

### Online Data Storage & Access

- facilitating access to morphological, anatomical and ecological data
- user-friendly environment both for experts and non-experts
- global, direct and rapid access

### Standardization of Descriptive Data

- providing consistent definitions for descriptive characters

### Illustration

- an illustrated glossary explains even complex and poorly known characters
- linking text with illustrations

### SpeciesBank

- storage and archival of descriptive data for scientific research
- rapid update options in contrast to printed descriptions

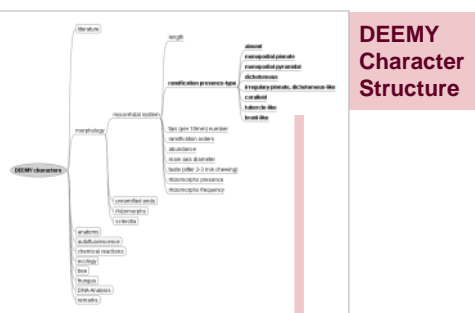
## DEEMY

An Information System for DEtermination and Characterisation of EctoMYcorrhizae



### Abstract

DEEMY was initiated as a DELTA-based information system in 1996. It is a database collection, gathering descriptive data on ectomycorrhizae, including a glossary of definitions of external, phenotypic characters that is illustrated with original line-drawings and photographs. It was first published on CD-Rom and commercially distributed. All information can be queried using elaborate interactive identification tools. DEEMY has recently been considerably expanded, now comprising nearly 320 types of ectomycorrhizae characterized by 420 different characters and nearly 850 descriptive drawings and photographs. The aim of the project soon shifted towards the integration into a freely accessible web-based database using *Diversity Workbench* modules.



### DEEMY Character Structure

Morphology - Morphology of the mycorrhizal system

morphology mycorrhizal system ramification presence-type

	1 absent
	2 monopodial-pinnate
	3 monopodial-pyramidal
	4 dichotomous
	5 irregularly pinnate, dichotomous-like
	6 coralloid
	7 tubercle-like
	8 braid-like

Character overview

Morphology - Morphology of the mycorrhizal system

morphology mycorrhizal system ramification presence-type

- absent
- monopodial-pinnate
- monopodial-pyramidal**
- dichotomous
- irregularly pinnate, dichotomous-like
- coralloid
- tubercle-like
- braid-like

The side-branches are oriented in three or more rows, forming a pyramidal-like three-dimensional system (A). Sometimes, originally three-dimensionally arranged, side-branches can secondarily grow in approximately one plane; this becomes apparent due to the insertion points of the side branches; such a ramification can be called monopodial-pinnate to monopodial-pyramidal, and can be entered under monopodial-pinnate and monopodial-pyramidal as well (B).

Character overview

Morphology - Morphology of the mycorrhizal system

morphology mycorrhizal system ramification presence-type

- absent
- monopodial-pinnate
- monopodial-pyramidal
- irregularly pinnate, dichotomous-like**
- dichotomous
- coralloid
- tubercle-like
- braid-like

Side-branches of originally dichotomous mycorrhizae grow to different lengths, in this way obscuring the typically forked growth (A). An irregularly pinnate growth habit can also be formed by originally pinnate or pyramidal systems; there, side-branches closer to the tip of the respective axis grow to greater length than side-branches of lower parts (B).

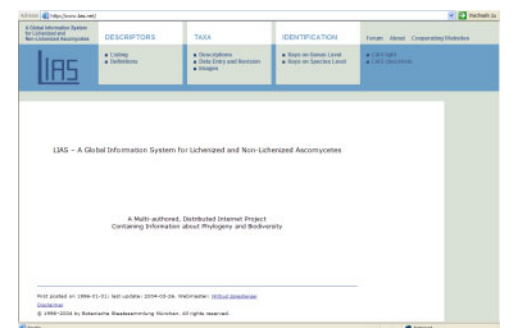
Character overview

## LIAS

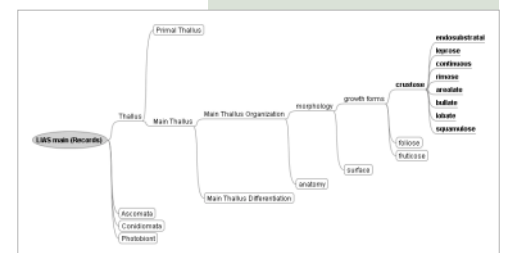
A Global Information System for Lichenized and Non-Lichenized ASComycetes

