© Verlag Alexander Just: Dorfbeuern - Salzburg - Brüssel; download unter www.biologiezentrum.at

Sauteria 9, 1998 IAL 3 - Proceedings 341-350

TOWARDS A CHECK-LIST OF SLOVENIAN LICHENS

Vorarbeiten zur Erstellung einer Checkliste der Flechten Sloweniens

by

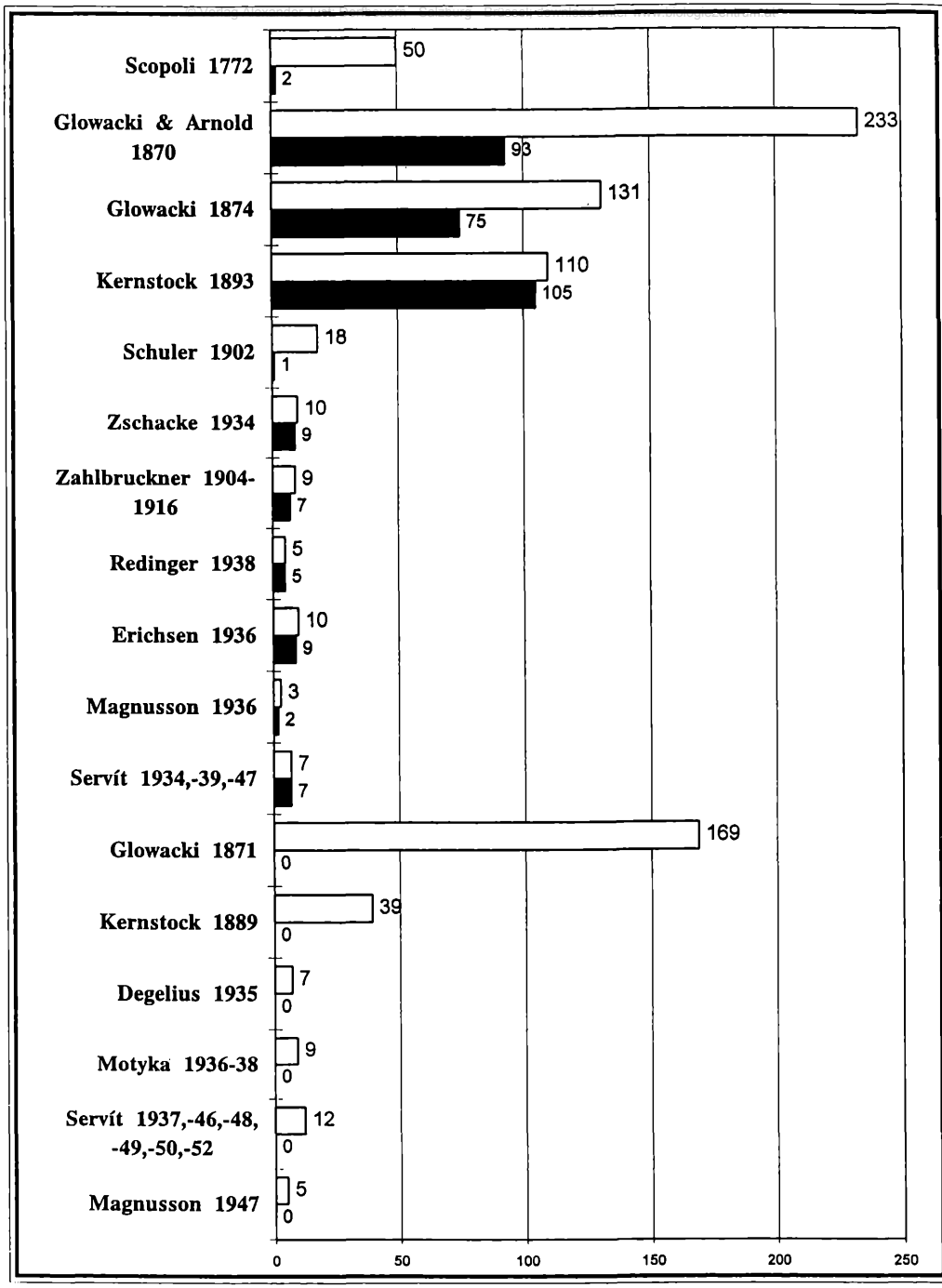
Ursula SUPPAN, Johannes PRÜGGER, Helmut MAYRHOFER, Martin GRUBE & Franc BATIČ

Key words: Lichens, Slovenia, check-list, bibliography, biodiversity, database.

