Obituary

In memoriam Meinhard M. Moser (1924–2002): a pioneer in taxonomy and ecology of Agaricales (Basidiomycota)

Meinhard M. Moser was born on 13 March 1924 in Innsbruck (Tyrol, Austria) where he also attended elementary school and grammar school (1930 to 1942). Already as a youngster, he developed a keen and broad interest in natural sciences, further spurred and supported by his maternal grandfather E. Heinricher, Professor of Botany at the University of Innsbruck. His fascination for fungi is proven by his first paintings of mushrooms, which date back to 1935 when he was still an eleven-year old boy. Based upon a solid humanistic education, he also soon discovered his linguistic talents and in subsequent years he became fluent in several major languages (including Swedish and Russian), which in later years helped him to correspond and interact with colleagues from all over the world.

In 1942, M. Moser enrolled at the University of Innsbruck and attended classes in botany, zoology, geology, physics and chemistry. In this period during World War II, his particular interest and knowledge in botany and mycology gave him the opportunity to become an authorized mushroom controller and instructor. In connection with this public function and to widen his experience, he was also officially requested to attend seminars in mushroom identification both in Germany and Austria. On these occasions, M. Moser met many of the leading German mycologists, who subsequently became his scientific mentors. He developed and kept close relationships with J. Schäffer, W. Neuhoff, G. Kallenbach, S. Killermann, H. Haas, B. Henning and numerous other contemporary mycological celebrities. At one of these meetings, E. Thirring directed M. Moser's attention to the difficult and large genus Cortinarius s.l. with which he remained engaged ever since.

After completing three terms at University, the then 19-years-old Moser was forced to interrupt his studies (1943) and was called up for military service (civil defence). Because of his linguistic skills, he was trained as an interpreter (for Slavonic languages) before being sent to the front lines in the Balkan Peninsula. Despite such a direct confrontation with war, M. Moser continued with his interest in mycology. Whenever time permitted, he collected and identified mushrooms wherever he was garrisoned and he memorized “Das
System der Agaricales" published by R. Singer (1936, 1942, 1943). It is a fact that he carried this series of contributions in his military pack for many years, so keeping alive his interest in the taxonomy of macrofungi.

In early 1945, M. Moser was taken prisoner of war in Czechoslovakia and was imprisoned in a labour camp in Crimea, Ukraine. As a member of a construction work gang, he often was pushed to the brink of his physical capacity. One day he escaped unscathed in an accident when a truck densely packed with prisoners turned over, killing several of his comrades.

M. Moser was released from captivity in 1948 and returned home. Despite poor health and the severe moral setbacks caused by the war, he decided to return to his studies at the University of Innsbruck. Two years later, he presented his Ph.D. thesis "Zur Wasserökologie der höheren Pilze, mit besonderer Berücksichtigung von Waldbrandflächen" (1950). Whilst still a student, he also published his first mycological papers, which finally amounted to almost 200 valuable and genuine contributions to various aspects of mycology.

During this hectic time in his life, M. Moser became a member of several mycological societies, in particular the Société Mycologique de France (1948) and the British Mycological Society (1949), and consequently he made efforts to re-establish broken relationships with colleagues in Austria, England, France, Germany, Switzerland, and in many other European countries. In order to widen his knowledge on the systematics and diversity of agarics and boletes, M. Moser began to attend scientific meetings, conferences, field forays and collected actively macrofungi in various kinds of habitats in Central Europe.

In 1951, M. Moser obtained a grant from the British Council, which gave him the opportunity to work under Prof. J. L. Harley in Oxford. The half-year long stay in Britain was focussed on ectomycorrhizal research and taxonomic revisions of Agaricales kept in the Kew Herbarium. In addition, A. A. Pearson introduced M. Moser to numerous contemporary British mycologists and researchers on ectomycorrhiza. On his return to Austria, M. Moser was offered a research position in 1952 at the Federal Forestry Research Institute in Imst (Tyrol) where he was fully occupied with theoretical and applied aspects of ectomycorrhiza research and mycoecology. For many years, M. Moser and his collaborators developed inoculation techniques with the goal to establish in nurseries a symbiotic fungus-tree relationship for seedlings, subsequently used in reforestation projects at and above the timberline in the Alps. The proposed methods were later successfully adopted world-wide in reforestation programs. After leaving the research institute (1968), ectomycorrhiza research never ceased to attract his attention and subsequently many
students worked in Moser's lab at the University on ectomycorrhiza-related problems.

