Mesocosm studies

Introduction to a series of papers given in a special session at the XXIII congress of the international association of limnology (SIL), 8–14 February 1987, Hamilton, New Zealand

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Since the early days of limnology and oceanography, *in situ* and *in vitro* (laboratory) experiments have been used to gain an understanding of ecological processes. The terms microcosms and mesocosms are often used to define the ecosystems studied in such experiments (Giesy Jr., 1980; Grice & Reeve, 1982). Draggan & Reisa (1980) defined microcosms as 'experimental units designed to contain important components and to exhibit important processes occurring in a whole ecosystem'. This general definition applies to both *in situ* and *in vitro* experiments. However, the prefix micro-, meso-, or macro- may be used to define the size of such an experimental unit. As an arbitrary limit, I suggest to define microcosms to contain $< 1 \text{ m}^3$ of volume, a mesocosm to contain 1 m^3 up to 1000 m^3 , and a macrocosm to contain $> 1000 \text{ m}^3$.

The experimental design of cosms can vary to a great extent. Figure 1 exemplifies the large variety of mesocosms as used in a series of papers presented at the special session of the 23rd SIL conference. Limnocorrals (syn. plastic etc. enclosures, bags) with

flexible walls are used *in situ*, whereas limnotanks (syn. fibreglass etc. vessels, containers) with rigid walls are used either on shore or in the laboratory.

It was the wish of all the contributing authors to publish their talks en bloc in *Hydrobiologia*, and to submit an extended abstract to the proceedings of SIL. Although there is substantial heterogeneity in the content of the presented papers, the reader will get a representative cross-section in recent mesocosm research. The contributed papers cover the topics biomanipulation, trophic plankton interactions, algal nutrient competition, algal-clay flocculation, contaminant sedimentation and remobilization, and ecotoxicology. The methodological benefits and problems of mesocosms are individually discussed.

I hope that these articles will stimulate the use and improvement of the mesocosm-techniques to the benefit of a better understanding of complex ecosystems.

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Chairman of the SIL session on mesocosm studies

Fig. 1. A selection of different mesocosms, A–E limnocorrals with flexible walls, F–G limnotanks with rigid walls.

- A 8 m diam., 15 m deep, $\sim 754 \text{ m}^3$ volume (McQueen & Post, 1987)
 B 3 m diam., 10 m deep, $\sim 70 \text{ m}^3$ volume (Bloesch et al., 1987)
 C 2 m diam., 10 m deep, $\sim 31 \text{ m}^3$ volume (Prepas & Trimbee, 1987)
 D 0.8 m diam., 2 m deep, $\sim 1 \text{ m}^3$ volume (Chant & Cornett, 1987)
 E 1 m diam., 3.5 m deep, $\sim 3 \text{ m}^3$ volume (Yasuno et al., 1987)
 F 2.3 m diam., 2 m deep, $\sim 8 \text{ m}^3$ volume (Threlkeld & Søballe, 1987)
 G 3 m long, 1 m wide, 1 m deep, $\sim 3 \text{ m}^3$ volume (Smith & Horne, 1987)

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