Schlagwörter: Flechten, Slowenien, Checkliste, Bibliographie, Biodiversität, Datenbank.

Summary: The evaluation of available records increased the number of known lichen taxa for Slovenia from 244 in KUŠAN's Prodromus to 416 (409 species) already recorded by 1953. The main reasons for the appearance of 172 additional taxa are briefly outlined. Information about results of recent floristic inventories in various parts of the country are provided. Ongoing activities are documented in the internet by the presentation of published floristic lists. The development of an on-line accessible database of Slovenian lichens has been initiated.

Zusammenfassung: Die Auswertung der zugänglichen Literaturdaten vergrösserte die Zahl der bis 1953 aus Slowenien bekannten Flechtentaxa von 244 in KUŠAN's Prodromus auf 416 (409 Arten). Die Hauptgründe für das Auftreten von 172 zusätzlichen Arten werden kurz erläutert. Über aktuelle floristische Studien in verschiedenen Teilen des Landes und deren Ergebnisse wird informiert. Die laufenden Aktivitäten werden im Internet mit der Präsentation publizierter florisitischer Beiträge dokumentiert. Mit der Entwicklung einer on-line Datenbank der Flechten Sloweniens wurde begonnen.



Tab. 1: Compilation of papers published till 1953, including records of lichens from Slovenia: □ complete number of taxa, ■ number of taxa included in KUŠAN (1953).

In the course of joint studies on Slovenian lichens between the universities of Graz and Ljubljana a check-list is planned as a first step towards the preparation of a lichen flora. The studies include inventories of local regions and an evaluation of literature records.

Historical survey

KUŠAN (1953) published his 'Prodromus flore lišaja Jugoslavije' dealing with all lichens reported from the republics of former Yugoslavia. His study was mainly based on records from floristic and taxonomic papers starting with SCOPOLI (1772). He included 244 taxa (without synonyms) from Slovenia. After a thorough evaluation of the available literature published until 1953, the number of known taxa increased to 416, including 409 species (compare table 1). The main reasons for these 172 additional taxa being not cited by KUŠAN (1953) are briefly summarized:

1. Some important papers were not available to KUŠAN, such as the floristic contributions of GLOWACKI (1871), KERNSTOCK (1889), DEGELIUS (1935) and SERVÍT (several papers; compare table 1).
2. KUŠAN (1953) cited 39 taxa from GLOWACKI (1874) and 8 taxa from SCHULER (1902) for Istria. Today these localities are in Slovenia which means 12 new taxa for the country.
3. The evaluation of some of the original papers was rather incomplete (e.g. GLOWACKI & ARNOLD 1870, GLOWACKI 1874 & KERNSTOCK 1893; compare table 1). For example KUŠAN missed very common species, such as *Caloplaca saxicola, Lecanora muralis, Phlyctis argena* or *Physcia adscendens*.

