

24 THE VERTICAL DISTRIBUTION OF ROTIFERS IN A COASTAL MEROMICTIC LAKE OF PAPUA NEW GUINEA (LAKE NAGADA, MADANG PROVINCE). L.

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Lake Nagada is a coastal meromictic lake in NE Papua New Guinea (1). As part of a field study on the limnology of this lake, we studied the day- and nighttime vertical distribution of the rotifer *Brachionus cf. plicatilis* ("S-type") (2) in relation to the stratification of abiotic factors (temperature, conductivity, redox potential, pH, dissolved oxygen, total sulfides, and light transmission) as well as of phytoplankton and photosynthetic bacteria. At the end of May 1992, the thermocline was situated at 2.00 m depth, whereas the chemocline was at 4.75 m depth. A phytoplankton peak concentration was observed at the thermocline (1.5 - 2 m), whereas a dense bacterial plate occurred at the chemocline. Light intensity dropped sharply to less than 0.1 % at the depth of the bacterial plate. The day- and nighttime vertical distribution of *Brachionus cf. plicatilis* was sampled at 0.5 m intervals. During the day, a bimodal distribution was observed, with a peak of more than 900 ind. l⁻¹ at 1-1.5 m depth, and a smaller peak of about 400 ind. l⁻¹ at 4.5 m. A small number of individuals was found below the chemocline (up to 6.5 m depth). At night, there was a clearcut unimodal distribution, with a peak concentration of 1040 ind. l⁻¹ at 1.5 m. Our results indicate two subpopulations of *B. cf. plicatilis* in Lake Nagada, with the animals residing near the chemocline during the day migrating to the phytoplankton maximum during the night.

(1) W. VYVERMAN (1991). *Biol. Jb. Dodonaea* 59:100-108.

(2) Y. FU, K. HIRAYAMA and Y. NATSUKARI (1991). *J. exp. mar. biol. Ecol.* 151:29-41.

25 ROOSTS OF BLACK-HEADED GULLS : KEY OF A SELF-ORGANIZED DISPERSAL SYSTEM. G. De Schutter* and E. Nuyts - *Université Catholique de Louvain (UCL) and **Limburgse Universitair Centrum (LUC).**

Self organizing principle suggests that very simple interactions between numerous agents lead to very sophisticated adaptive behaviours on the hole system of these interacting agents. Self-organization has been evidenced as the leading principle of several adaptive mass behaviour in social animals, mostly social insects. Here we construct a model based on field observations and experiments on the social behaviours of wintering black-headed gulls, particularly roosting behaviour. This model leads from the simple rules structuring flocks of gulls till the complex adaptive system regulating the daily distribution of lens of thousands of them over wide

areas. These simple rules will be linked to this complexity through spatial structure of daily moves and nocturnal roosting behaviours. This model is both an illustration of the self-organizing principle as a mean of regulating bird dispersal and a new hypothesis about the function of communal roosting behaviour in birds.

26 INFLUENCE OF COPPER ON SOME ASPECTS OF THE ENERGY METABOLISM OF THE COMMON CARP *CYPRINUS CARPIO*. H. De Smet, G. De Boeck and R. Blust - University of Antwerp (RUCA).

The influence of copper on the oxygen consumption, nitrogen excretion and oxygen consumption/nitrogen excretion ratio (O/N ratio) of carp (15-25g) was determined at three different concentrations of the metal, during the first ten hours and after one week of exposure. Experiments were performed in a respiration chamber with the use of an oxygen-and ammonia-electrode. At a concentration of 250 µg/l an immediate significant drop of 60% in the O/N ratio was observed. This was followed by a transient, partial, but significant recovery. Finally, the O/N ratio stabilised at the level reached during the first hour of exposure. The same pattern was observed at a copper concentration of 125 µg/l, but the initial drop in O/N ratio was less (45%). At a copper concentration of 62.5 µg/l the response of the fish was not significantly different from control values. The sudden drop in the O/N ratio during the first hours was caused by a decrease in oxygen consumption compared to a smaller decrease in ammonia excretion. One week later however, ammonia excretion was fully restored to the initial level whereas oxygen consumption remained low. When the carps were exposed to an additional stressor, *i.e.* hypoxia, the critical oxygen concentration shifted from 1 mg/l (for clean water) to 3.5 mg/l (for exposure to a copper concentration of 125 µg/l and during one week). Under normal conditions, the ammonia excretion rate decreased after the critical ammonia concentration of 1 mg/l. At 125 µg/l Cu however, the ammonia excretion rate declined gradually. These changes clearly indicate that the fishes who were exposed to a sublethal concentration of copper, were more sensitive to the additional stressor than the controls.

27 PALEONTOLOGICAL STUDY OF THE NEERREPEN SANDS (GHOST-, ICHNO- AND MICROFOSSILS IN THE TUNGRIAN ID). J. Deville - University of Gent (RUG).

Until now there were few finds of macrofossils in the Neerrepén sands. It's very difficult to get ghost fossils out of the sand. When they