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## A CD-ROM for documentation and identification of mangrove fungi

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An interactive CD-ROM for documentation and identification of mangrove fungi has been produced. The fungi included in the CD-ROM were collected from mangroves of India and Hong Kong. A total of 80 species are covered. All images were electronically captured and processed. The CD provides the original microscopic images and camera lucida sketches; easy-to-use menus, edited in HTML format; and interactive keys linked to descriptions and images of fungi.

**Key words:** digital images, innovative technology.

### Introduction

Traditional methods to communicate data and exchange information on taxonomy and biodiversity is usually in the textual form. The printed medium, has served various fields in science and provides an excellent but limited output. However, it cannot cope with the new demands for readily accessible interactive information. A serious problem in biodiversity studies is the limited availability and accessibility of data which are widely spread in several books, journals, and off-line databases, as well as stored in biological collections, making it very time consuming to compile the necessary information. Also there is a lack of adequate tools to take a large part of different types of data and information into account at the same time (Schalk, 1998a,b,c).

Information and communication technology (ICT) may provide an answer. At the end of the millennium we witness the birth of a new field of science, i.e. biodiversity informatics. This is a broad field of applying ICT to all kinds of biological sciences using computer software, high capacity digital dissemination

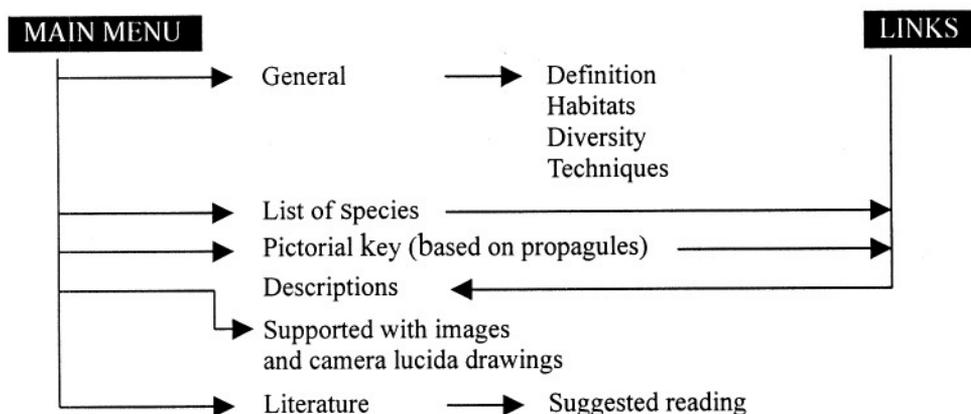


Fig. 1. Structure of the CD-ROM.

media, and fast electronic networks to exchange and combine information.

Advantages of electronic scientific information systems are (i) they offer new avenues for training and capacity building, (ii) instead of printed paper, the new output media are generally compact disks or a local network computer, through the Internet. Both CDs and the internet have their own advantages and disadvantages, but share, in common, interactive use and use of multimedia (the combination of text, still and moving images). It is clear that the innovative ICT technologies offer exciting possibilities to exchange, compile, process, analyse, interpret and disseminate a multitude of compiled biodiversity data and are more accessible than the traditional printed media. Some of these techniques may still be imperfect, but will become the future scientific and educational information dissemination systems (Schalk, 1998b).

Access to species information and identification keys is limited by the fact that the literature is scattered over a variety of resources. The exchange of biodiversity data between researchers is hampered by the lack of universal and compatible electronic documentation tools. There is a growing demand for reliable, up-to-date, easy to use and accessible identification tools, preferably in a standardized formation. It has been emphasized that to revive the fortunes of mycology new vistas of information dissemination are needed. Internet and CD-ROMs offer the best alternatives. Keeping this in view we have attempted to make a CD-ROM on marine mangrove fungi. The first version of this software is presented and it is our wish to upgrade it continually.

## Features of the CD-ROM

(Figs. 1-3)

### *General*

This section provides information on mangrove fungi, e.g. definition, habitats, diversity and techniques.