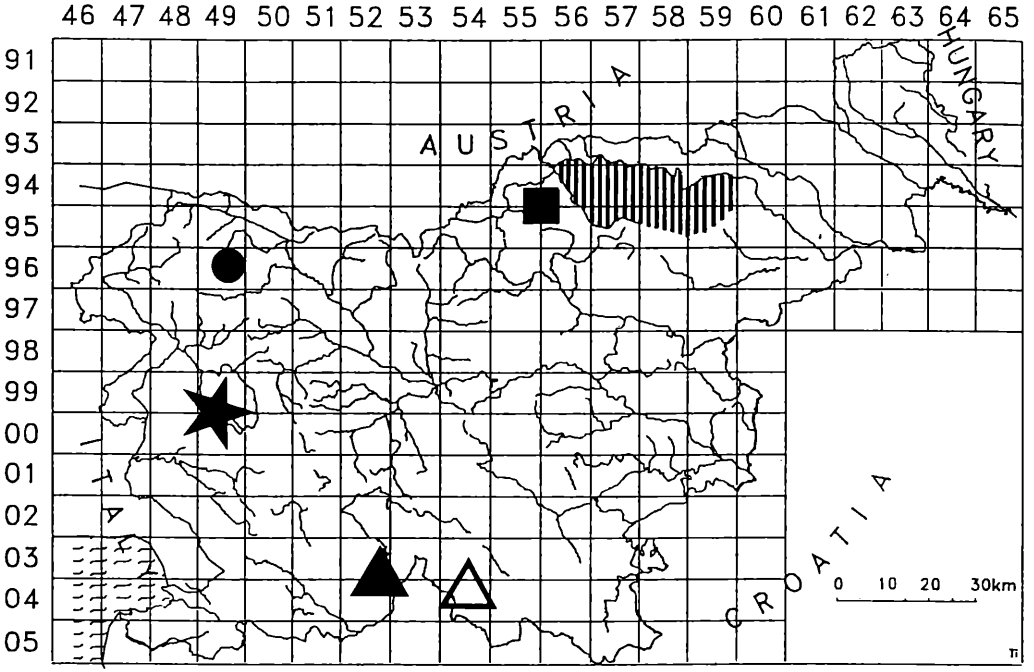
There are a few recent contributions such as BATIČ (1976, 1978), CHRISTENSEN (1987) and HOČEVAR et al. (1995) as well as smaller papers (e.g. BATIČ 1986) and records in various monographic treatments (e.g. DEGELIUS 1954, JØRGENSEN 1978, PRINTZEN 1995, WUNDER 1974) referring to material collected especially by GLOWACKI and KERNSTOCK in the last century. The evaluation of these is still in process.

Local inventories

The current knowledge of the lichen flora of Slovenia has increased in recent years due to extensive field work, f.e. in the Pohorje mountain range from where MAYRHOFER et al. (1996) list 330 taxa (322 species including 14 lichenicolous fungi). Some parts of this region were investigated in the last century by Ernst KERNSTOCK (KERNSTOCK 1889 and 1893) who recorded 132 taxa.

Uršlja Gora (1699 m), the eastern outpost of the Karavanke mountain range, is heavily influenced by former lead mining in Žerjav, the SO_2-emitting

Fig. 1: Locations of the recently investigated regions in Slovenia.
■ Uršlja Gora, || Pohorje, ● Triglav National Park (investigation still in process), ★ Trnovski gozd, ▲ Notranjski Snežnik, △ Gotraniški Snežnik and Krokar area



thermal power plant in Šoštanj, and other industrial sources. Nevertheless, 186 epiphytic lichenized and lichenicolous fungi have been detected there (ŠUPPAN 1997).

In the regions belonging to the Dinarids, the epiphytic lichen flora was investigated in particularly sheltered and protected forests (*'Abieti-Fagetum dinaricum'*). GRUBE et al. (1995) report 160 species (including 8 lichenicolous fungi) from Notranjski Snežnik, GRUBE et al. (1998) 119 species (with 9 lichenicolous fungi) from Goteniški Snežnik, and 131 species (86 new with 4 lichenicolous fungi) from the neighbouring Krokar area.

PRÜGGER (1997) records 197 epiphytic species (with 8 lichenicolous fungi) from the Trnovski Gozd mountain plateau which is characterised by extensive karst phenomena. This area and its surroundings were investigated before by Julius GLOWACKI (GLOWACKI & ARNOLD 1870, GLOWACKI 1871, GLOWACKI 1874) who reported 79 epiphytic species (mainly macrolichens), including several species which are endangered or extinct today such as *Heterodermia speciosa, Lobaria amplissima* and *L. scrobiculata*. PRÜGGER (1997) could not confirm the continued occurrence of these rare species. After consideration of the already published taxa from the area the number of known epiphytic species increased to 276

© Österreichische Mykologische Gesellschaft, Salzburg - Brüssel; download unter www.biologiezentrum.at

(including 10 lichenicolous fungi).

Current projects are being carried out in the Triglav National Park under the supervision of Franc BATIČ.

