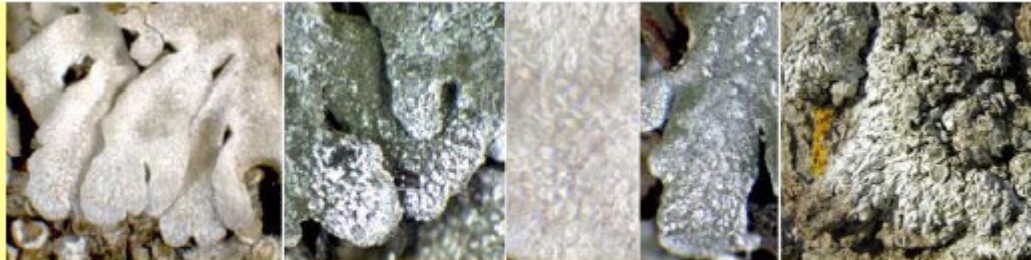
Rizine: strutture simili a radichette che ancorano i licheni fogliosi al substrato.



Tomento: denso feltro di peli sulla faccia inferiore del tallo. Da non confondere con le rizine che sono molto più robuste.



Vene: limitate al genere *Peltigera*, sono delle evidenti venature sulla faccia inferiore del tallo. Possono essere piatte o in rilievo, scure o chiare.



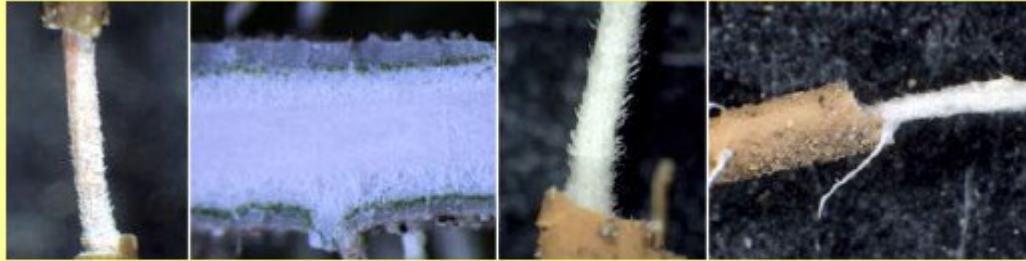
Pruina: depositi di cristalli alla superficie del tallo (di solito di colore bianco).



Costolature: in alcuni licheni la faccia superiore del tallo è fortemente reticolato-costolata, con costolature in rilievo.

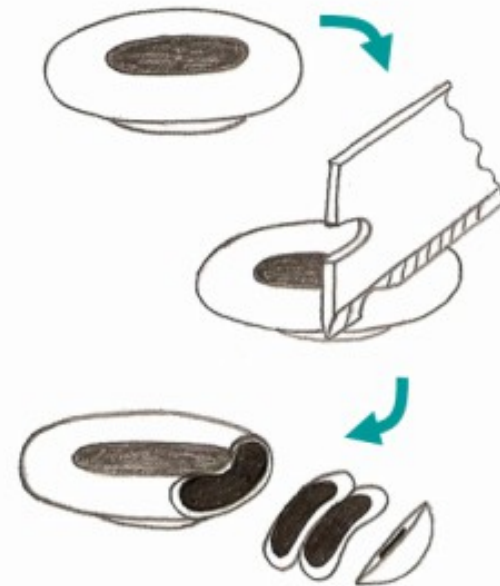
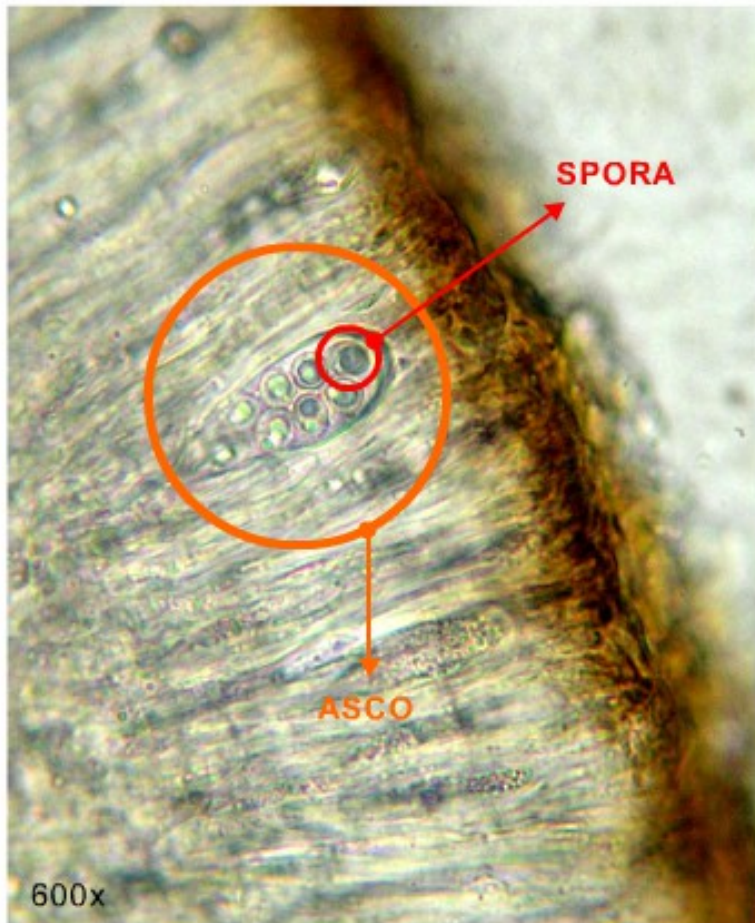


