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## Theory and practice of hydrostatic lysimeters for direct measurement of net seepage in a patterned mire in north Scotland

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**Abstract.** A novel design of lysimeter for use in mires (peatlands) with shallow water tables is described. It employs an hydraulic mechanism for the automatic equilibration of soil moisture distribution between the outside and the inside of the lysimeter tank but uses no electronic components or electrical power; and it can be installed with minimal disturbance in surfaces with poor load-bearing capacity. The system was deployed on a mire in northern Scotland to investigate the distribution of shallow seepage associated with catenary arrays of different types of surface (microtopes). During the three-year period 15 November 1988 to 19 November 1991, the fraction of rainfall dispersed as seepage was 52% in a pool system; 62% in ridge-furrow microtopography; and 59-67% in unpatterned sloping mire. The data provide preliminary confirmation of the hypothesis of K. E. Ivanov that different microtopes within the same mire differ in their hydrological norms; and suggest that the range of ecohydrological differences at the study site may be similar to those obtained by Ivanov in western Siberia. Details of lysimeter design, construction, installation and operation are appended together with a discussion of the theory of the lysimeter.

**Keywords:** acrotelm, blanket mire, ecohydrology, evapotranspiration, pool system, valley-side flow, water balance

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