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## Calicioid lichens and fungi of Italy: A State of the Art

### Abstract

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This paper presents a synthesis of the hitherto available information on the Italian distribution of Calicioid lichens and fungi. 65 species and 15 genera are known from Italy. Their distribution in the 20 administrative regions of the country is depicted by maps based on a critical screening of the literature and original collections. Five species are reported as new to Italy: *Calicium montanum*, *Chaenothecopsis consociata*, *Ch. ochroleuca*, *Ch. nana* and *Ch. vainioana*.

*Key words*: Calicioid fungi, Lichens, Italy.

### Introduction

Calicioid lichens and fungi were regarded for a long time as a monophyletic group (e.g. see Tibell 1975; Sato 1975). There is, however, increasing evidence that the former “*Caliciales*” are highly polyphyletic (Tibell 1984, 1999; Tibell & Wedin 2000). These organisms, however, are still often treated together by ecologists, because of their peculiar ecology, and their importance for bioindication and conservation.

Calicioid lichens and fungi are sensitive to changes in the forest environment, to air pollution and fire, and usually indicate a long ecological continuity (Selva 1994, 2002; Hoffmann & Van Landuyt 1997). Most species are confined to primeval deciduous and coniferous forests (Detkki & al. 1998; Kruys & Jonsson 1997), but several are able to recolonise secondary forests, and in S Europe do also occur in old cultivated stands of *Castanea sativa* and *Olea europaea* (Puntillo 1996). Most of them thrive in relatively shaded and humid situations, in habitats with a stable microclimate (Barkman 1958). Most of the Calicioid lichens and fungi occur on bark and lignum. Some species can thrive on both types of substrata. Lignum must be hard, acid and dry, with a low water capacity (Barkman 1958). A few species occur on rock and on the ground. Favoured habitats are tree bases and crevices of rough bark, well protected by snow and water, tilted parts of boles, pendulous rootlets of trees in rain-protected hollows, shady niches of acid rock, vertical or overhanging, often N-exposed rock surfaces. Atmospheric humidity and diffuse light are the most important factors for this guild of organisms (Holien 1996).

Most species have a wide distributional range, extending to temperate and tropical areas of both Hemispheres (Tibell 1994). The knowledge of Calicioid lichens and fungi in S Europe is still rather scanty. A synthesis concerning the Iberian peninsula was published by Sarrion & al. (1999), while a synthesis for Romania was provided by Bartok et al. (2001). For Italy, a first study was published by Puntillo (1989), and a first synthesis can be found in Nimis (1993). After 1993, several papers were published, which either were specifically dedicated to this group of organisms (e.g. Puntillo 1994), or which contained new records for different parts of the Country (e.g. Nimis & Tretiach 1999). The most recent list is that by Nimis & Martellos (2003), which, however, does not report the breakdown of species into the administrative regions of the Country. Furthermore, this list does not take into account the consistent number of unpublished records from various part of Italy which originates from the rich collections assembled by the authors.

The present paper provides an updated synthesis on the hitherto known distribution of calicioid lichens and fungi in the Italian territory.

## Data and Methods

The distribution maps which make up the core of this paper are based on two principal data sources:

1. A critical screening of the literature containing records of Calicioid lichens and fungi from Italy.
2. The rich collections by the Authors from different parts of Italy, preserved at the Herbarium of the University of Calabria (CLU).

A list of all herbarium samples will be available in ITALIC, the information system on Italian lichens (Nimis & Martellos 2002), before the end of 2004.

Nomenclature follows Nimis & Martellos (2003).

The maps show the hitherto known distribution of all species in the 20 administrative regions of Italy (Fig.1).

## Results and Discussion

Altogether, 66 species and 15 genera of Calicioid lichens and fungi are known from Italy. Their distribution is shown in Fig. 2. The maps do not show the real, complete distribution in Italy, but only the present state of knowledge: they may be useful also to point out the main holes in the floristic exploration of the Country.

As far as the main substrata are concerned, 36 species occur on bark, 25 on lignum, 7 on siliceous rocks, and 2 on soil. The most frequent phorophytes are: 1 (*Abies* nr. 28 species), 2 (*Castanea* nr. 19), 3 (*Pinus* nr. 17 species), 4 (*Quercus* nr. 13), 5 (*Larix* nr. 9), 6 (*Picea* nr. ), 7 (*Alnus* nr. 6), 8 (*Olea* nr. 5), 9 (*Taxus* nr. 3), 10 (*Acer* nr. 2).