Cefalodi: strutture simili a verruche scure che contengono cianobatteri che si trovano su talli di licheni con alghe verdi (tipiche di poche specie, ad es. di alcune *Peltigera*).



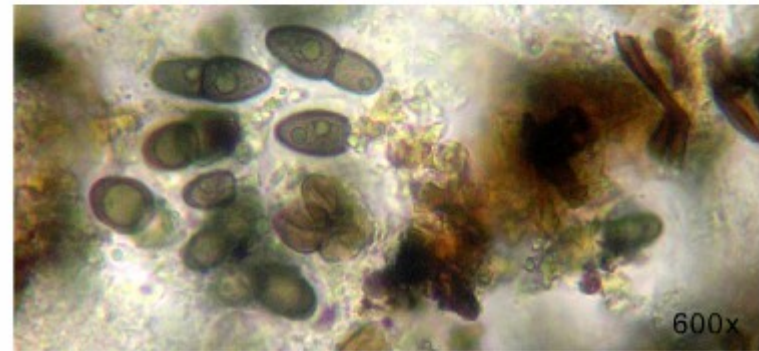
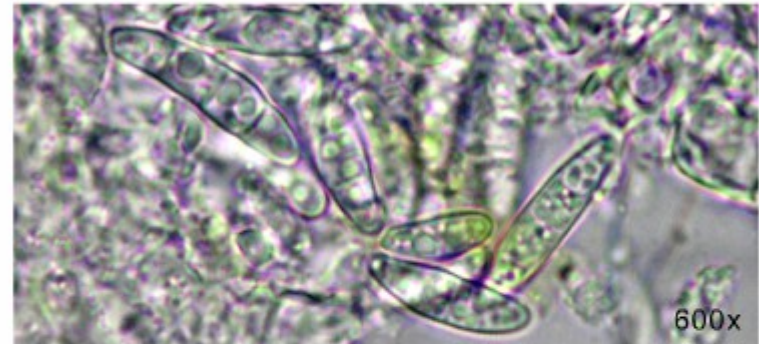
Cordone medullare di *Usnea*: Nel genere *Usnea* il tallo è filamentoso e la parte centrale della medulla forma una struttura compatta simile ad un filo, visibile stirando i rametti con le dita.

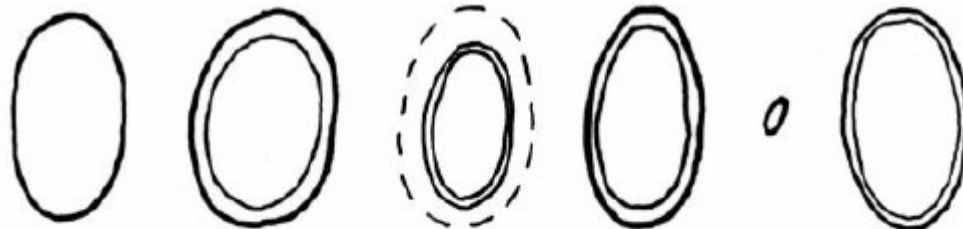
Apoteci e periteci sono gli organi utilizzati dal fungo per la riproduzione sessuale. Al loro interno sono presenti gli **aschi** (al singolare **asco**), speciali cellule a forma di sacco in cui sono racchiuse le **spore**.