Ongoing activities

In order to allow flexible access to recent data on Slovenian lichens we have established a workspace in the internet. The homepage for Slovenian lichens is embedded in a larger project directed at a compilation of a Mediterranean Lichens Check-list initiated by the 'OPTIMA Commission for Lichens' (NIMIS 1996). The Slovenian lichens homepage can be accessed under "http://bkfug.kfunigraz.ac.at/~grubem/countries/Slovenia_o.htmlx" (GRUBE 1996). In this homepage we have currently included links to floristic lists of the Pohorje and Snežnik regions. As plain ASCII text files, the available lists can easily be searched for particular taxa using standard WEB-browsers. Additional links are established to a literature reference list and to a page for general information on the Mediterranean Lichens Project (GRUBE & KAGER 1996). We have included a form, which allows the submission of new floristic data. This form is also regarded as a forum for discussion of critical data.

As a further improvement, we have started to organize the data on Slovenian lichens as a relational database. The database format offers a convenient way to access complex information via the internet (GREEN 1994). We decided to use an ORACLE relational database management system, because ORACLE offers flexible possibilities for the development of applications and has already been adopted in other projects (Botanical Information System SysTax, HOPPE & BOOS 1996, and Lichen Database of the Red List of Lichens of Switzerland, WEY 1996).

The Slovenian lichens database is connected to the WWW by the ORACLE WebServer.

With a query form, accessible via hypertext links from the Slovenian page, it is possible to search the database without password restrictions. Currently, three types of queries are possible. First, for grid references where a certain taxon occurs, second, for the species in a given grid, and third for some ecological parameters of lichens in a particular grid. We plan to improve the query form to allow more complex queries and to link the table with data from different sources, e.g., resources of the Geographic Information Systems (GIS).

Acknowledgements

Dr. Mario MATZER and Dr. Christian SCHEUER are acknowledged for reading the manuscript, valuable suggestions and comments, Dr. Brian J. COPPINS and Anthony MAYRHOFER for improving the English. We thank Sabine

KAGER for support regarding the ORACLE system, Univ.-Prof. Dr. Josef HAFELLNER for his help with literature, and last but not least Ing. Harald SUPPAN for his assistance and patience in EDP problems.

References

BATIČ, F. (1976): Prispevek k flori lišajev (Lichenophyta) na Slovenskem I. - Biol. Vestn. **24**: 61-67.

BATIČ, F. (1978): Prispevek k flori lišajev (Lichenophyta) na Slovenskem II. - Biol. Vestn. **26**: 1-8.

BATIČ, F. (1886): Stanje epifitske lišajske flore in pojav temperaturne inverzije v Ljubljanski kotlini. - Biol. Vestn. **34**: 1-12.

CHRISTENSEN, S. N. (1987): Contribution to the lichen flora of Jugoslavia. - Acta Bot. Croat. **46**: 161-171.

DEGELIUS, G. (1935): Das ozeanische Element der Strauch- und Laubflechtenflora von Skandinavien. - Acta Phytogeogr. Suec. **7**: 1-411.

DEGELIUS, G. (1954): The lichen genus *Collema* in Europe. - Symb. Bot. Upsal. 8 (2): 1-499.

ERICHSEN, C. F. E. (1935-36): Pertusariaceae. - In: Dr. L. RABENHORST's Kryptogamenflora von Deutschland, Österreich und der Schweiz, 2. Aufl. **9** (V/1): 319-702. Akademische Verlagsgesellschaft, Leipzig.

GLOWACKI, J. (1871): Prodromus einer Flechtenflora von Görz. - In: GATTI, F. (ed.): 11. Jahresbericht der K. K. Ober-Realschule in Görz: 1-31.

GLOWACKI, J. (1874): Die Flechten des Tommasini'schen Herbars, ein Beitrag zur Flechtenflora des Küstenlandes. - Verh. Zool.-Bot. Ges. Wien **24**: 539-552.

GLOWACKI, J. & F. ARNOLD (1870): Flechten aus Krain und Küstenland. - Verh. Zool.-Bot. Ges. Wien **20**: 431-466.

GREEN, D. G. (1994): Databasing diversity - a distributed, public-domain approach. - Taxon **43**: 51-62.

GRUBE, M. (1996, 25. Nov.): Slovenian lichens on-line. - Available: http://bkfug.kfunigraz.ac.at/~grubem/countries/slovenia_o.htmlx.