Tab. 1 reports the number of species known from each region according to Nimis (1993), and that deriving from the present paper (see Fig. 3a ,b). Although the general picture remains the same – with parts of central-southern Italy still insufficiently explored, several regions have consistently increased the known number of Calicioid lichens and



Fig. 1. Administrative subdivision of the Italian peninsula. Abr = Abruzzo, Bas = Basilicata, Cal = Calabria, Camp = Campania, Emil = Emilia Romagna, Frl = Friuli, Laz = Lazio, Lig = Liguria, Lomb = Lombardia, Marc = Marche, Mol = Molise, Piem = Piemonte, Pugl = Puglia, Sar = Sardegna, Si = Sicilia, TAA= Trentino Alto Adige, Tosc = Toscana, Umb = Umbria, VA = Valle d'Aosta, Ven = Veneto, VG = Venezia Giulia.

fungi, and 5 species were added to the flora of Italy. They are: *Calicium montanum*, *Chaenothecopsis consociata*, *Ch. ochroleuca*, *Ch. nana* e *Ch. vainioana*. The best-known areas are the Alps, the N Apennines, Sardinia and Calabria.

In Italy most of the species are relict, restricted to ancient, humid montane forests of the Apennines and the Alps (lowlands being usually de-forested). Some of them also occur, how-