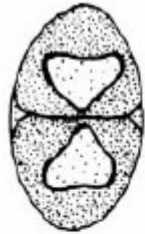
Se si osserva una fettina di apotecio o peritecio al microscopio ottico, a 600 o 1000 ingrandimenti, è possibile riconoscere gli aschi, ed al loro interno le spore.

Nella maggior parte dei licheni gli aschi funzionano come piccole pistole sotto pressione. Quando le spore al loro interno raggiungono il corretto livello di maturazione, vengono espulse per essere disperse dal vento.





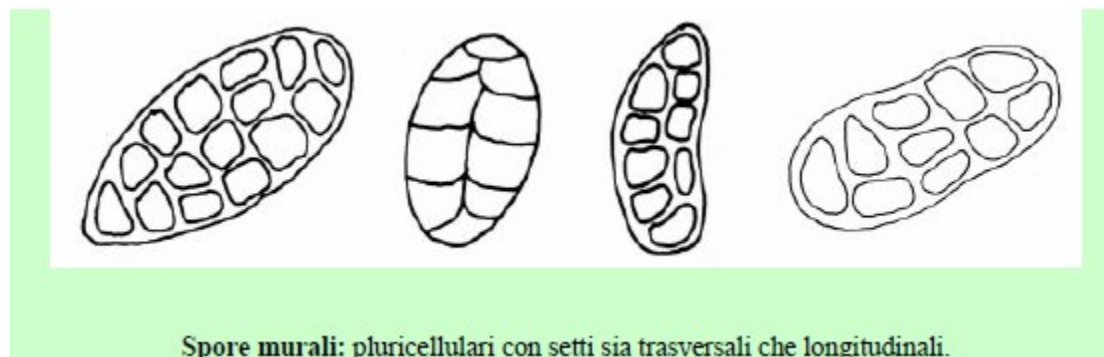
Spore bicellulari incolori.



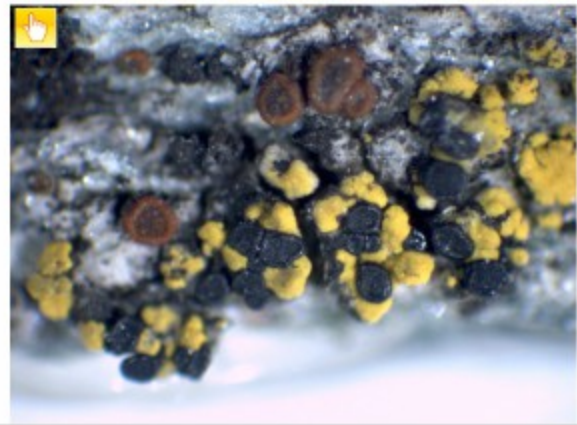
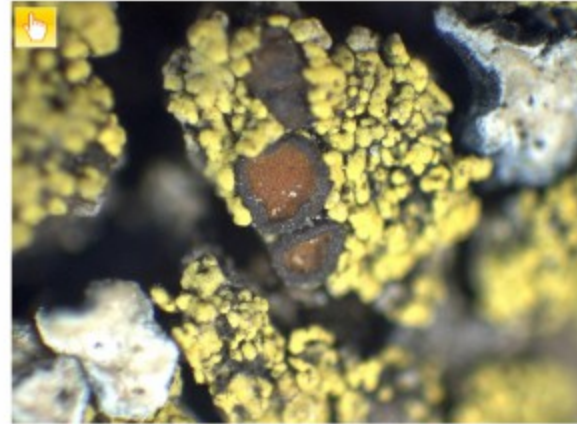
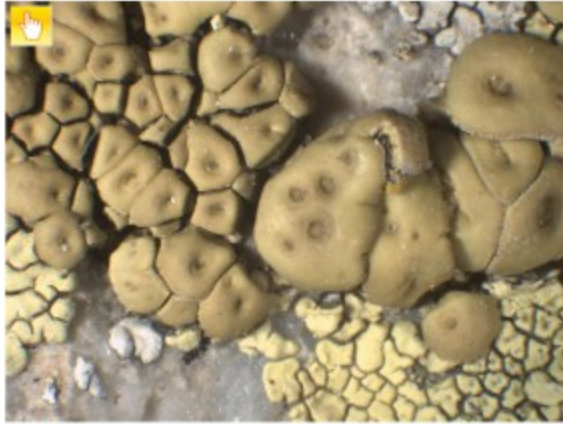
Spore bicellulari colorate.

