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"Hopping Boy", a Simple Wood-Framed Neuston Net[1]

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Abstract: A neuston net of simple structure is described. The filtering part of Motoda Horizontal Net (MTD net) is employed for netting of the present neuston net, and it is equipped to the wooden frame which functions as float and makes surface collection effective. The inner dimension of the mouth frame is 58×30 cm, and side stabilizing bars are 95 cm long. It is nicknamed "Hopping Boy", and it keeps advantages: light enough for one-man handling, operation capability on a small boat, consistent floating, and low cost.

The organisms essentially dwelling within the immediate surface stratum of the sea have been attracting mariners' interest for long years, as some larger forms such as *Velella, Porpita etc.* can be observed by naked eyes from the board, and can be easily captured with simple tools. On the other hand, the smaller forms which may compose the important portion in the surface community have to be collected by retaining through fine-meshed netting, and further highly locomotive organisms have to be fished with high speed samplers. The marine biologists who are interested in the epifauna, therefore, have designed various types of neuston net suitable for their study programs (DAVID, 1965 *a*, *b*; BIERI and NEWBURY, 1966; SAMEOTO and LAROSZYNSKI, 1969;

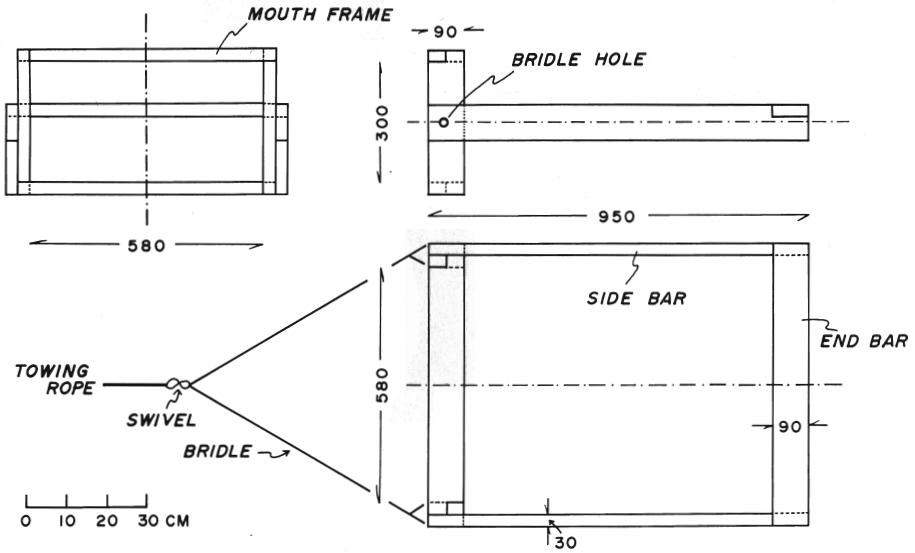

Fig. 1. Dimension of the wooden frame of "Hopping Boy".

[1] 小牧勇蔵・森岡泰啓：ニューストン・ネット，"ホッピング・ボーイ"について

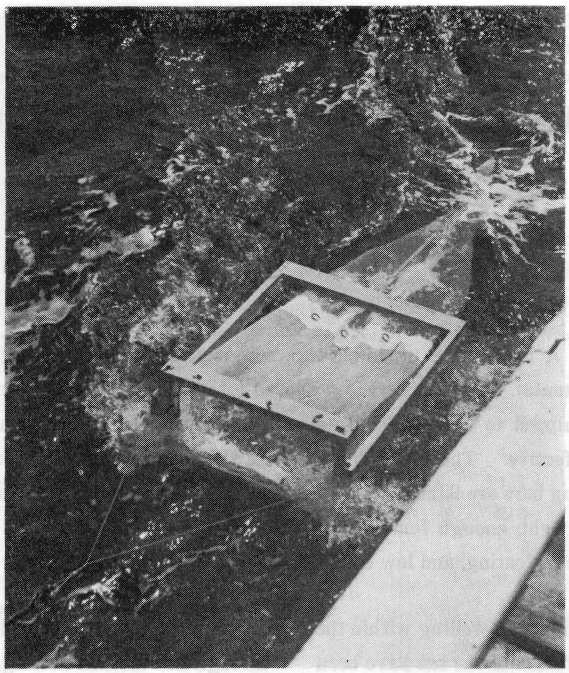

Fig. 2. "Hopping Boy" in operation.