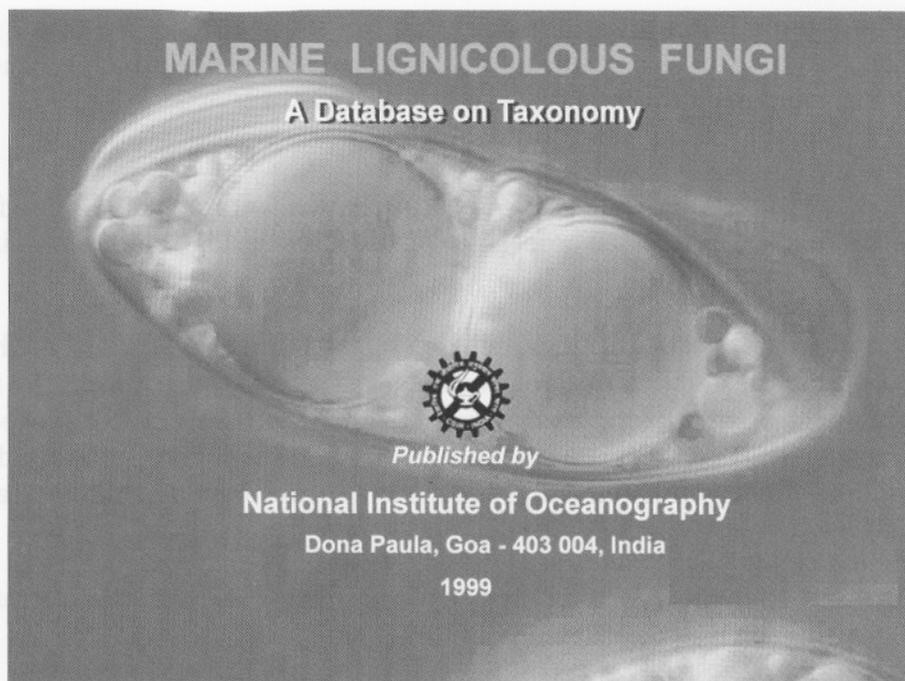


Fig. 2. CD-ROM on marine lignicolous fungi.

***Savoryella paucispora*** (Cribb et Cribb) Koch

*Nordic J. Bot.* 2: 169, 1982

**Ascomata** 84-140  $\mu\text{m}$  in diameter, flask-shaped, immersed, ostiolate, papillate, membranaceous, cream-colored to brown, solitary. **Papillae** 70-100  $\mu\text{m}$  long, 40-55  $\mu\text{m}$  diameter, stout, pallid. **Paraphyses** up to 1  $\mu\text{m}$  in diameter, scarce, simple or ramose.

**Asci** 82-100 x 18-23  $\mu\text{m}$ , two-spored, cylindrical-clavate, thin-walled at maturity.

**Ascospores** 36-50 x 13-16.5  $\mu\text{m}$ , fusoid-ellipsoidal, three-septate, slightly constricted at the septa, central cells brown, apical cells hyaline.

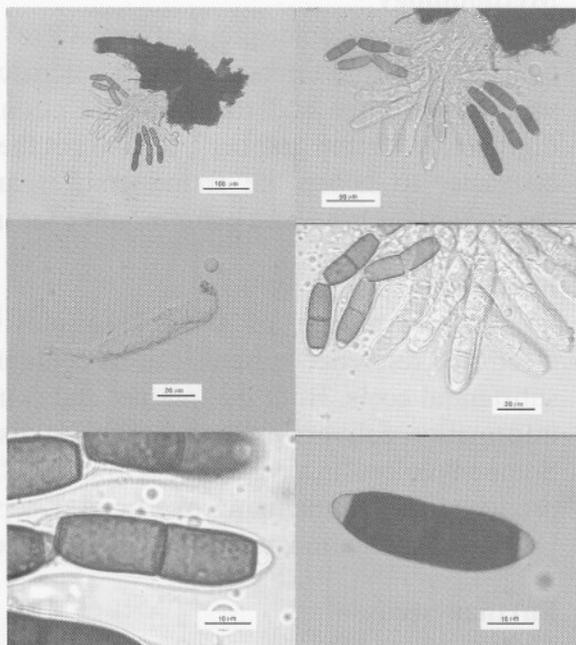


Fig. 3. A sample illustration of how a fungus is described with associated images.

### ***List of mangrove fungi***

Eighty species have been incorporated in the first version which are mostly collections from mangroves of India and Hong Kong

### ***Pictorial key***

A pictorial key has been provided for easy identification of the fungi included. This is based on the propagules (ascospores/basidiospores/ conidia).

### ***Descriptions***

Descriptions for all the fungi included in the CD are given. Although not exhaustive the essential features of taxonomic identification covering the form and size of ascomata, asci, ascospores, basidiomata, basidia, basidiospores, conidiomata and conidia are given. The descriptions are supported by microscopic images for all the fungi and camera lucida drawings in some cases.

### ***Dichotomous key***

An artificial dichotomous key that separates species mainly using propagule characters is provided.

### ***Literature***

A reading list is added in addition to the references cited in the text of CD.