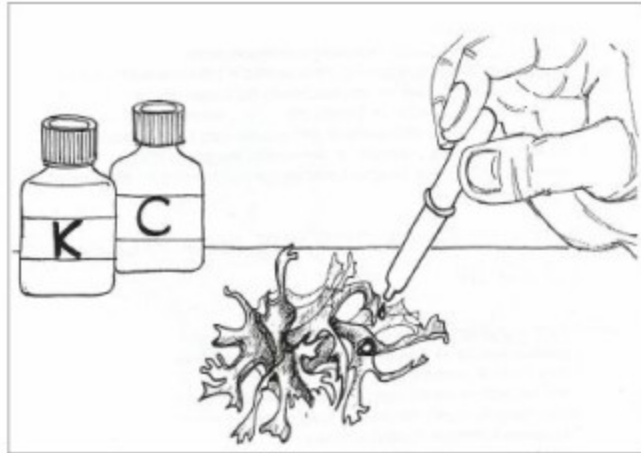


Spore bicellulari polar-diblastiche: due cellule unite da un canale citoplasmatico.



Un fenomeno interessante, soprattutto tra i licheni rupicoli, è l'esistenza di numerose specie che iniziano il ciclo vitale su altre specie di licheni, a volte "rubando" loro il fotobionte e divenendo licheni autonomi, a volte comportandosi da parassiti. Formano di solito delle piccole "isole" sul tallo dei licheni ospiti.







Reazioni negative: il liquido non cambia colore.



Reazione K+giallo: il liquido e/o la parte di lichene cui è stato applicato si colora di giallo.



Reazione C e KC+ rosa della medulla: la medulla si colora di rosa (reazione molto effimera).



Reazione C+ giallo del disco degli apotecii: in *Lecanora carpinea*.

Pier Luigi Nimis



The Lichens of Italy

An annotated catalogue

Museo Regionale
di Scienze Naturali
Torino

MONOGRAFIA XII
1993

1993



THE LICHENS OF ITALY

A second annotated catalogue

EUT

Pier Luigi Nimis

2016



ITALIC 5.0, THE INFORMATION SYSTEM ON ITALIAN LICHENS

P.L. Nimis & S. Martellos

ITALIC makes available information about the lichens known to occur in Italy. It is maintained and updated by the Research Unit of Prof. Pier Luigi Nimis, at the University of Trieste (NE Italy), Dept. of Life Sciences. The present version incorporates information from the latest Checklist of the Lichens of Italy by Nimis (2016).

The information can be queried through three interfaces (taxonomic, floristic, statistic). Other sections are devoted to the TSB Lichen Herbarium, the image archive, and to regional and national red lists. ITALIC also provides access to useful resources such as digital identification keys, developed in the framework of Project Dryades (<http://dryades.units.it>).

Cetraria islandica (L.) Ach. subsp. islandica

Meth. Lich.: 293, 1803. Basionym: Lichen islandicus L. - Sp. Pl., 2: 1145, 1753.

Synonyms: *Cetraria islandica* f. *platysmoides* Sambo; *Cetraria islandica* var. *platyna* (Ach.) Ach.

Distribution: N - Fri (Tretiach & Hafellner 2000, Tretiach & Molaro 2007, Minganti & al. 2014), Ven (Nimis 1994, Nascimbene & Caniglia 1997, 2003c, Caniglia & al. 1999, 2000, Nascimbene 2001b, 2005c, 2008c, Cercasov & al. 2002, Nascimbene & al. 2006e, Nascimbene & Marini 2007, Brackel 2013, Minganti & al. 2014, Giovagnoli & Tasinazzo 2014), TAA (Caniglia & al. 2002, Nascimbene & Caniglia 2002c, Nascimbene 2003, 2006c, 2008b, 2013, Nascimbene & al. 2005, 2006, 2006e, 2008c, Lang 2009, Bilovitz & al. 2014, 2014b), Lomb (Rivellini 1994, Rossi & al. 1998, Valcuvia & al. 2000d, Dalle Vedove & al. 2004, Valcuvia & Truzzi 2007b, Brackel 2013, Minganti & al. 2014, Vitalini & al. 2015), Piem (Morisi & Sereno 1995, Isocrono & Falletti 1999, Isocrono & al. 2003, 2004, 2006, Morisi 2005, Isocrono & Piervittori 2008, Minganti & al. 2014), VA (Verger & al. 1993, Siniscalco 1995, Borlandelli & al. 1996, Piervittori & Isocrono 1997, 1999, Valcuvia 2000, Piervittori & al. 2001, 2004, Revel & al. 2001, Matteucci & al. 2008, Minganti & al. 2014), Emil (Tomaselli 1991, Ferrari & al. 1994, Tomaselli & Rossi 1994, Rossi & Ferrari 1994, Dalle Vedove & al. 2002), Lig (Brunialti & al. 1999, Minganti & al. 2014), C - Tosc (Benesperi & al. 2007, Minganti & al. 2014, Minganti & al. 2014, Brackel 2015), Marc (Nimis & Tretiach 1999), Umb (Panfilii 2000, 2007, Ravera & al. 2006), Laz (Brackel 2015), Abr (Nimis & Tretiach 1999, Minganti & al. 2014, Brackel 2015), Mol (Nimis & Tretiach 2004, Caporale & al. 2008), S - Camp, Bas (Potenza & Fascetti 2005, 2012, Potenza 2006), Cal (Puntillo 1996, Potenza & al. 2011, Minganti & al. 2014).