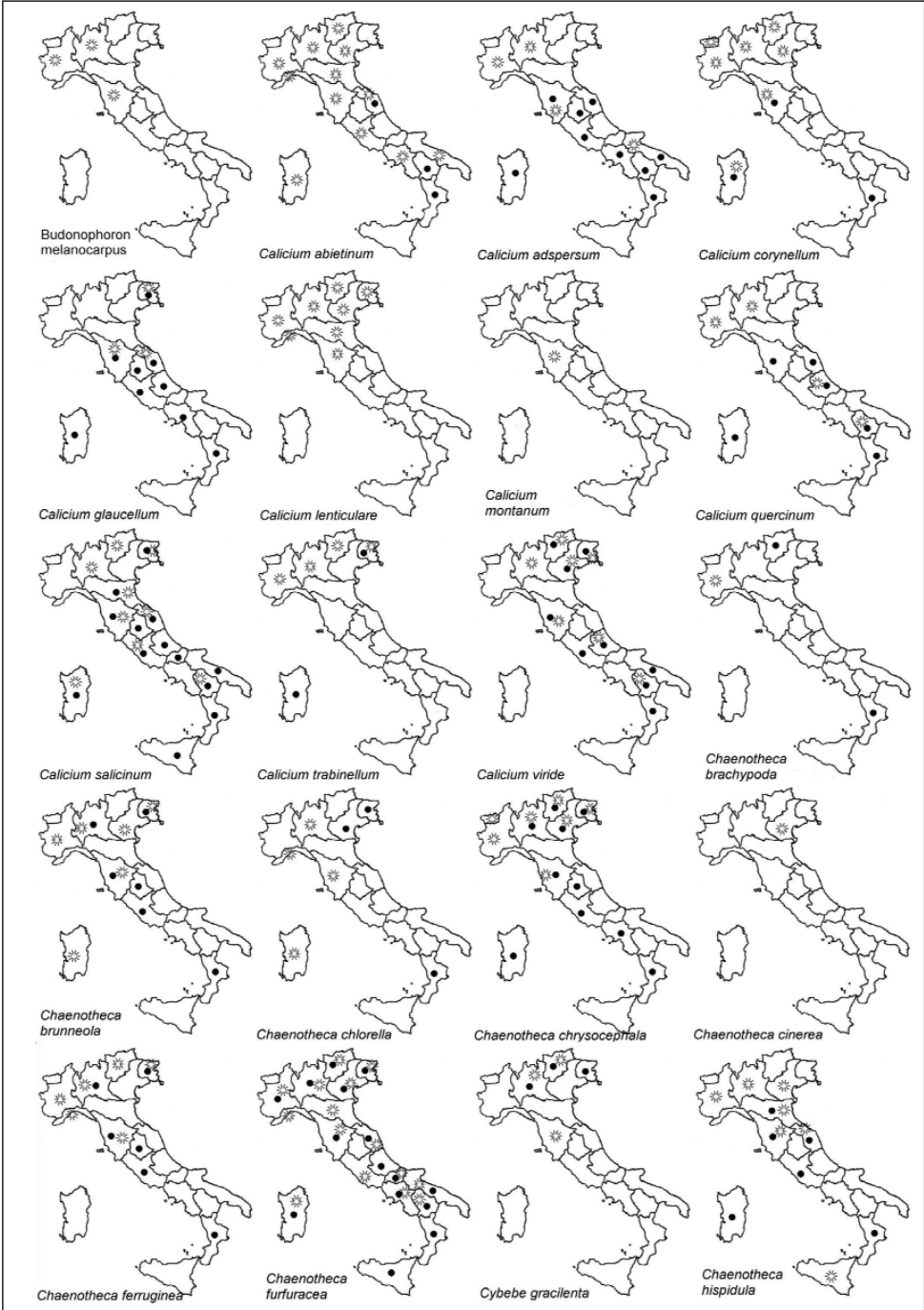


Fig. 2. Distribution of calicioid lichens and fungi in the administrative regions of Italy, based on specimens collected by the authors (CLU, solid dots), and on critically selected literature records (stars).