In the early fifties, R. Singer's taxonomic concepts on agarics and boletes were still revolving in the back of M. Moser's mind. He also realized that identification of the Agaricales was seriously hampered due to the lack of adequate and updated literature. Consequently, he decided to write a pocket-size booklet based on Ricken's "Vademecum für Pilzfreunde" (1920) but reflecting his own and Singer's taxonomic views. The "Kleine Kryptogamenflora von Mitteleuropa" was published in 1953, and its subsequent new editions (1955, 1967, 1978, 1983, now out of print) have been at the top of the bestseller list of mycological books ever since. In the following years, this book (treating some 3,150 taxa) was also translated in English (1983) and Italian (1986). The French version is still uncompleted. The "Moser" volume undoubtedly became not only the most popular standard book for the identification of European macromycetes but it also successfully helped to draw attention to the "modern" taxonomy of Agaricales as proposed by R. Singer. It is worth mentioning, however, that Singer and Moser did not actually meet until much later in 1960 (M. Singer 1984).

In the series "Kleine Kryptogamenflora von Mitteleuropa" M. Moser also published "Ascomycetes" (1963) which provided dichotomous keys for the identification of the more common European species of cup fungi. Lack of time and expertise in ascomycete taxonomy, however, stopped him from preparing a second edition of this less known book.

Despite heavy duties and scientific challenges both in the lab and in fieldwork, M. Moser became "Privatdozent" at the University of Innsbruck in 1956 and taught Microbiology. Eight years later, he was promoted associate professor and finally became a full professor in 1968. The newly created Microbiological Institute was officially opened in 1972 and M. Moser was in charge of this gradually increasing research and teaching institution until his retirement in 1991. For many years, M. Moser instructed hundreds of students in classes and lab work on diverse fields of microbiology ranging from the taxonomy, ecology and mycogeography of fungi, to bacteria and viruses, chemotaxonomy, molecular genetics, microbial toxicology, immunology and symbiosis. During his scientific career at the University of Innsbruck, M. Moser supervised and directed more than 60 doctoral theses and numerous diploma theses dealing with topics related to the above-mentioned fields of research. In addition, he was closely engaged in administration and worked in several committees at the faculty of Natural Sciences.

Going through the long list of M. Moser's publications (cf. also Schinner & al. 1983, and Wasser 1995), the following four major
topics of his research activity and interests in *Agaricales* s.l. are apparent:

a. **Classical morphotaxonomy of *Agaricales***: in connection with the "Kleine Kryptogamenflora", M. Moser was forced to clarify the taxonomic identity of the taxa recorded from Europe. In his concept, the only possible and feasible way to obtain reliable results was to go back to the localities in Sweden where E. Fries gathered the specimens described in "Systema mycologicum" (1821) and to screen Fries' subsequent publications. Accordingly, M. Moser not only learned Swedish but gathered topotypical material of *Agaricales* at localities visited by E. Fries with the intention of creating an international herbarium consisting of "neotypes" available to all fungal taxonomists world-wide. His disappointment was obvious when the rules of nomenclature for fungi were changed (1981) and the taxa mentioned in Fries' books became "sanctioned only".

As mentioned above, M. Moser concentrated his attention on the taxonomy of the genus *Cortinarius*, the most difficult and most diverse genus in the *Agaricales*. In the course of his studies, he monographed the European representatives of *Phlegmacium* (1960) and wrote many critical and supplementary contributions on related taxa. Invited by R. Singer to Argentina and Chile, M. Moser (together with E. Horak) published a comprehensive monograph on *Nothofagus*-associated *Cortinarius* species occurring in the Patagonian Andes. In numerous trips to the United States, M. Moser continued his taxonomic research on *Cortinarius* material lodged in the A. H. Smith Herbarium (MICH) and he added, in cooperation with J. Ammirati (Seattle), valuable data towards the knowledge of these taxonomically difficult species of agarics in North America. At the same time, M. Moser documented (often including paintings) and published data on personal collections gathered in a wide range of habitats (with special interest in arctic-alpine sites) from all over Europe, Greenland and the former Soviet Union (Crimea, Altai Mts.). He also examined material of SE-Asian and Australasian *Cortinarius* species sent to him by E. J. H. Corner (Cambridge) and E. Horak (Zurich).

Though initially expressing scepticism, M. Moser soon realized the taxonomic potential of molecular techniques to disentangle the complex systematics of the *Agaricales*, *Cortinarius* in particular. Accordingly, he did not hesitate to cooperate with colleagues in several leading molecular labs and
passed on his ample expertise in order to encompass all aspects in modern taxonomy.

