

THE HERBARIUM OF RUDOLF M. SCHUSTER:  
UNLOCKING OVER A HALF A CENTURY OF BOTANICAL EXPLORATION  
ГЕРБАРИЙ РУДОЛЬФА М. ШУСТЕРА: НАКОНЕЦ-ТО СТАЛИ ДОСТУПНЫ  
МАТЕРИАЛЫ БОЛЕЕ ЧЕМ ПОЛУВЕКОВЫХ ИССЛЕДОВАНИЙ

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Abstract

The esteemed scholar, bryologist, and botanist, Prof. Rudolf M. Schuster, was a prolific collector and author of over 300 scientific publications. His staggering number of collections, reliably estimated at over 80,000 specimens, span almost six decades of fieldwork in over 38 countries. For almost his entire career, over two thirds of R. M. Schuster's herbarium was largely inaccessible at his private residence. In 2013 his herbarium, in its entirety, was transferred to Field Museum. A detailed overview of the herbarium of R. M. Schuster is provided, including a description of the collections, the geographical extent, and status of curation and accessibility. This is complemented by tabulations and summary data representing the number of liverwort taxa R. M. Schuster described during his career and appended with a complete list of publications associated with liverworts and hornworts. Supplementary material provides a complete list of validly and legitimately published names at all ranks, from species to order, coupled with their original publication. This is the only publication that attempts to centralize and summarize the collections, publications, and exhaustive list of described taxa representing the career of the pre-eminent scientist, Prof. R. M. Schuster.

Резюме

Выдающийся ученый, бриолог, ботаник, проф. Р.М. Шустер был выдающимся коллектором и автором более 300 научных трудов. За почти 60 лет исследований он собрал в 38 странах более 80,000 образцов. Почти все время две трети его гербария, хранившиеся у него дома, были малодоступны. В 2013 г. его гербарий был передан Музею естественной истории имени Филда в Чикаго. В статье приводится подробный обзор гербария Шустера, самих образцов, географии сборов, состояния, работы с ними и, наконец, доступности. Приводится полная библиография трудов Шустера по печеночникам и антоцеротовым, дополнительные материалы включают полные каталоги описанных им таксонов, от порядков до таксонов внутривидового ранга. В этой публикации наиболее подробно обобщены данные о научном наследии великого ученого – Рудольфа Матиаса Шустера.

KEYWORDS: Rudolf M. Schuster, herbarium, collections, liverworts, taxa, volunteers

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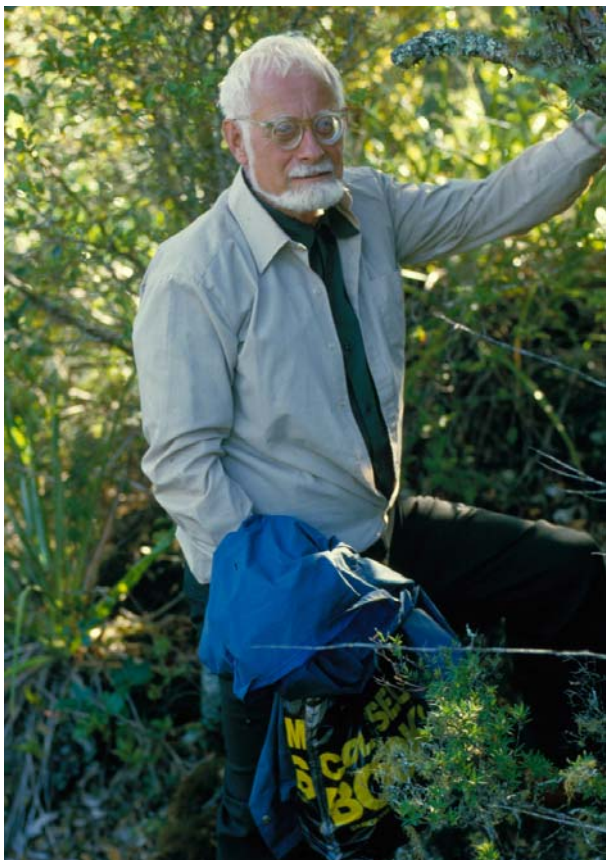


Fig. 1. Prof. Rudolf M. Schuster collecting on Rangitoto Island in the Hauraki Gulf, North Island, New Zealand in 1984. Photo Dr. John E. Braggins.