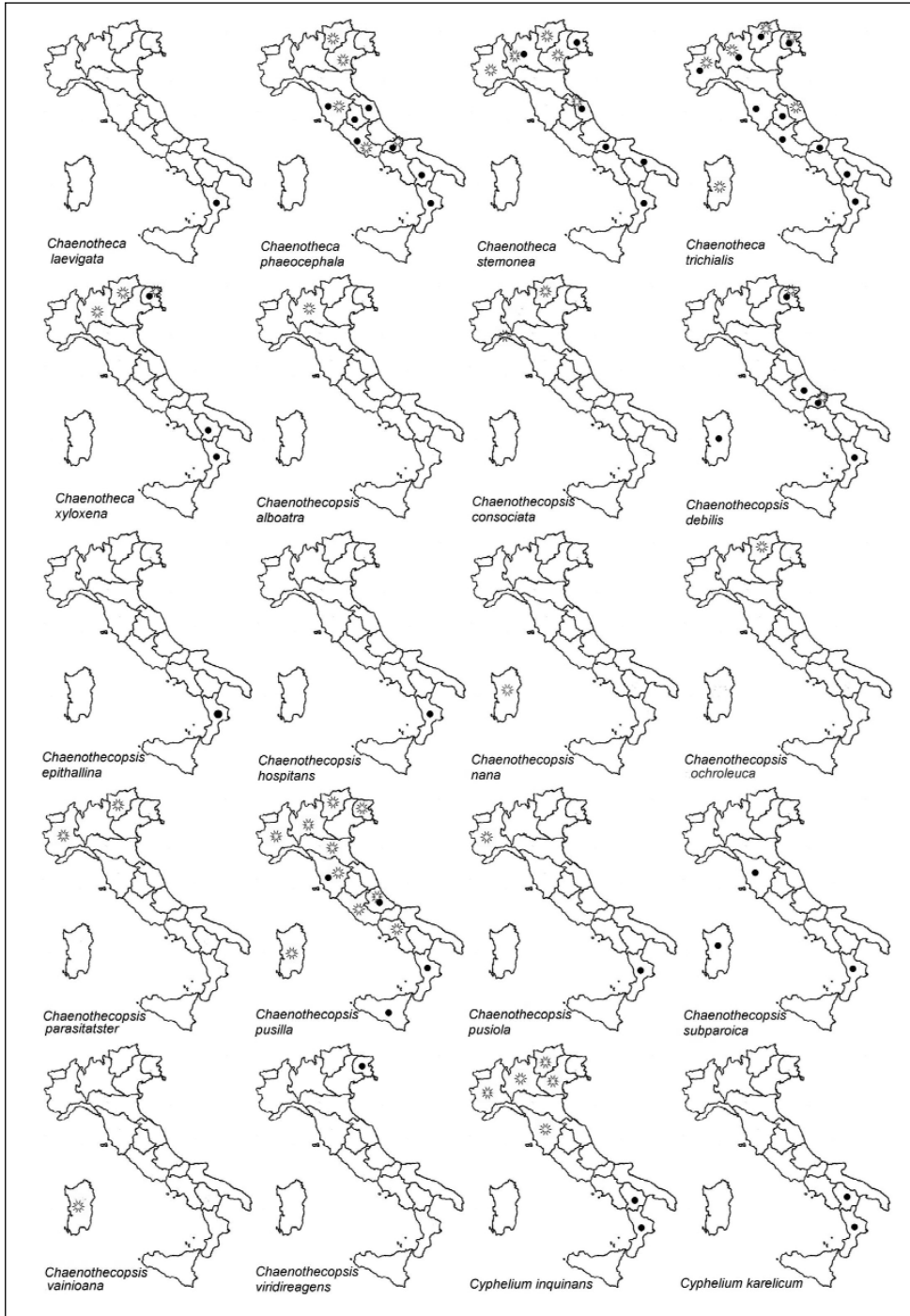


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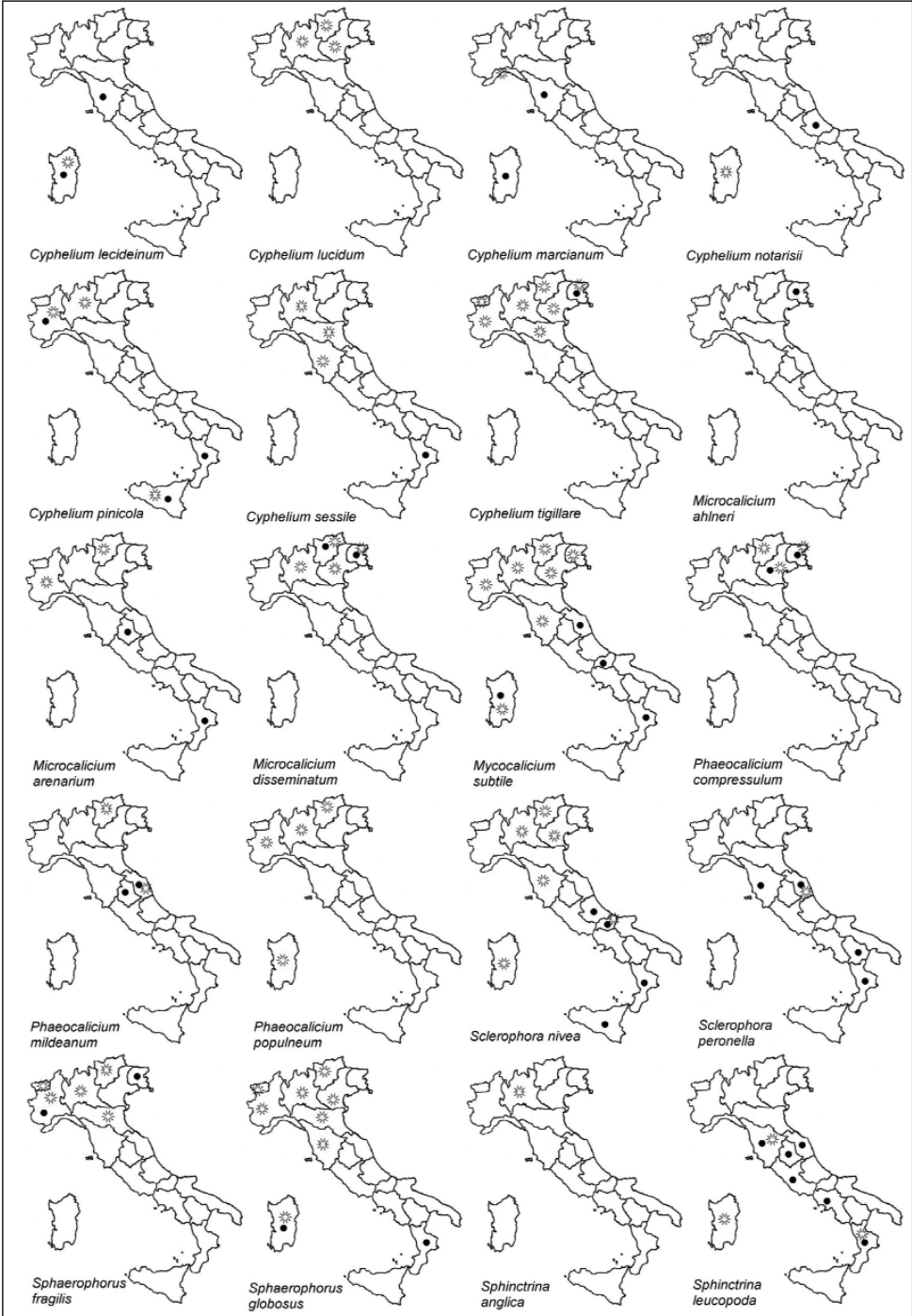


