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Taxonomic Results of the BRYOTROP Expedition to Zaire and Rwanda

I. Introduction

Jan-Peter Frahm

Universität Duisburg, Fachbereich 6, Botanik, D-47048 Duisburg, Germany

The Bryotrop project was planned in 1981 by several bryologists from Germany. Aim of this project was a comparative study of the bryoflora and -vegetation of rain forest areas in different parts of the tropics. In contrast to other bryological research in the tropics, this project should not be limited to pure floristic studies at various collecting sites but consist of interdisciplinary work of researchers from different fields together in a small region, an attempt which was not made before in bryology. For the field studies, the transect method was chosen. By this way a survey should be given of

(1) the the floristic composition of selected regions based on the intensive studies of relevées along a transect in a distance of 200 m altitude,
(2) subsequent taxonomic studies based on the collections,
(3) the description of epiphytic bryophyte communities according to the Braun-Blanquet method, which has so far not be used in the tropics,
(4) the ecology of epiphytic bryophytes including determination of their phytomass and water storage capacity,
(5) morphological adaptations of rain forest bryophytes and correlations of structure and function.

With this project the German tradition of bryological research in the tropics should again be taken up. Many important contributions on tropical bryology are going back to German bryologists such as C. Müller, M. Fleischer or Th. Herzog. However, since about fifty years the long tradition of bryological research in the tropics in Germany was no more continued. The Bryotrop project should help to continue and intensify tropical rain forest studies on bryophytes and also coordinate the activities of various researchers in Germany, since a concentration of several activities on a common project is promising much more effectivity as single projects. The first two of three projected fieldstudies have been performed in Peru and Borneo, supported by the German Research Foundation (DFG). They revealed numerous new results summarized in a large number of publications. The results of these projects provided

(1) new floristic results (new records of species) or taxonomic results (numerous species new to science),
(2) first phytosociological studies on epiphytic bryophyte communities using the Braun-Blanquet method,
(3) floristic and ecological studies on the altitu-

dinal zonation of tropical bryophytes which resulted in new proposals for a classification of the rain forest zonation,
(4) field studies on the ecology of epiphytic bryophytes and subsequent laboratory experiments which could first explain the increase of species numbers and abundance of tropical bryophytes with the altitude.

Ten years after the first Bryotrop expedition to Peru in 1982 and five years after the second expedition in 1986 to Borneo, the Bryotrop project was completed in Africa with an expedition to Zaire and Rwanda in august and september 1991. By this way fieldstudies in all three major rainforest regions of the world have ben carried out with the same objectives and the same methods, allowing a worldwide comparison.

Participants were:
Dr. Eberhard Fischer (Botanical Institute, University of Bonn) - logistics, floristics
Dr. Jan-Peter Frahm (Botany Dept., University of Duisburg) - floristics, ecology, altitudinal zonation
Dr. Wolfgang Frey (Institute for Systematic Botany and Phytogeography, University of Berlin) - phytosociology, morphological adaptations
Dr. Harald Kürschner (Institute for Systematic Botany and Phytogeography, University of Berlin) - phytosociology, morphological adaptations
Dr. Rainer Lösch (Botanical Institute, University of Düsseldorf) - ecophysiology
Dr. Tamás Pócs (Esterhazy Teacher´s College, Eger, Hungary) - floristics - phytogeography

Although Central Africa is one of the better floristically explored regions in tropical Africa, mainly due to the former activities of Belgian bryologists (e.g. there are 65 bryological publications for Zaire), nearly all these publications so far concerned floristics and taxonomy.
For the fieldwork, the Kivu Province in Zaire was chosen, since this was the only place available in Africa where transect studies could be realized from relatively low elevations to the forest line. In contrast to Peru, where the transect along the eastern slope of the Andes covered 300 - 3200 m, and Borneo, where the transect started at almost sea level and went up to 3500 m, the situation in Africa is not so favourate. Theoretically, Mt. Cameroon would be a place for such a transect, but the lower 2000 m of this mountain is no more covered by rainforests. In Central and East Africa, all volcanoes start above 2000 m and in many cases, the lower part is used by agriculture. Only at the western slope of the Mt. Kahuzi-Biega massif, a transect is possible with some delimitations. The lowermost point is the Irangi fieldstation in a forest reserve at 850 m, which is much higher as in the transects studied before. Although a reserve, large parts of the forest was already cut by natives. However, by long footwalks an elevation of 1500 m at top of Mt. Ilimo could be reached. The area outside the forest reserve and outside the Kahuzi-Biega National Park is intensively used by agriculture. Only at 1900 m a spot of rainforest at the park border could be studied, which was, however, going to be logged. Within the Kahuzi-Biega National Park, the altitude betwen 2100 and 3300 m at top of Mt. Kahuzi could be studied. Although this mountain is not a high as for instance the Virunga volcanoes, the forest line is reached at about 3200 m and the summit covered with subalpine *Erica-Senecio* vegetation.
Additional, mainly floristic studies and comparative ecological observations and measurements could be made in the Nyungwe forest between 1600 and 2400 m and on Mt. Karisimbi between 2700 and 4500 m in Rwanda.

This volume of “Tropical Bryology” shows part of the taxonomic results of this expedition. The study of several taxonomic groups such as Ditrichaceae, Leucobryaceae, Bryaceae, Orthotrichaceae except for *Orthotrichum*, Splachnaceae, Meteoriaceae and Hookeriaceae amongst the mosses and several hepatic genera as well as the epiphyllous liverworts has not yet completed. These results will be published in the next volume of this journal together with results of ecological, ecophysiological and phytosociological studies. Although Central Africa is not just a undercollected region but more frequently visited by bryologists in the past as other parts of Africa, and bryophytes have been collected before at all the localities visited, numerous new records could be made. Twelve species new to science were found, nine species could be repor-

ted for the first time for Africa (*Haplomitrium blumei, Marchantia polymorpha ssp. montivagans, Campylopus carolinae, Paraleucobryum longifolium, Racomitrium crispipilum, Erythrodontium squarrosum, Acroporium pungens, Sematophyllum subsimplex, Herzogiella cylindrocarpa*). Ninety-four species were collected for the first time in Rwanda, seventy species could be added to the flora of Zaire. Numerous new records were made for the regions visited, e,g, Mt. Karisimbi, Nyungwe Forest or Kahuzi-Biega National Park. The floristic results are in separate publications by the specialists for the taxonomic groups. We like to thank all colleagues involved for their cooperation.

In total, 2500 specimens were collected, plus several hundred specimens collected for the phytosociological studies. The collection data were stored in a computer using the dBaseIII+ program "Herbar" (#378 in the software library of the International Association of Bryologists). It allows to store all specimen data as well as to print herbarium labels and to generate reports e.g. of all species arranged by collecting numbers or localities. Lists of all species arranged by elevation or habitat makes this program useful for the study of altitudinal zonation or habitat preferences.

The first set of the collections will be deposited at the Botanical Museum in Berlin (B), were also the material of the first two Bryotrop expedition is stored. Duplicate specimens are in the herbaria of J.-P. Frahm, T. Pócs (EGR), E. Fischer and W. Frey as well as in the herbaria of the identifier.

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