The structural optimization of the Global Information System for Lichenized and Non-Lichenized Ascomycetes (LIAS) includes two major aspects: The LIAS names server is established as taxonomic reference database (see the separate poster) and a LIAS glossary considerably expands the Descriptors Workbench, integrating definitions and illustrations as part of the Workbench module *DiversityCharacterDocumentation*. This optimization process includes a general review of LIAS, revising more than 700 descriptors to facilitate future data entry. Data accumulated for both LIAS names and LIAS glossary are available to support lichen projects within the German GBIF Node for Mycology. Access to LIAS content data is facilitated in the context of the EU project Species2000 europa.

### Abstract



### LIAS Character Structure

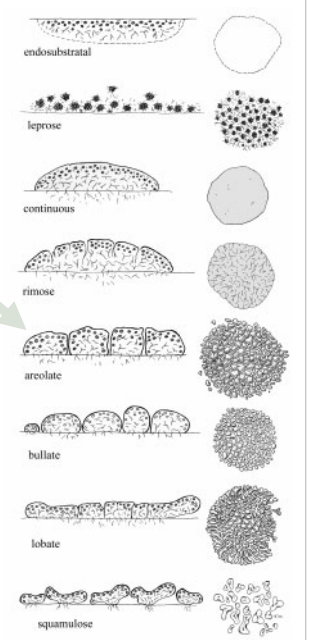


### Example of a Definition

**CRUSTOSE** [alternative spelling: CRUSTACEOUS; the spelling *crustose* is preferred since *crustaceous* is commonly used to describe hard-shelled animals, i.e. crustaceans] – general growth form where the entire thallus forms a crust, i.e. the lower surface without a cortex and directly attached to the substrate, removed only with difficulty and most generally not without destroying or damaging the thallus. The crustose growth from *includes* GRANULAR, RIMOSE, AREOLATE, PLACODIODE, LOBATE, SQUAMULOSE, and PELTATE thalli. Poorly differentiated and / or loosely aggregated thalli such as filamentose or leprose are also treated here, even though they are not, strictly speaking, forming distinct crusts. Other categories treated here represent transition forms. Thus SQUAMULOSE and lobed thalli may be considered subfoliose. Minutely FRUTICOSE or DACTYLIFORM thalli are SUBFRUTICOSE. Crustose thalli are rarely continuous but usually organized in smaller units like areoles or squamules.

### Illustration:

Variation of crustose growth forms  
© 2002 Lichen Flora of the Greater Sonoran Desert Region  
(available in LIAS by permission of the author: F. Bungartz)



### Challenges – Where Do We Stand?

#### Online Data Storage & Access in both systems:

- modular, dynamic data storage
- efficient query functions for species identification
- export functions to generate natural language descriptions
- tools for data update and maintenance

#### Standardization of Descriptive Data

- character sets follow a general concept of Structure–Property–State
- terminology based on terms commonly used in scientific literature

#### Illustrations

- **DEEMY**: All characters are explained with a brief definition and illustration (drawing or photograph).
- **LIAS**: Over 700 descriptive characters have been provided with detailed definitions; illustrations are available for a subset of characters in *LIAS light*.

### Perspectives and Goals for the Future ...

#### SpeciesBank: using descriptive data beyond simple identification

- “Blast Search”: data retrieval for phylogenetic character reconstruction by mapping descriptive characters onto molecular phylogenies
- advancing the development of dynamic update tools for data maintenance
- developing dynamic tools that facilitate updates of classical concepts (Descriptive data are subject to change when more new observations become available; unlike molecular characters, where the basic alphabet ACGT does not change.)

#### ENBI (European Network for Biodiversity Information): using descriptive data in a European context

- implement dynamic translation tools that will allow access in additional languages (French, German, Spanish)

#### Illustration Libraries

- **DEEMY**: building a photographic reference for all species
- **LIAS**: providing illustrations for all definitions in LIAS glossary