GRUBE, M. & S. KAGER (1996): Mediterrane Flechten im Internet. - Memory (Informationszeitschrift des EDV-Zentrums der Karl-Franzens-Universität Graz) **41**: 18-19.

GRUBE, M., BATIČ, F. & H. MAYRHOFER (1995): Contribution to the lichen flora of Slovenia I. Epiphytic lichens of the Snežnik area. - Herzogia **11**: 189-196.

GRUBE, M., MAYRHOFER, H. & F. BATIČ (1998): Contributions to the lichen flora of Slovenia III. Epiphytic lichens of Goteniški Snežnik and Krokar area. - Herzogia **13**: in press.

HOČEVAR, S., BATIČ, F., PISKERNIK, M., & A. MARTINČIČ (1995): Glive v pragozdovih Slovenje III. Dinarski gorski pragozdovi na Kočevskem in v Trnovskem gozdu. - Gozdarski Inštitut Slovenje / Strokovna in Znanstvena dela **117**:

1-320. © Verlag Alexander Just: Dorfbeuern - Salzburg - Brüssel; download unter www.biologiezentrum.at
HOPPE, J. R. & E. BOOS (1996, 12 Sept.): SysTax database system for systematics and taxonomy. - Available: http://www.biologie.uni-ulm.de/systax/.

JØRGENSEN, P. M. (1978): The lichen family Pannariaceae in Europe. - Opera Bot. **45**: 1-124.

KERNSTOCK, E. (1889): Fragmente zur steirischen Flechtenflora. - Mitt. Naturwiss. Vereines Steiermark **25**: 15-43.

KERNSTOCK, E. (1893): Zur Lichenenflora Steiermarks. - Mitt. Naturwiss. Vereines Steiermark **29**: 200-223.

KUŠAN, F. (1953): Prodromus flore lišaja Jugoslavije. - Jugoslavenska Akademija Znanosti i Umjetnosti, Zagreb. 595 pp.

MAGNUSSON, A. H. (1936): Acarosporaceae und Thelocarpaceae. -In: Dr. L. RABENHORST's Kryptogamenflora von Deutschland, Österreich und der Schweiz, 2. Aufl. **9** (V/1): 1-318. Akademische Verlagsgesellschaft, Leipzig.

MAGNUSSON, A. H. (1947): Studies in non-saxicolous species of *Rinodina* mainly from Europe and Siberia. - Acta Horti Gothob. **17**: 191-338.

MAYRHOFER, H., KOCH, M. & F. BATIČ (1996): Beiträge zur Flechtenflora von Slowenien II. Die Flechten des Pohorje. - Herzogia **12**: 111-127.

MOTYKA, J. (1936-38): Lichenum generis *Usnea* studium monographicum. - Leopoli, 651pp.

NIMIS, P. L. (1996): Towards a checklist of Mediterranean lichens. - Bocconea **6**: 5-17.

PRINTZEN, C. (1995): Die Flechtengattung *Biatora* in Europa. - Biblioth. Lichenol. **60**: 1-275.

PRÜGGER, J. (1997): Die epiphytische Flechtenflora des Trnovski gozd (Ternovaner Wald) in Slowenien. Diplomarbeit, Karl-Franzens-Universität Graz (unpublished).

REDINGER, K. (1938): Arthoniaceae, Graphidaceae, Chiodectonaceae, Dirinaceae, Roccellaceae, Lecanactidaceae, Thelotremaceae, Diploschistaceae, Gyalectaceae und Coenogoniaceae. Lieferung 2, Graphidaceae 1. - In: Dr. L. RABENHORST's Kryptogamenflora von Deutschland, Österreich und der Schweiz, 2. Aufl. **9** (II/1): 181-404. Akademische Verlagsgesellschaft, Leipzig.

SCHULER, J. (1902): Zur Flechtenflora von Fiume. - Mitt. Naturwiss. Clubs Fiume **6**: 3-122. (Separat-Abdruck).

SCOPOLI, I. A. (1772): Flora Carniolica. Band 2. - Vindobonensis, 496 pp. (Nachdruck: Akademische Druck- u. Verlagsanstalt, Graz 1972).