Description: Thallus fruticose, dark brown to pale olive-green in shade, the basal parts often reddish, loosely attached. Lobes flattened, elongate, ascending, up to 4 cm broad and to 10 cm tall, often sparingly branched, the margins in-rolled, with short (0.2-1 mm) marginal spinules bearing pycnidia. Upper surface smooth, sometimes pitted; lower surface usually paler, with large, maculiform, irregular pseudocyphellae spread throughout the surface. Apothecia extremely rare, lecanorine. Asci 8-spored, *Lecanora*-type. Ascospores 1-celled, hyaline, ellipsoid to ovoid. Pycnidia immersed at the top of the marginal spinules. Conidia filiform, multiseptate, colourless. Photobiont chlorococcoid. Spot tests: thallus K-, C-, KC-, P-; medulla P+ yellow to orange, UV-. Chemistry: medulla with fumarprotocetraric acid, and variable amounts of protocetraric and protolichesterinic 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. *crispiformis* (Räsänen) Kärnefelt should be looked for in the Alps.

Growth form: Fruticose

Substrata: soil, terricolous mosses, and plant debris

Photobiont: green algae other than *Trentepohlia*

Reproductive strategy: mainly asexual, by thallus fragmentation

Commonness-rarity: (info)

Alpine belt: very common

Subalpine belt: extremely common

Oromediterranean belt: rare

Montane belt: very rare

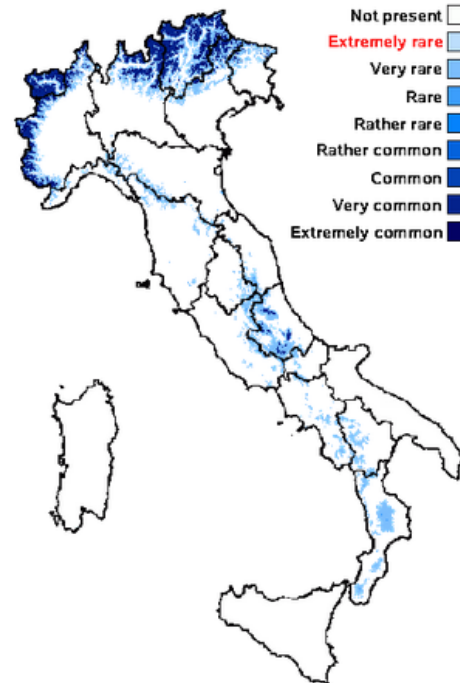
Submediterranean belt: absent

Padanian area: absent

Humid submediterranean belt: absent

Humid mediterranean belt: absent

Dry mediterranean belt: absent



CLASSIFICATION

REFERENCES

pH of the substrata:  (info)

Solar irradiation:  (info)

Aridity:  (info)

Eutrophication:  (info)

1 2 3 4 5

Poleotolerance:  (info)



Caloplaca brouardii (B. de Lesd.) Zahlbr.



Caloplaca bullata (Müll. Arg.) Zahlbr.



Caloplaca cacuminum Poelt



Caloplaca congregiens (Nyl.) Zahlbr.



Caloplaca conversa (Kremp.) Jatta



Caloplaca californica Zahlbr.



Caloplaca campidia (Tuck.) Zahlbr.



