



Rudolf M. Schuster
1921–2012

RUDOLF M. SCHUSTER, IN MEMORIAM

The year 2021 marks the 100th anniversary of the birth of R.M. Schuster. His outstanding works, based on a thorough study of morphology and the incredible experience of field research in various regions of the world, are an invaluable guide for researchers in different parts of the world. Schuster's work gave a powerful impetus to the development of taxonomy, phylogeny and biogeography of liverworts in almost all regions of the world.

This volume of Bryological journal *Arctoa* dedicated to his memory aims, on one hand, to pay tribute to the great scientist, and on the other, to present different directions of development of modern hepaticology, developing his ideas and continuing his research in different regions of the world.

This edition represents most of the main areas in which Schuster worked but first we put a few notes with the memories of those who were lucky enough to communicate and work with Schuster. This is followed by Gradstein's article (pp. 119–125), devoted to Schuster's contribution to hepaticology, including discussion of some of the key points of Schuster's work, supplements previously published articles on Schuster with new facts of his biography, in particular, unknown episodes from Rudy's field trips.

Despite the fact that it is widely known about Schuster's collecting trips, few people imagine the volume of his collections. The article by Matt von Konrat and co-authors (pp. 126–137) reveals this mystery and gives a visual idea of the scale of the collection and the representativeness of the regions in which the specimens were collected. In addition, it provides a complete bibliography of Schuster's publications and an appendix contains a huge list of taxa described by Schuster, indicating the source in which the taxon was first published.

Having developed a global system of liverworts, Schuster adhered to conservative views, treating the higher taxa of liverworts very broadly. However, he emphasized that "My own view is that the subjective matter of hierarchy adopted is of slight importance – it is not a matter of relative "correctness" and I am not overly concerned whether my suborders are inflated into orders, and orders into superorders. Time, probably, is on the side of the Schljakov classification. My chief concern is that, if eventually adopted, the Schljakov "inflation" of my system (Schuster, 1966, 1972) needs considerable cleaning of untidy group perimeters" (Schuster, 1984: 931 – 932). The use of molecular phylogenetic methods has made significant corrections to the Schuster system and made it possible to clarify the perimeters of both higher taxonomic units, as well as genera and species. One of the papers in this edition (Potemkin & Vilnet, pp. 138–148), describes the new genus *Rudolgaea* named after R.M. Schuster and his first wife O.M. Schuster who remained his constant assistant until her death. The paper by Mamontov et al. (pp. 159–169), is devoted to clar-

ifying the perimeters of taxa based on an integrative approach, and Konstantinova et al. (pp. 149–169) describe new species from the Sino-Himalaya.

In the preface to *New Manual of Bryology* Schuster wrote: "Bryology has "grown up" in the wrong parts of the world – especially in the biologically depauperate northern portion of Europe and in the glaciated parts of North America. Not only has this geographical restriction limited research on taxonomic problems, but it has equally served to restrict our understanding of cytology (chromosome counts of most primitive families of Hepaticae are unknown, or virtually so, because these groups evolved in Gondwanaland), of ecology, and phytogeography" and "It is to be hoped that this new generation of workers will include a large representation not just from three current centers of Bryophyte research (Europe, North America, Japan) but from tropics and antipodes" (Schuster, 1983: iii). The beginning of the 21st century was marked by the rapid development of taxonomic research in the southern hemisphere. The focus of liverwort diversity studies is increasingly shifting to the tropics and the Southern Hemisphere. In this edition, we follow Schuster (1983: iii) who tried to remove this "hol-arctic bias" including several papers on liverworts of Southern Hemisphere.

Engel's paper, which is a continuation of his long series of articles about Austral Hepaticae, includes the description of a species new to science that is endemic to New Zealand. Another description of a new endemic species from Australia is given in the article of Cargill (pp. 175–186).

The family Lejeuneaceae was one of the first subjects of Schuster's study, his first publications on North American Lejeuneaceae appeared in 1954 and the study of this family was a red thread through his whole life. The last years of Rudy's life were devoted to work on this family, work that he could not finish. At his country house in Conway, where he was making drawings of species of Lejeuneaceae, Rudy had bundles of illustrations of species of this family, the processing of which, as he expected, he failed to complete. Therefore, it is symbolic that one of the major articles in this issue by Renner, de Lange & Glenny (pp. 187–212) is a synopsis the genus *Lejeunea* from the family Lejeuneaceae in one of Rudy's favourite regions of the Southern Hemisphere – New Zealand.