#### INTRODUCTION

Dr. Schuster, Professor Schuster, or Rudy – to all who knew him – was born April 8, 1921, in Altmühldorf, Germany (Fig. 1). Rudolf M. Schuster was an eminent botanist, hepaticologist, scholar, and world explorer, with a stunning career that spanned over six decades and represented one of the foremost classical scholars of our time in botany. Over the course of his career, he was awarded two Guggenheim Fellowships and a Fulbright U.S. scholar grant to conduct botanical research in New Zealand. His fieldwork took him all over the world and led to numerous scientific discoveries and novelties from the rank of form to order. It is difficult to name another contemporary botanist who discovered this much new diversity of a major clade of land plants (Qiu *et al.*, 2013). Schuster's research has had far reaching implications beyond bryology including his being one of the first botanists who recognized the importance of Wallace's Line in plant biogeography (Schuster 1972).

The International Association for Plant Taxonomy awarded him the Engler Medal in Silver in 1992 recognizing his illustrious scientific contributions. Since his passing on the 16th of November 2012, there have been several obituaries and biographies that provide an in-depth account of R. M. Schuster's life, from early childhood to his death, e.g., Qiu *et al.* (2013) and Long (2015).

Earlier, Engel & Klekowski (1988) provided an extensive account of the life and travels of R. M. Schuster as part of a Festschrift in celebration of his distinguished scholarship. Readers are referred to these accounts for his biographic background.

The object of this paper is to provide, for the first time, a detailed account of his exhaustive herbarium, and centralized information about all of his publications as they relate to liverworts and hornworts (Appendix 1) as well providing summary information about new taxa to science that he validly and legitimately described (Table 1). This is supplemented by a complete list, as we know it, of all taxa representing all ranks; this is confined to validly and legitimately names coupled with the original publication (Supplement 1). Our ambition with this paper is to provide thorough information about this important collection along with his exhaustive publications and novelties, which we hope will stimulate future research and continue the legacy of Prof. Rudolf M. Schuster.

#### OVERVIEW OF THE HERBARIUM OF R. M. SCHUSTER

In 1982, Field Museum purchased the entire herbarium of R. M. Schuster through the efforts of now Emeritus Curator John Engel. As part of the contractual agreement, the vast majority of R. M. Schuster's herbarium remained at his residence up until his passing to enable him to pursue his research. However, some 25,000 specimens, mainly from North America, were physically transferred to Field Museum where they were curated and databased. It was not until February 2013, that Field Museum acquired the remaining portion of what was then estimated to be approximately 35,000 specimens (Fig. 2).

Upon the packing and transfer of the herbarium of R. M. Schuster, it was abundantly clear that over a third of the collection was in critical need of curation ranging from specimens in original newspaper and brown paper bags to original collecting packets (Fig. 3C, D, F). There was also vital type material that required urgent attention, some of which was in glass vials and on microscopic slides. This was a major undertaking. Shortly after the acquisition, Field Museum Collections Spending Fund and later in 2015 the National Science Foundation (NSF Award No. 1115002) provided support for curation, sorting, barcoding, databasing and digitizing significant portions of the collection in order to make it accessible.