### **Methodology**

(Figs. 4, 5)

All microscopic preparations were viewed under bright field, phase contrast and interference contrast microscopes. A true color CCD camera is used to optimize and transmit an electronic image to the processor; a video digitizer or "frame grabber", to connect the analog image to digital form; a host computer to house the frame grabber and run image processing and data analysis software; and a color monitor for image display and data operations.

### **Remarks**

The advantage of the biodiversity information system is that such electronic reference systems can be continuously updated and extended without substantial costs. Both the internet and compact discs provide relatively cheap information delivery methods, enabling dissemination of recently updated data. Some mycologists have resorted to using CD-ROMs, but no CD-ROM has been produced for marine/mangrove fungi. Keeping this in view the present work on CD-ROM on marine/mangrove fungi has been undertaken.

### **Further needs**

#### ***Update***

One of the main advantages with a CD-ROM is that it can be constantly

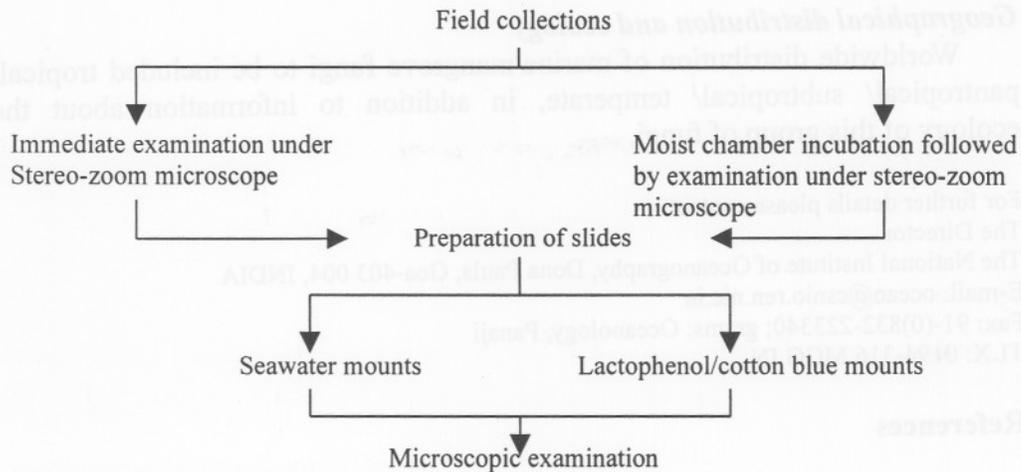


Fig. 4. Mycological preparations.

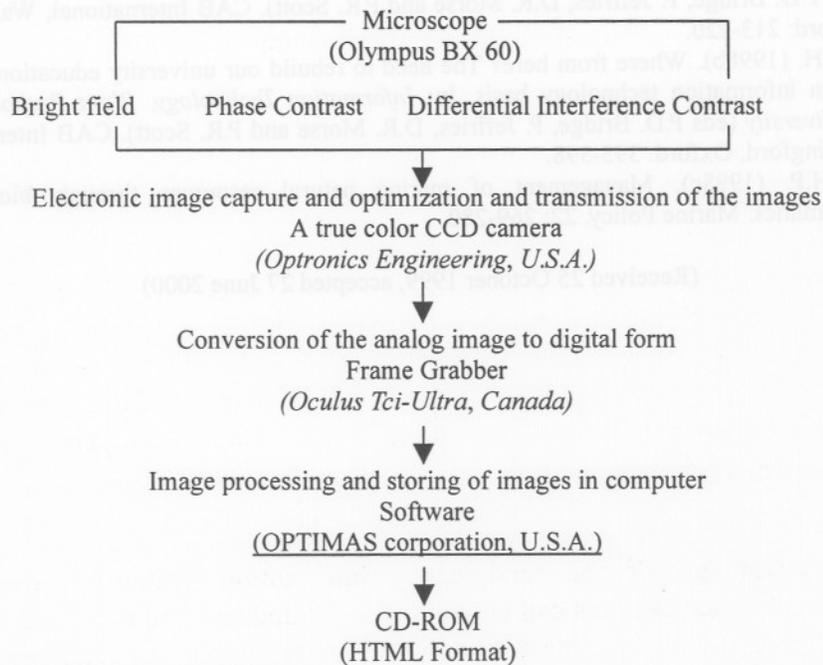


Fig. 5. Electronic capturing of images.

updated. The present CD-ROM which is the first version will be updated by addition of species from other regions also.

#### Website

The internet has revolutionized the dissemination of knowledge. With this in view, the present CD-ROM may be placed on the web.

### ***Geographical distribution and ecology***

Worldwide distribution of marine/mangrove fungi to be included tropical/ pantropical/ subtropical/ temperate, in addition to information about the ecology of this group of fungi.

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