Caloplaca ceracea J.R. Laundon



Caloplaca cretensis (Zahlbr.) Wunder



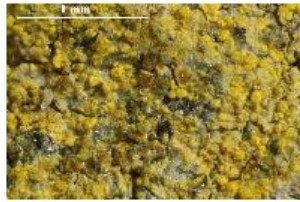
Caloplaca crocea (Kremp.) Hafellner &



Caloplaca cerina (Hedw.) Th. Fr. s.lat.



Caloplaca chapadensis (Malme) Zahlbr.



Caloplaca chejuensis S.Y. Kondr. & Hur



Caloplaca cupulifera (Vain.) Zahlbr.



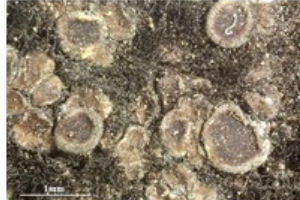
Caloplaca dahlii Elix, S.Y. Kondr. & Kär



Caloplaca chilensis Kärnefelt, S.Y. Kondr., Frödén & Arup



Caloplaca chlorina (Flot.) H. Olivier



Caloplaca chrysophora Zahlbr.



Caloplaca demissa (Körb.) Arup & Grube



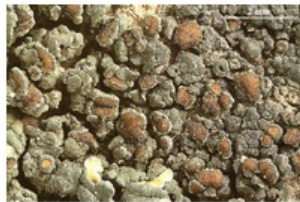
Caloplaca diphasia (Tuck.) Wetmore



Caloplaca circumalbata (Müll. Arg.) Wunder



Caloplaca coccinea (Müll. Arg.) Poelt



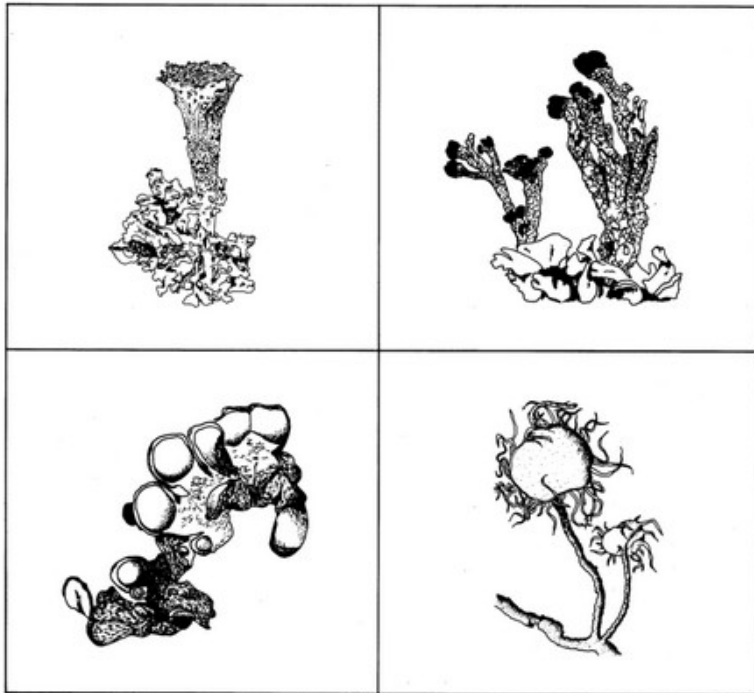
Caloplaca conglomerata (Bagl.) Jatta



Caloplaca eos S.Y. Kondr. & Kärnefelt

P.L. NIMIS

I MACROLICHENI D'ITALIA
CHIAVI ANALITICHE PER LA DETERMINAZIONE



grafiche fulvio spa/ud
1987

Le guide di Dryades 1 - Serie Licheni I (L-I)

**KEYS TO THE LICHENS
OF ITALY**
I. TERRICOLOUS SPECIES

Pier Luigi Nimis & Stefano Martellos



Edizioni Goliardiche



KEYS TO THE LICHENS OF ITALY - 7) XANTHORIOID LICHENS

Pier Luigi Nimis

Responsible for the apparatus of images: Andrea Moro - Management of software and databases: Stefano Martellos