Throughout the past eight years, the collection has been widely used by visiting scholars and through loan activity. This period was also concurrent with a large-scale databasing initiative – the NSF funded Thematic Collection Network North American lichen and bryophyte consortium; a project imaging about 2.3 million North American lichen and bryophyte specimens from more than 60 U.S. herbaria to address questions of how species distributions change after major environmental events, both in the past and projected into the future. With the collection of R.M. Schuster being worldwide in scope, this effort continues with a similar NSF funded



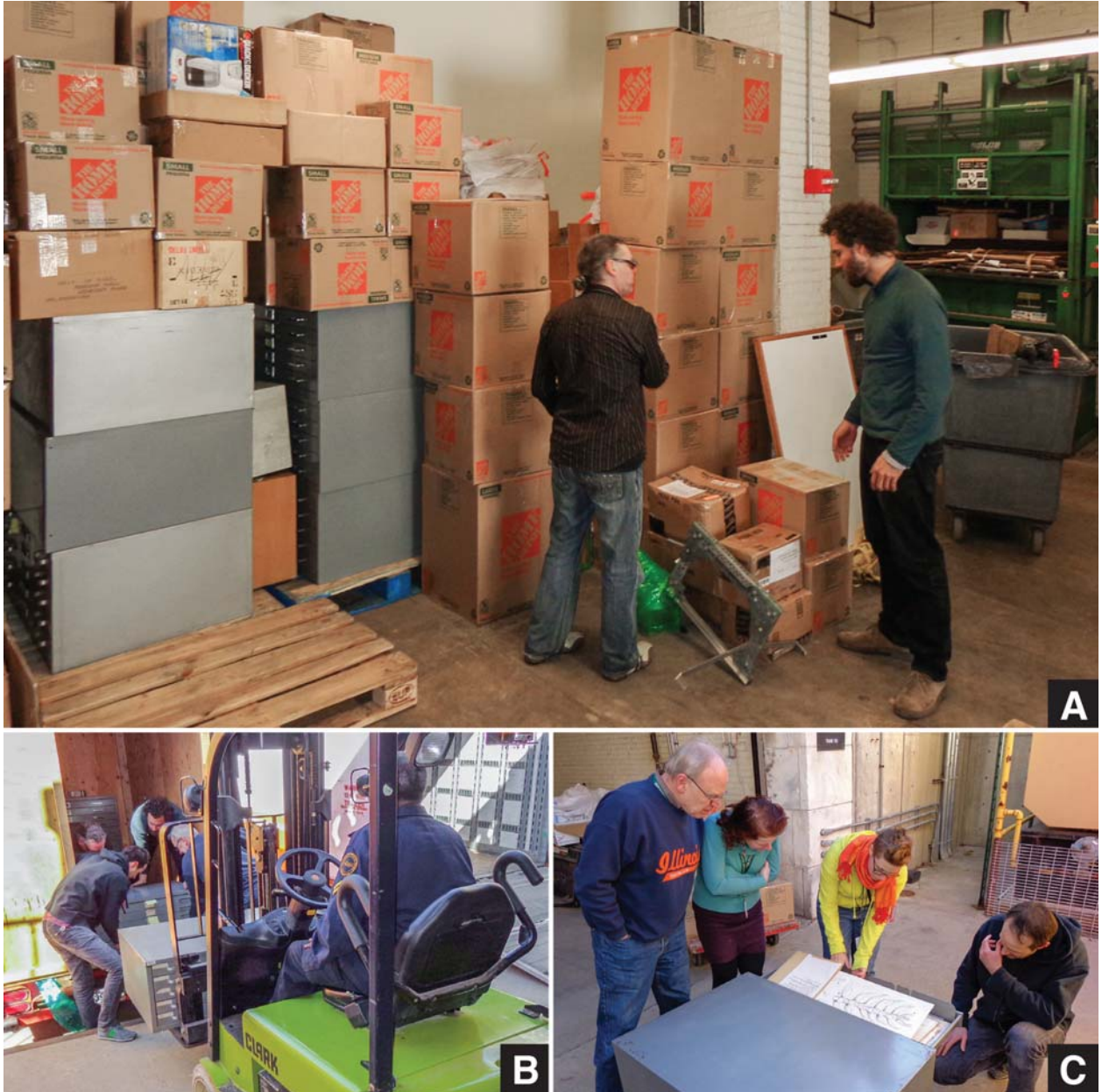


Fig. 2. Unloading of the herbarium of R. M. Schuster at the loading dock of Field Museum. A. Matt von Konrat and Juan Larrain with the scores of boxes of specimens. B. Matthew Nelson, Matt von Konrat, Juan Larrain, and John Engel manoeuvre the steel drawers full of original illustrations with Terry Bruce. C. Laura Briscoe and staff marvel at the original plates.

