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REPORT OF THE LABORATORY WORKSHOP ON *CALANUS*

Bergen, Norway, 15 - 30 April 1994

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Report from ICES study group on zooplankton production, workshop at the Marine Biological field station, Univ. of Bergen, Norway, 15 - 30 April 1994.

Today we lack an accepted standard method for measuring secondary production of plankton, although several direct and indirect methods are commonly used. The problem is that the results of these methods have not been thoroughly compared and evaluated, and therefore, there is no official recommendation for using one of them as a standard method. This is especially bad when we want to evaluate possible environmental changes, because a methodological bias can then produce differences that are considered as effects of the changed environment. It is also of fundamental importance that the production of plant-eating animals can be quantified when estimating the production potential of various marine biological resources, like the commercially important pelagic fish stocks. Due to the importance of plankton secondary production in the sea and the lack of methodological standardisation, an international ICES study group on zooplankton production has been established. Within the framework of this study group, a laboratory workshop was organised at the marine biological field station, University of Bergen, in the period 15 - 30 April 1994, with the aim of evaluating various laboratory methods to measure production of the copepod, *Calanus finmarchicus*. More than 20 scientists from seven countries participated in this workshop, that was sponsored by the Norwegian Research Council, the Nordic Academy for Advanced Study, the Institute of Marine Research in Bergen, and department of Fisheries and Marine Biology, University of Bergen.

The test organism, *Calanus finmarchicus* (Copepoda: Calanoida) is probably the quantitatively dominating secondary producer in the North Atlantic. We kept a small population of this species in plastic-bag enclosures of c. 11 m^3, in the sea, to be used in the experiments. We also used freshly collected material from the field. The studies performed can be defined into six categories:

A. Stage distribution, size, moulting and biochemical composition:

The stage and size distribution within the field population was followed over c. one month, through silhouette photography, direct microscopic measurements and image analyses of subsamples. Samples for individual content of carbon and nitrogen was taken and the production of moults of animals held in tanks in the laboratory were recorded. This should give information on average individual growth rate in the population.

B. Respiration and excretion:

Respiration and excretion are quantitatively important variables in the total energy budget of the animal, and usually these variables changes in parallel with the growth rate. In laboratory experiments we studied how a variable food environment influences these functions and how their variability reflect growth rate.

C. Egg production and egg hatching success:

There is quite a large individual variability in egg production rate, that is unexplained by the present food environment. Laboratory experiments set up were designed to evaluate more in detail which trophic factors (also pre-historic) are most important in governing the egg-production rate but also the hatching success of the produced eggs.

D. Grazing and egestion:

These functions were quantitatively studies by several scientists, using several techniques. Because grazing (ingestion) is the basis for metabolism and growth there is a close coupling between grazing rate and production rate. Because egestion is supposed to be directly related to ingestion in a stable food environment, result on the production of faecal pellets can be converted through ingestion to growth (production).

E. Various enzyme activities:

In the workshop we measured activities of ETS, GDH and ATC, as indices of respiration, excretion and growth. These results should be related to the more direct measurements of metabolism and growth (category A and B above).

RNA/DNA:

The content of RNA and DNA was measured on animals from different food environments, including stable low and high food concentrations as well as fluctuating environments. This should give information about how well the level of RNA and the RNA/DNA ratio reflect pre- and present food situation and how they are related to the growth rate.

The results are prepared by the different scientists during autumn 1994 and we expect to present a preliminary report before the end of this year. Individual contributions from the workshop will be prepared for publication in international scientific journals. There will also be a co-operation with the American part of the working group, that has been working in parallel with the European group.