The taxonomy of Teloschistaceae is presently in a state of flux and high confusion, with different authors proposing different generic arrangements. In a recent revision of the Xanthorioideae, Kondratyuk et al. (2014) accepted no less than 31 genera for this group only (97 genera for the whole Family). Here I follow the much less extreme splitting proposed by Arup & al. (2013), although I admit that by having every single species into a monospecific genus we would reach nomenclatural stability. The paper by Arup et al. (2013) is the most comprehensive attempt of a re-definition of the Teloschistaceae based on molecular data. The traditional circumscription of *Xanthoria* has been profoundly modified, with the segregation of several species into other genera, such as *Polycauliona*, *Rusavskia* and *Xanthomendoza* (see Arup & al. 2013). In its narrower definition, *Xanthoria* is a well-supported genus of c. 10 species, including the slightly deviating *X. resendei*. The genus is best represented in the Northern Hemisphere, with an obvious diversity centre in the Mediterranean area. *Polycauliona*, as re-defined by Arup & al. (2013) is a rather large (c. 25 species) genus consisting of some smaller-sized foliose and fruticose species formerly included into *Xanthoria*, together with crustose species. *Xanthomendoza* was originally monotypic, until Søchting et al. (2002) transferred all *Xanthoria*-species with rhizines and bacilliform conidia to *Xanthomendoza*. Afterwards, the genus was once again made monotypic when all these species were transferred to *Oxneria* (Kondratyuk and Karnefelt 2003), a separation which was not generally accepted (see e.g. Lindblom 2006).

In spite of their showy appearance, Xanthorioideae lichens are still rather poorly known in Europe, and especially in the Mediterranean region, with several species which would require further study. Here – pending molecular analysis of original material of *Xanthomendoza huculica* - I follow Lindblom et al. (2019) in treating *X. huculica* as a synonym of *X. fallax*. The key includes the 19 infrageneric taxa known to occur in Italy.

I am grateful to U. Arup (Lund), M. Grube and W. Obermayer (Graz), who provided material regarding *Rusavskia hafellneri*. The key is presently under revision by L. Lindblom (Bergen).

References .

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- Kondratyuk S., Kärnefelt I. 2003b. Revision of three natural groups of xanthorioideae lichens (Teloschistaceae, Ascomycota). Ukrayins'kyi Bot. Zhurn. 60: 427-437.
- Kondratyuk S.Y., Kärnefelt I., Thell A., Elix J.A., Kim J.A., Jeong M.H., Yu N.H., Hur J.S. 2014. A revised taxonomy of the subfamily Xanthorioideae (Teloschistaceae, Ascomycota) based on molecular phylogeny. Acta Bot. Hung., 56.
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- Søchting U. et al. 2002. Revision of *Xanthomendoza* (Teloschistaceae, Lecanorales) based on morphology, anatomy, secondary metabolites and molecular data. Mit. Inst. Allg. Bot. Hamburg 30-32: 225-240.

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List of species

IDENTIFY



[Dichotomous key](#)

[Textual key to all taxa](#)

[Key home page](#)

THE LICHENS OF NORTHERN ITALY - An interactive guide

Taxon:

On



bark and wood



rock

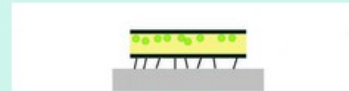


soil, terricolous mosses and plant debris

Thallus



fruticose (only for species with green algae)



foliose

Thallus



crustose or leprose

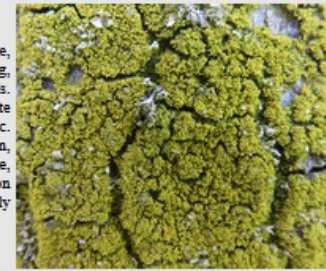


squamulose, or (for cyanobacterial lichens only) microfruticose

1	Thallus K-	2
1	Thallus K+ red	5
2	Lobes very thin, 0.1-0.4 mm wide	3
2	Lobes >2 mm wide	4
3	Thallus of ascending, almost entire lobes, not forming rosettes. Lower surface arachnoid, ecorticate, without true rhizines	

[*Candelaria pacifica* M. Westb. & Arup](#)

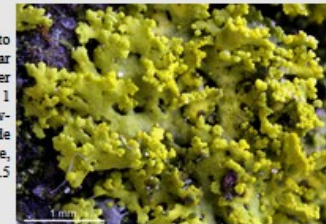
Thallus minutely foliose to subsquamulose, bright lemon yellow, paling to yellow-green in shade, forming rosettes to 5 mm wide, often coalescing into colonies up to 30 cm across. Lobes narrow and short, subsquamulose, 0.1-0.6 mm wide, adnate or ascending, dorsiventral, sparse to imbricate, with granular blastidia ((35-40 µm wide), most common on the more or less fan-shaped ends. Upper cortex c. 10-45 µm thick; medulla white, very thin; lower cortex absent. Lower surface with an arachnoid appearance, white and transparent, showing the green algal layer. Apothecia extremely rare in Europe (not observed in Italian material), sessile, to c. 1 mm diam., with a yellow, plane to finally convex disc, and a smooth but often sorediate margin. Epithecium yellow-brown, granular; hymenium colourless; paraphyses simple, cylindrical to submoniliform; hypothecium colourless. Asci 8-spored, clavate, *Candelaria*-type. Ascospores simple, guttulate, hyaline, oblong-ellipsoid, 11-16 x 4-6 µm. Pycnidia appearing as raised warts on the thallus surface. Conidia ellipsoid, 2.5-3.5 x c. 1.5 µm. Photobiont chlorococcoid. Spot tests: all negative. Chemistry: probably calycin (major) and pulvinic dilactone (minor).



