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Plankton Collection Instruments

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Today a variety of instruments constructed to determine plankton concentrations require the use of ships for deployment, an expensive and normally time consuming operation. A factor commonly considered as an obstacle for quantification of plankton is not only their variation in size but the great difference of their living space in water (Schlieper 1972).

Indirect observations relative to the presence of zooplanton are made with the help of the echo sounder, however, experience is required to interpretate the resulting echograph. Photometers or secchi-disk are used often to determine transparency or turbidity as an aid. This methodology yields only approximate data on the size composition (Schlieper 1972). Various types of nets and traps have been used to concentrate plankton from large volumes of water, some more effective than others depending upon the habitat and the species to be sampled (Wetzel and Likens 1979).

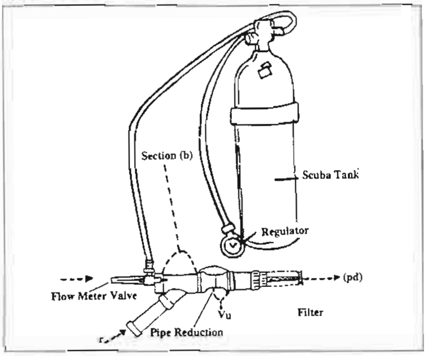
According to Schlieper (1972) a certain avoidance effect of the plankton is exerted by the pressure wave which precedes the net when the latter is towed through the waters; also the determination of the precise haul depth is a particular problem of all horizontal hauls, where other equipment is required such as a mechanical recorder or electrical depth meter.

Now it is possible to collect plankton from different water depths and record the temperature, depth, water flow through the net, and net angle with an instrument constructed in Woods Hole called MOCNESS (Multiple Opening Closing Net Enviromental Sensing System) operated at a towing velocity of 1 to 2.5 Knots.

Berman and Kimor (1983) constructed a shipboard differential filtration apparatus from agricultural irrigation filters that enables organisms of different size classes to be sampled simultaneously; water pumped either with the ship's pumping system for surface water sampling while cruising or for profiling and deep pumping with a 150 m. long 0.5 inch hose connected to a submersible pump.

An instrument that does not necessarily require the use of a ship for its deployment and may be less expensive than the others explained before can be designed as follows:

Ideally pressurized air from a scuba tank is left to escape from a small nozzle (inside the y- shaped pipe) at a determined pressure **Pe** of mass **Me** at a high velocity **Ve** (see fig. 1). The momentum **Me Ve**, of this mass of air is transmitted to the volume of water that comes from **r** and remains in section **(b)**, creating a discontinous mix **Mu** **(Mr+Me=Mu)**, that runs into the reducer with a cinetic energy of equivalent velocity **Vu**. Since pressure increases with the increase of transversal section along the reducer, cinetic energy is changed into energy of pressure. In this way, water at position **r** is compressed through the reductor from **Pr** to **Pd**.



The pressure of the fluid coming through the reductor must be greater than the sum of the pressure drop of filters in use, however, since the filter will tend to clog at a time x due to the viscosity of the fluid, experimental work would always be needed to define the filtering capacity (The capacity of retaining a certain weight of particles from a specific volume of fluid) of different filtering materials. Samples can be recovered backwashing the filters.

The construction of a hand held apparatus for plankton surveys based on a similar concept, would enable divers to collect organisms of various size classes at different water depths, by replacing only filter cartridges underwater in reef areas and coastal shallow waters where towing methods can not be considered due to the complex array of bottom structures, and without the mechanical problems associated to submersible water pumps.

References:

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