During his long mycological career, M. Moser gathered and documented more than 25,000 collections, which are kept in the Herbarium IB at the University of Innsbruck. Voucher specimens photographed and presented in “Farbdatlas der Basidiomyzetzen” (Moser & Jülich 1985–2002) are also kept in this herbarium. In addition, he published around 420 new species of Cortinarius and about 80 new taxa belonging to other genera of agarics and boletes. Finally, he proposed Singeromyces (1966), Stephanopus (1975) and Anamika (2002) as new genera, the first two exclusively occurring in temperate southern South America.


b. Ectomycorrhiza research: many users of M. Moser’s “Kleine Kryptogamenflora” are probably unaware that he was an internationally recognized expert on ectomycorrhiza. After having been introduced to this topic by J. L. Harley, and in close contact with the Swedish researchers belonging to the Melin-Björkman school, M. Moser’s contributions in this field of research have been notable due to fact that (based on his taxonomic background) he put the fungal partners in the centre of his ecologically oriented concept of ectomycorrhizal relationships. In connection with extensive fieldwork carried out in the transitional zone between the upper subalpine and alpine belt both in Europe and the USA, he contributed many
interesting records and described new taxa from these unique habitats. Under his guidance, several of his students have been engaged in the study of ectomycorrhizal relationships in alpine habitats. With regard to this alpine mycota, it was an open secret that M. Moser had a high opinion of the contributions published by J. & J. Favre, R. Kühner and D. Lamoure from the Swiss and French Alps. For many years, he was in close scientific contact and exchanged research data and expertise with these Swiss and French colleagues. Apart from the afore-mentioned ecological contributions, M. Moser was also one of the first to realize the physiological importance of IES-auxins synthesized by the mycelia of ectomycorrhizal fungi in the rhizosphere.

c. **Chemotaxonomy of Agaricales:** Basidiomes belonging to many taxa of M. Moser’s pet genus *Cortinarius* s.l. are particularly characterized by conspicuous colours. On the lookout for additional criteria to separate taxa at species level, he made the first successful steps to study these pigments, which predominantly belong to anthrachinonic compounds. Based upon his selected material, PhD students worked hard on chemotaxonomic aspects believed to be reliable tools in practical taxonomy. In addition, M. Moser sought support and cooperation with biochemists actively involved in pigment biosynthesis and analysis, and as a result several important pieces of research data have been published in the literature.

d. **Toxic constituents in Agaricales:** Insiders are well aware that M. Moser was an excellent amateur cook renowned for creating delicious menus containing agarics and boletes. After having been intoxicated in the course of gastronomic experiments with *Phaeolepiota* and *Agaricus*, however, he also developed interest in the field of toxicology. M. Moser and his students became particularly involved in the chemical and pathological properties of the potent toxin orellanine, isolated from basidiomes of species belonging to the *Cortinarius orellanus-speciosissimus* complex. In his long scientific career, M. Moser was actively engaged in enhancing, progressing and promoting mycology at many different levels and functions. Hence he kept mutual contacts not only with leading professional mycologists but also with amateur mycologists thoroughly familiar with the diversity and ecology of the mycota in their preferred collecting sites. He organised numerous workshops and meetings, acted as chairman or president in several national and international congresses, was a member and referee on the editorial committees of several mycological journals (e.g. from 1989–2002 as member of the Editorial
Board of Sydowia), and belonged to the committees of various mycological societies and congresses. M. Moser always emphasized and valued his very close relationships with the mycological societies in Austria, Switzerland and Italy, which invited him routinely for forays which offered ample opportunities to enhance his knowledge of macromycetes.

Due to his broad expertise in mycology and related sciences, M. Moser evaluated countless research proposals on behalf of national and international associations and academies, and accordingly directed the thrust of mycological research in many institutions.


This summary of Meinhard Moser's long career could lead to the false conclusion that he centered his interests exclusively on mycology and worked like a robot for years on end. Yet it is a fact that he was gifted by an uncompromising capability for concentration. His memory for relevant literature sources was near-perfect. Over the years, his PC became his close companion in order to manage and control the immense pool of his descriptive data.

Meinhard Moser was rather shy, taciturn, formal and constrained in public or in official functions. In a relaxed atmosphere among students, collaborators or friends, he became extrovert and surprised many by his sense of humour and ready wit. Relaxing from his heavy load of duties in his comfortable home in Vill near Innsbruck, M. Moser easily became absorbed in several of his treasured hobbies. In particular, he liked to spend time on his stamp collection and enjoyed reading both belletristic literature and books on the history of early exploration (he owned a complete set of Sven Hedin's works), geography, botany and mycology, or he tried to raise plants from seeds brought back from his numerous collecting trips in Europe, North and South America. Even after he finally retired in
1991, he still kept up an intensive pace of work, which he usually began at 5 a.m., only occasionally interrupted by a short stroll through the forests in his neighbourhood.

A short while after returning from the 7th International Congress in Oslo (Norway), M. Moser suffered from a series of heart attacks, and was admitted to hospital. His condition worsened rapidly and he passed away on 30 September 2002. With the untimely death of Meinhard Moser, the mycological world has lost one of its pillars of taxonomy for agarics and boletes. His former students, assistants and collaborators at the Microbiological Institute at the University of Innsbruck, his professional colleagues in the mycological community worldwide and his many friends will deeply regret the loss of a distinguished researcher, teacher, leader and mentor.

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Publications submitted or in print


Nachtrag