digitization effort - Building a global consortium of bryophytes and lichens: keystones of cryptobiotic communities (NSF Award No. 2001509). This latter digitization effort offers the opportunity to also capture digital images of the physical specimen itself as well as label data.

#### THE UNLOCKING OF SIX DECADES OF COLLECTIONS

The following describes the effort from several key individuals, including co-authors Laura Briscoe, Yarency Rodriguez, Mike Niezgodka with numerous assistance from volunteers and interns throughout the past eight years. Originally, ten's of thousands of specimens were in paper bags and newspaper (Fig. 3 C, D, E, F). Typically, R. M. Schuster would collect specimens in packets

in the field, transfer these to individual newspaper sheets then into bundles, with locality information for later curation and processing (Fig. 3E, F). An estimated 30,000 specimens had already been at least partially curated, labelled and packeted (Fig. 3B). Over 20,000 specimens were in critical need to be transferred from newspaper to packets for accessibility. This was largely achieved by assistance from volunteers, including Field Museum Collection Club members - a group of volunteers that meet every quarter (Fig. 4A). Through these combined efforts spanning several years, the collections have finally become accessible to scientists worldwide that have otherwise been largely inaccessible for several decades.





Fig. 3. A. One of two aisles dedicated to the herbarium of R. M. Schuster herbarium. B. Jorge Enrique Gil Novoa, from Colombia, perusing the 1000's of specimens that were already adequately housed, labelled and identified to various degrees. C., D. Significant collections remain in brown paper collecting bags, have not been identified but have valuable label data. E. Bundle of specimens in newspaper with locality data affixed to the "lot" or bundle. F. Over 20,000 specimens were housed in newspaper. G. The final curated specimen with label printed directly on archival packet, barcoded and databased.

Figure 4B, C & D indicate the final curated specimens. Many specimens came with adequately archived label data that was glued directly onto archival packets (3B).

A complete inventory of R. M. Schuster's herbarium was performed by Collection Club members after it had

been immaculately sorted and curated by staff and volunteers over the years. A staggering 58,974 specimens were counted and inventoried. The lots themselves had been earlier carefully surveyed by Laura Briscoe and Mike Niezgodka to determine level of curation, e.g., presence/absence





Fig. 4. A. Collections Club members that significantly contributed to unlocking the collections of R. M. Schuster exemplifies community science efforts. B., D. Original labels glued on to archival packets. C. Specimens housed in the main herbarium by geography. E, F. Over 600 microscopic slides; some have been salvaged by Juan Larrain. G. Over 500 vials of material in FAA have been inventoried.

of label data, identification, and level of processing in order to establish priorities. Together with material already in the main herbarium we count 80,273 specimens representing collections from 35 countries (Fig. 5). This includes approximately 5,000 specimens that are either gifts, exchange or exsiccate sets. Unfortunately, close to 10,000 specimens have either no label data at all, or limited label data, or only the country is known.

The R. M. Schuster collection also has a significant number of specimens in FAA glass vials (549) and important microscopic slides (over 600) that have been inventoried and available upon request (Fig. 4E, F, G). Some the newly described species by R. M. Schuster were only of reported from the type collection from slides or FAA (von Konrat et al. 2006) so these represent a valuable resource. Field Museum also has over 1,000 of R.





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Supplementary Material: Hepatic taxa described by R.M. Schuster  
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