Foreword

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The family of *Lemnaceae* is a morphologically and ecologically isolated group that consists of very reduced monocotyledonous plants floating at, or just below the surface of the water. It comprises four genera and 35 species and its geographical distribution is world-wide. For the last fifty years the duckweeds were frequently used in physiological research; they represent a suitable material, for their predominantly vegetative reproduction results in genetically uniform clones that can easily be grown in aseptic cultures, not much laboratory space being required. The literature on the *Lemnaceae* is exceedingly voluminous and became quite complex since the review of HILLMAN (1961).

The duckweeds are known since long time as a good source of food for poultry, pigs and fish (SCHULZ 1962); in Mexico, *Lemna gibba* is sold at the food-market (SEIDL, personal communication). In Thailand, Burma and Laos, *Wolffia globosa* is used by the natives as vegetable or spice under the name "khai-nam" i.e. "water eggs" (BHANTUMAVIN and McGAPPY 1971, RUSKIN et al. 1976). According to ALBERTS (in lit.), the *Lemnaceae* represented an important food source for the ancient Mayas in Guatemala; the name "Xima Ha" given by them to the duckweeds corresponds to "water corn". More recent investigations reveal that the *Lemnaceae* indeed are an important food source both as far as their biomass productivity and their protein composition are concerned. The protein content amounts to 45 per cent of dry weight; about the same part is represented by carbohydrates, whereas fats constitute about 5 per cent (RUSKIN and SHIPLEY 1976, see also AMADO et al. 1980 in the further part of this volume). The nutritive value of the *Lemnaceae* is particularly high due to cystine and arginine that represent important components in their amino-acids.

The duckweeds take up numerous nutritive elements from the water and store them in their fronds. Dry fronds can accordingly contain up to seven per cent

of nitrogen, three per cent of phosphorus and three per cent of Kalium. The *Lemnaceae* could thus be used, particularly within regions characterized by a year-round vegetation season, for waste water cleaning purposes. On the other hand, they could be applied as organic fertilizers. RUSKIN and SHIPLEY (1976) reviewed the literature of the subject and gave a list of laboratories working on these problems; further data are provided in the bibliography in the present volume.

Taxonomical studies in the *Lemnaceae* are exceedingly difficult, for the few disponible morphological characters are largely modifiable and fruits occur only rarely. For these reasons, systematics of the duckweed family as well as patterns of their geographical distribution were not fully understood, in spite of the outstanding monography by HEGELMAIER (1868) and numerous further papers (e.g. a monography by DAUBS 1965). The only possibility of getting a better comprehension of the problem seemed to be a comparative study carried out on alive material. We decided therefore to establish a collection of clonal cultures that should not only serve for systematic and ecological investigations, but also be available for future research in various fields. Given the multivarious possibilities of study and use of the *Lemnaceae*, a possibly complete stock comprising taxa from various geographical regions was advisable.

The collection was initiated in 1953 and is still being completed, with the inevitable periodical rearrangements of the stock cultures. Various studies were carried out so far in this material; the first part of the obtained results is presented in our two volumes.

The first two contributions of the present volume, both by the Editor, deal with taxonomical problems: a brief systematic treatment of the *Lemnaceae* accompanied by the determination key is followed by the description of six new taxa.

The third paper deals with cytological variation within the *Lemnaceae*. Krystyna URBANSKA-WORYTKIEWICZ carried out during fifteen years a survey comprising 1500 samples; the extent of the resulting information on the cytology of the *Lemnaceae* makes them one of the best documented plant families. Contrary to the expectations, the study revealed that chromosome numbers are of no support for the classification of the duckweeds; however, the singular

pattern of cytological variation points out again towards the particular status of the *Lemnaceae*.

In the next contribution, Renato AMADO and collaborators report an amazingly uniform composition of amino-acids and carbohydrates within various taxa of the family. The differences between particular samples being negligible and statistically non-significant, it seems that a more extensive study should not bring about much more relevant information in this respect.

The paper by Annamaria LüöND deals with requirements of some duckweeds from Central Europe towards nitrogen and potassium; the presented experimental results will be compared later with ecological characteristics in the wild. Comparable studies dealing with Ca- and Mg-requirements are in progress at the Geobotanical Institute and further investigations, dealing with other taxa of the family, are foreseen.

The bibliography on the *Lemnaceae* presented in a further part of this volume comprises about 1500 references, nearly all research branches in which the duckweeds were studied being represented. Most of these publications will be briefly referred to in the second volume.

About 1600 samples that were kept, at least for some time, in our collection are listed in the last part of the present volume. For the most part, the material was examined morphologically and cytologically. The list contains data on origin of particular samples, collectors' names and chromosome numbers. The clones marked with a cross are still kept in aseptic cultures.

The second volume will consist of a monography of the *Lemnaceae*. Further results, mostly those obtained in morphological and ecological studies, will also be reported.

By publishing the two volumes on the *Lemnaceae*, we naturally whished to present the results of various investigations carried out in this group. Our main goal, however, is to encourage further research, so that the potentials offered by this unique plant family may be explored and become of the best use for the mankind.