SERVÍT, M. (1934): Flechten aus Jugoslavien. 3. Fruška gora und Črdak planina. - Hedwigia **74** (2): 119-160.

SERVÍT, M. (1937): Seltenere und neue Flechten. - Vestn. Král. České Společn. Nauk, Tr. Mat.-Prír. Roč. 1936: 1-16.

SERVÍT, M. (1939): Lichenum sectionis *Verrucaria sphinctrina* revisio critica. - Beih. Bot. Centralbl. **59 B**: 113-168.
SERVÍT, M. (1946): The new Lichens of the Pyrenocarpae-Group I. - Stud. Bot. Čechoslov. **7**: 49-111.
SERVÍT, M. (1947): Species novae generis lichenum *Verrucaria*. - Vestn. Král. České Společn. Nauk, Tr. Mat.-Prír. Roč. 1947: 1-20.
SERVÍT, M. (1948): The new lichens of the Pyrenocarpae-group II. - Stud. Bot. Čechoslov. **9**: 67-115.
SERVÍT, M. (1949): Nové nebo méne známé druhy Lišejnikové čeledi Verrucariaceae. - Sborn. Nár. Mus. v Praze Vol. **5B** (9): 1-51.
SERVÍT, M. (1950): The new lichens of the Pyrenocarpae-group IV. - Stud. Bot. Čechoslov. **11**: 101-144.
SERVÍT, M. (1952): Nové a málo známé druhy z čeledi Verrucariaceae a Dermatocarpaceae. - Preslia **24**: 345-390.
SUPPAN, U. (1997): I. Vorarbeiten zur Bibliographie der Flechten und flechtenbewohnenden Pilze Sloweniens. II. Die epiphytische Flechtenflora der Uršlja Gora (Slowenien). - Diplomarbeit, Karl-Franzens-Universität Graz (unpublished).
WEY, J. (1996, 12. Sept.): Database LICHEN. Red list of the epiphytic lichens of Switzerland. - Available: http://www.wsl.ch/rauminf/riv/datenbank/lichen/database_lichen.html.
WUNDER, H. (1974): Schwarzfrüchtige, saxicole Sippen der Gattung *Caloplaca* (Lichenes, Teloschistaceae) in Mitteleuropa, dem Mittelmeergebiet und Vorderasien. - Biblioth. Lichenol. **3**: 1-186.
ZAHLBRUCKNER, A. (1904-1916): Schedae ad 'Cryptogamas exsiccatas'. - Ann. K. K. Naturhistor. Hofmus. **19**: 379-427 (1904). - **24**: 269-292 (1910). - **25**: 223-252 (1911). - **26**: 155-182 (1912). - **30**: 197-225 (1916).
ZSCHACKE, H. (1933-34): Epigloeaceae, Verrucariaceae und Dermatocarpaceae. - In: Dr. L. RABENHORST's Kryptogamenflora von Deutschland, Österreich und der Schweiz, 2. Aufl. **9**(I/1): 44-695. Akademische Verlagsgesellschaft, Leipzig.

Addresses:
Ursula SUPPAN, Johannes PRÜGGER, Helmut MAYRHOFER, Martin GRUBE
Institut für Botanik, Karl-Franzens-Universität Graz
Holteigasse 6
A-8010 Graz
Austria
E-Mail: helmut.mayrhofer@kfunigraz.ac.at
E-Mail: martin.grube@kfunigraz.ac.at

© Verlag Alexander Just: Dorfbeuys, Joseph Beuys-Modell; download unter www.biologiezentrum.at

Franc BATIČ
Agronomy Department, University of Ljubljana
Jamnikarjeva 101
SI-1001 Ljubljana
Slovenia.
E-Mail: franc.batic@bf.uni-lj.si

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: Sauteria-Schriftenreihe f. systematische Botanik, Floristik u. Geobotanik

Jahr/Year: 1998

Band/Volume: 9

Autor(en)/Author(s): Mayrhofer Helmut, Grube Martin, Suppan Ursula, Prügger Johannes, Batic Franc

Artikel/Article: Vorarbeiten zur Erstellung einer Checkliste der Flechten Sloweniens 341-349