The genus *Cephaloziella* remains one of the most poorly studied groups, its taxonomy is very confusing. According to Schuster (1980: 39), "Perhaps no genus of Hepaticae is more difficult than *Cephaloziella*", and on the same page, in one of the footnotes so characteristic for all of Schuster's publications, "Taxonomic chaos in *Cephaloziella* not only because of enormous degree of splitting practiced in this group, and because of the ambiguity of Douin's species, but also because the species are minute, exhibit few good taxonomic characters, and demonstrate an extraordinary polymorphism". Kiebach & Urmi's work (pp. 213–218) is a small step in the

direction of solving the huge number of problems in the taxonomy of this genus.

Starting from the very first works and almost in all his papers and books Schuster emphasized the importance of studying oil bodies for liverworts identification. One of the largest articles in this volume by Bakalin *et al.* (pp. 219–346) provides 1032 photographs of living cells in 572 species and 6 infraspecific taxa collected in China, Indonesia, Japan, Republic of Korea, Russia and Vietnam. This paper is a unique illustrated guide to oil bodies of a large number of species.

The importance of transplanting species and growing outside their natural habitats for understanding the stability of morphological features has been repeatedly emphasized by Schuster. In this volume there is an article by Berg *et al.* (pp. 347–353) devoted to the results of an experiment on cultivation in the genus *Riccia*.

The Arctic in a broad sense was, along with the Southern Hemisphere, Rudy's favourite region. His first field work in the Arctic was in Ellesmere Island where he stayed from mid-May through mid-September 1955. Later he spent two seasons (1966 and 1970) in West Greenland and in 1982 in South Greenland. The result of his work in Greenland was the publication of two books: "The hepaticae of west Greenland from ca. 66°N to 72°N" (Schuster & Damsholt, 1974) and "The Hepaticae of South Greenland" (Schuster, 1988a). These two books published on the basis of the studies on the liverworts of Western and Southern Greenland are an invaluable addition to the six-volume of "The Hepaticae and Anthocerotae of North America east of the hundredth meridian" and are basic guides to the study of the liverworts of the Arctic. They should be on the desktop for everyone who studies the liverworts of the Arctic. In addition to descriptions of species, including detailed discussions of variability and descriptions of many infraspecific taxa, these books include valuable generalization both on morphology and variability as well as phytogeography of arctic liverworts. Therefore, it is no coincidence that one of the articles in this publication by Söderström *et al.* (pp. 354–397) is the checklist of liverworts of one of the northernmost archipelagos in the world – Svalbard.

Schuster travelled a lot and was a great collector. He proudly emphasized that he had collected liverworts on all continents and in a huge number of countries. However, Schuster never collected in Korea. We are pleased to present the paper of Hyun Min Bum *et al.* (pp. 407–416) describing the flora of Jirisan Mountain National Park in Korea. The paper by Konstantinova (pp. 398–406) is devoted to the liverwort flora of Alaska, another phytogeographically remarkable region where the author collected liverworts together with Schuster in 1992.

Schuster largely concentrated on liverworts. However, his considerations on the phytogeography of mosses in the famous Manual of Bryology edited by him are of no less interest. East Asia always attracted Schuster at-

tention, so we include two papers, one on the new genus and species from this area by Fedosov *et al.* (pp. 417–424) and another on a new species from the genus with disjunctive East Asian – Eastern North American distribution by Kučera *et al.* (pp. 425–433).

Schuster's stressing the importance of branching for the systematic of liverworts is well known, while regarding mosses he regretfully wrote: "It is possible that, due to the fact that such seemingly fundamental criteria as ramification pattern, branch origin and merophyte development and sequencing, criteria repeatedly analysed in the Hepaticae, have received rather little attention in mosses" (Schuster, 1988b). The paper by Ignatov *et al.* (pp. 425–441) – addresses this.

It is known that Schuster began his scientific activity with works on entomology and even his PhD thesis "Preliminary Revision of the Genus *Ephuta* (Mutillidae) in America North of Mexico" was on entomology. Paying tribute to this side of his activity, we have included an article of Ignatov *et al.* (pp. 442–453) on "pollinators" of *Schistostega*.

The two traditional articles at the end of the volume, about discoveries of new species for different regions, are a tribute to Schuster's diverse collecting trips, from which he always brought numerous specimens and immediately published discoveries of interesting species.

We tried to collect in this volume articles on various areas in which Schuster worked and to present as many regions as possible in which he worked. We are deeply grateful to everyone who responded and took part in the preparation of this edition either by submitting an article or as a reviewer or both.

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