3 Thallus of adpressed, branched lobes, forming rosettes when young. Lower surface smooth, corticate, rhizinate

[*Candelaria concolor* \(Dicks.\) Stein](#)

Thallus minutely foliose, bright lemon yellow to yellow-green in shade, forming rosettes to 1 cm wide, often coalescing into extensive colonies. Lobes narrow, 0.1-0.4(-1) mm wide, adnate or ascending, dorsiventral, often densely imbricate, with granular blastidia most common on the more or less fan-shaped ends. Upper cortex c. 10-30 µm thick; medulla white, very thin; lower cortex c. 20 µm thick. Lower surface white to pinkish, somewhat shiny; with simple, white rhizines. Apothecia rare, sessile, to c. 1 mm diam., with a yellow, plane to finally convex disc, and a smooth but often sorediate or lobulate margin. Epithecium yellow-brown, granular; hymenium colourless, c. 60-90 µm tall; paraphyses simple, cylindrical to submoniliform, with up to 5 µm wide tips; hypothecium colourless, c. 50 µm thick. Asci >30-spored, clavate, *Candelaria*-type. Ascospores simple or thinly 1-septate, uni- or biguttulate, hyaline, 6-14 x 4-6 µm. Pycnidia appearing as raised warts on the thallus surface. Conidia ellipsoid, 2-3 x 1-1.5 µm. Photobiont chlorococcoid. Spot tests: all negative. Chemistry: calycin (major) and pulvinic dilactone (minor).



4 Soredia absent, apothecia common

[*Vulpicida juniperinus* \(L.\) J.-E. Mattsson & M.J. Lai](#)

Thallus foliose to subfruticose, loosely attached, forming irregular rosettes or dense tufts to 5 cm across. Lobes 1-5 mm wide, dorsiventral, slightly canaliculated or terete, ascending to erect. Upper surface bright yellow in open habitats to greenish-yellow in shaded habitats; medulla bright yellow; lower surface pale yellow to tan or whitish, more or less veined, with pale, squarrose rhizines. Apothecia lecanorine, submarginal to almost laminal, to 6 mm across, with a brown to brown-black disc and a smooth, yellow thalline margin. Asci 8-spored, broadly clavate, *Lecanora*-type. Ascospores 1-celled, hyaline, broadly ellipsoid to subglobose, 5-6 x c. 5 µm. Pycnidia marginal to laminal, immersed or on short black projections. Conidia bottle-shaped, 6-8 x 1-2 µm. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC+ yellow, P-; medulla K-, C-, KC-, P-. Chemistry: usnic acid in the cortex; vulpinic and pinastric acids in cortex and medulla.



4 Soredia present. Apothecia very rare

[*Vulpicida pinastri* \(Scop.\) J.-E. Mattsson & M.J. Lai](#)

Thallus foliose, mostly <4 cm diam. Lobes lemon-yellow to greenish yellow in shade-forms, smooth, dull, dorsiventral, adnate to ascending, (0.5-)1-2(-3) mm wide, with rounded apices and undulate, more or less ascending, sorediate margins. Soredia bright yellow, finely granular. Upper and lower cortex paraplectenchymatous; medulla yellow, very loose. Lower surface concolorous with upper surface or paler, with scattered, whitish rhizines. Apothecia extremely rare, lecanorine. Asci 8-spored, broadly clavate, *Lecanora*-type. Ascospores 1-celled, colourless, subglobose, c. 5-6 µm diam. Pycnidia rare, on marginal projections, pyriform to subspherical. Conidia bottle-shaped, 6-8 x 2 µm. Spot tests: cortex and medulla K-, C-, KC-, P-; medulla UV+ blackish red. Chemistry: pinastric, usnic and vulpinic acids (major), zeorin and unknowns (accessory).