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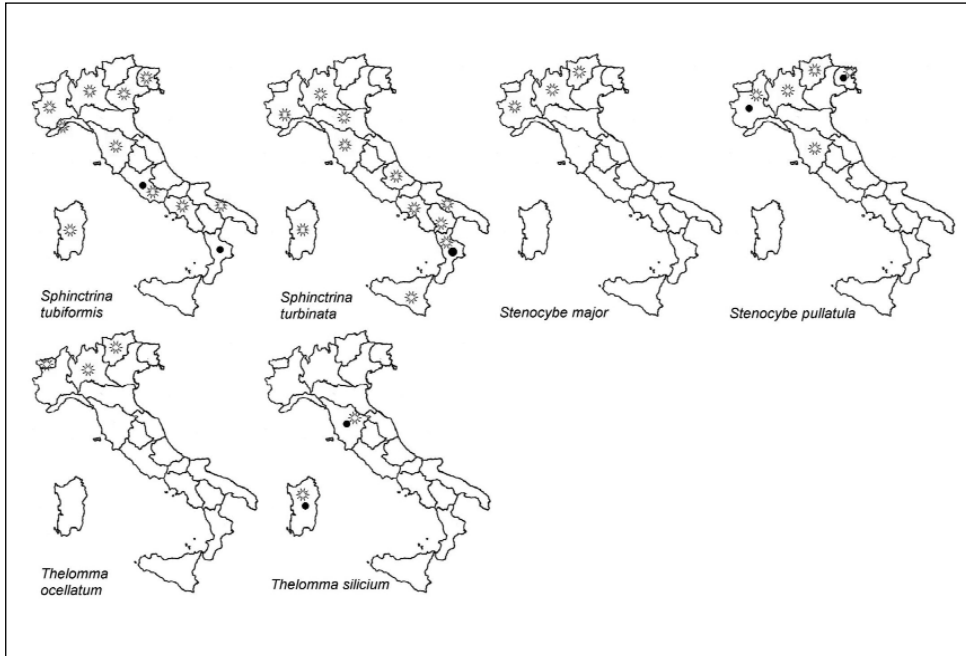


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ever, in ancient lowland forests, such as the Castelporziano Estate near Rome or the Circeo National Park, which indicates that their former distribution was much broader in the past.

Some species, such as *Microcalicium ahlnerii*, *Phaeocalicium compressulum*, *Stenocybe major* and *Thelomma ocellatum* are restricted to the Alps. *Stenocybe pullatula* is restricted to subalpine *Alnus viridis*-stands. The few saxicolous species (*Calicium corynellum*, *Cyphelium lecideinum*, *Microcalicium arenarium* and *Thelomma siliceum*) occur both in the Apennines and in the Alps.

Some species have a low substrate specificity. As an example, *Calicium glaucellum*, *Chaenotheca phaeocephala* and *C. trichialis* were found on the bark of numerous phorophytes (*Abies*, *Alnus*, *Castanea*, *Pinus*) and on decorticated stumps of several trees. *Cyphelium inquinans* seems to prefer the bark of conifers, but was found on lignum as well, and once even on acid vertical rocks. *Chaenotheca furfuracea* and *Cybebe gracilentia* also occur on ground, in cavities at the base of boles.

