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THE MOSS *Mnium hornum*, A PROMISING SOURCE OF ARACHIDONIC ACID

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Bryophytes are the second largest group of land plants, after the flowering plants, with about 15,000 to 25,000 species and many intraspecific taxa [1–3]. They settled all known ecosystems from desert to arctic with the exception of salt water. In general, bryophytes consist of three very diverse groups: hornworts, liverworts, and mosses. They are extremely rich in terpenoids, phenols, glycosides, and fatty acids. Despite liverworts, which have already received significant attention due to the presence of oil bodies with terpenoid substances of high biological activities, mosses remain very poorly studied chemically [4]. However, hornworts are the least chemically examined bryophytes [5].

Since the discovery of fatty acids in bryophytes in the 1960, it became evident that different species contained different lipid classes containing varying portions of these acids [6]. Fatty acids are known to be present within mosses, but there are still assumptions and generalizations from a relatively small number of species studied [7, 8]. The most abundant fatty acids of the bryophytes are also common to most other organisms. Typical for many bryophytes, however, is a high content of long-chain polyunsaturated fatty acids, particularly arachidonic acid and eicosapentaenoic acid, compounds which are not found very abundantly in the rest of the plant kingdom [7, 9].

Up to now, there are no data in the literature on fatty acids of the moss *Mnium hornum* Hedw. (Mniaceae), which is investigated in this study. The aim of this study was to examine its fatty acids by gas chromatography and gas chromatography/mass chromatography in the corresponding chloroform–methanol extract 1:1 (the yield was 8.85%).

Seven fatty acids have been identified in *M. hornum*: 20:4n6 26.03%, 16:0 25.25%, 18:3n3 19.65%, 18:2n6ε 11.76%, 20:5n3 9.44%, 18:1n9c 5.13%, and 18:0 2.74%.

P. Karunen states that evolution from lower to higher plants has a parallel in the biosynthesis of fatty acids, leading from longer chain and highly unsaturated fatty acids to shorter chain and less unsaturated ones, i.e., from C_{20}-C_{22} polyenoates (with 4 to 6 double bonds) to C_{16}-C_{18} polyenoates (with a maximum of 3 double bonds) [8, 10]. As inferred from the results obtained, acrocarp *M. hornum* is an interesting source of arachidonic acid. A possible and the most appropriate way for the production of large amounts of the moss that can be used for the isolation of arachidonic acid is its *in vitro* culture. Further studies are needed to compare the content of arachidonic acid of moss grown *in vitro* and moss from natural habitats. Therefore, the axenic culture of *M. hornum* is established and is under development.

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REFERENCES

1. S. R. Gradstein, S. P. Churcill, and A. N. Salaar, *Mem. N. Y. Bot. Gard.*, **86**, 1 (2001).
2. H. Grum, *Structural Diversity of Bryophytes*, Ann Harbor, Michigan (2001), 379 pp.
3. J. M. Glime, *Bryophyte Ecology* V/2 , E-book, Michigan (2007), p. 57.
4. Y. Asakawa, *Progress in the Chemistry of Organic Natural Products*, Springer, Vienna (1982), p. 1.
5. A. J. Shaw and B. Goffinet, *Bryophyte Biology*, Cambridge University Press, Cambridge (2000), 160 pp.
6. H. Wagner and H. Friedrich**,** *Naturwissenschaften*, **52**, 305 (1965).
7. S. Huneck**,** *New Manual of Bryology,* The Hattori Botanical Laboratory, Nichinan, Miyazaki (1983), p. 1.
8. P. Karunen, *Bryophytes, Their Chemistry and Chemical Taxonomy*, Clarendon Press, Oxford (1990), 121 pp.
9. J. L. Gellerman, W. H. Anderson, D. G. Richardson, and H. Schlenk, *Biochim. Biophys. Acta*, **388**, 277 (1975).
10. P. Karunen, *J. Hattori Bot. Lab.*, **53**, 255 (1982).