Other species have a moderate substrate specificity: *Cyphelium karelicum*, *Cyphelium lucidum* and *Cyphelium pinicola* were only found on bark of conifers. Saprophytic species often grow on lignum of various trees, but some of them have a high specificity (obligate phorophytes): *Phaeocalicium mildeanum* occurs only on *Fraxinus ornus* in submediterranean areas. *Stenocybe pullatula* only on twigs of *Alnus viridis* and *Phaeocalicium populneum* on *Populus* sp. Species of *Sphinctrina* do occur only on *Pertusaria pertusa*, *P. hymenea* or *Ochrolechia* spp.

Table 1. Number of species of calicioid lichens and fungi known from each administrative region according to: a) Nimis (1993), b) the present paper.

<b>Region</b>	<i>Nimis (1993)</i>	<i>This paper</i>	<i>New taxa</i>	<i>% increase</i>
Venezia Giulia	2	2	0	0
Friuli	20	25	5	25
Veneto	21	22	1	4,76
Trentino-Alto Adige	31	32	1	3,22
Lombardia	38	39	1	2,63
Piemonte	27	28	1	3,70
Valle d'Aosta	5	7	2	40
Emilia-Romagna	11	11	0	0
Liguria	7	8	1	14,28
Toscana	27	34	7	25,92
Marche	0	14	14	nd
Umbria	0	11	11	nd
Lazio	5	15	10	200
Abruzzo	2	10	8	500
Sardegna	19	30	11	57,89
Molise	0	8	8	nd
Campania	5	9	4	80
Puglia	4	8	4	100
Basilicata	3	12	9	300
Calabria	36	37	1	2,77
Sicilia	6	7	1	16,66
<b>ITALY</b>	61	66	5	8,19



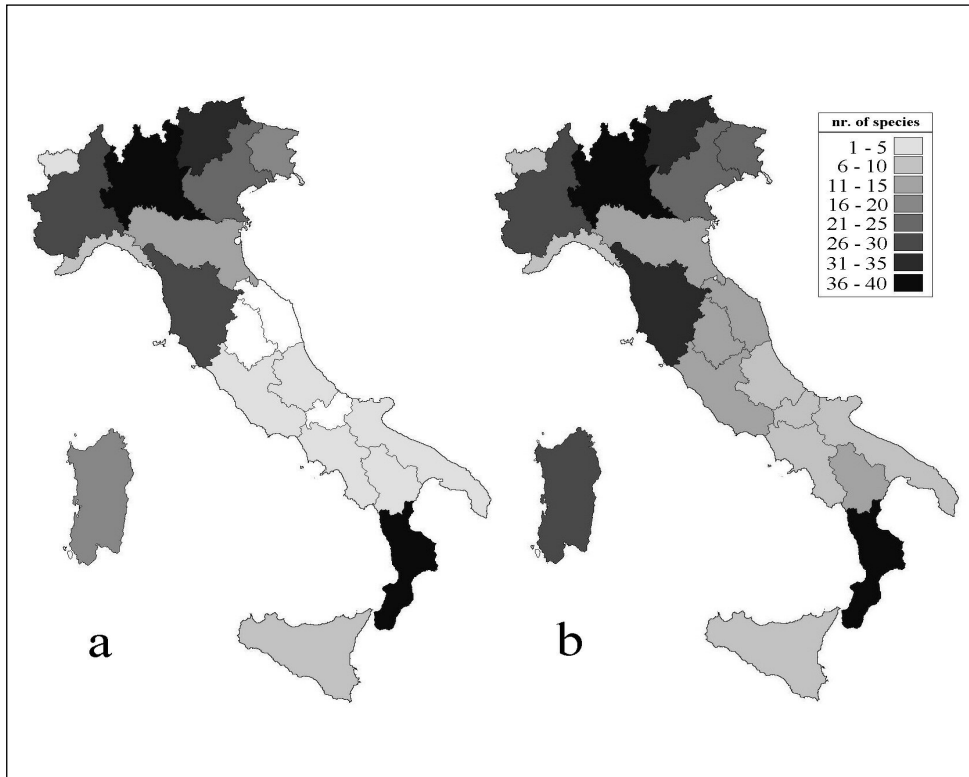


Fig. 3. Number of species of calicioid lichens and fungi known from each administrative region according to: a) Nimis (1993), b) the present paper (see Tab. 1).

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