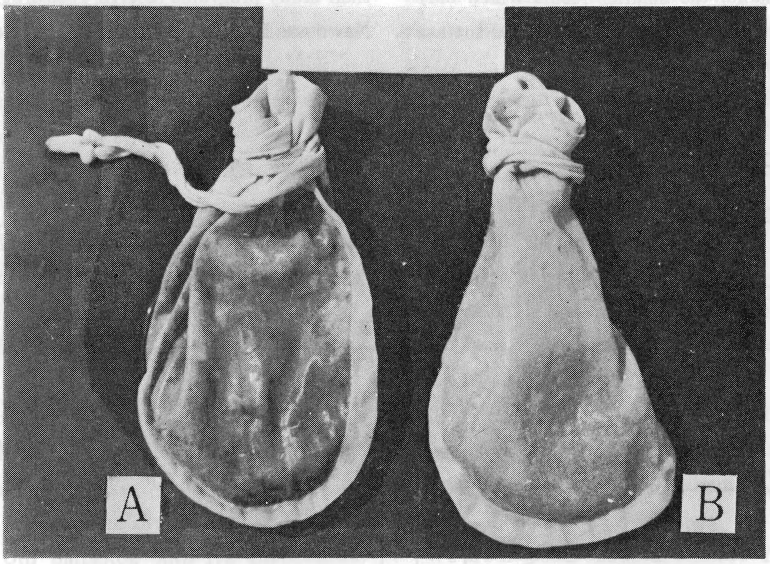

Fig. 3. Tail bags containing plankters collected by "Hopping Boy" (A), and by surface tow with an MTD net (B).

HEMPEL and WEIKERT, 1972; ZAITSEV, 1974).

Here is introduced a neuston net which has been employed in our plankton surveys since January of 1972 together with the other sampling gears for vertical and sub-surface horizontal hauls. It is of very simple structure, of extraordinary low cost, and able to be operated with ease and no failure as far as the ship is sailing normally ahead. The filtering part of the present neuston net is that of a Motoda Horizontal Net (MOTODA, 1971; abbreviately nicknamed MTD net); it is 56 cm in mouth diameter and 200 cm in length, and made of polyethylene NIP® 60 mesh bolting cloth (approximately 0.35×0.35 mm mesh aperture). The net is easily attached to and detached from the wooden frame by tying and loosing ropes on the mouth frame through bird's eye holes around the mouth part of the net.

The wooden frame, which is the work of our hobby carpentry, is made of 30×90 mm spruce lumbers and painted to keep off water penetration into the grain of wood. The dimension of the frame is shown in Fig. 1. The rectangular mouth frame is made to fit the mouth size of an MTD net.

Avoiding the turbulence caused by bow and side waves, the present net is to be towed from the boom streched out starboard (port) of the bow, and the length of towing rope is to be adjusted to locate the net as close to the bow as possible. Fig. 2 shows the net in operation. A handling line is tied up to the mouth frame, so that a single man can easily cast and recover the net.

In still water, the net floats on the surface, keeping the upper half mouth part in the air and the lower half in the water. In operation, the side and end bars of the frame effectively functionate as stabilizer, and the net skims steadily the surface water. The net has never dived beneath the sea surface, and has never skipped or hopped on the surface as far as the ship goes ahead at the usual towing speed, 1–3 knots, and the towing rope is approximately long. So then, the net usually swallows surface sea water of 10–20 cm thickness.

Although the present net was nicknamed "Hopping Boy" prior to towing trials, this nickname hurts his honour so much, as he behave quite gently at the surface and perform his role of collecting the surface living organisms effectively.

The repeating samplings are easily possible with "Hopping Boy", as the successive replacement of tail bag can be done within a minute. When the works aboard are too busy to treat collected sample immediately, the tail bag containing materials itself may be dipped into preservation liquid and the another bag may be successively attached to the tail tube for next cast.

The remarkable difference between the organisms collected by "Hopping Boy" and those by MTD surface tow is recognized from Fig. 3. The latter gear was towed without the triangular frame from stern, and consequently it traveled through the turbulent waters caused by the wake, and also its fishing depth was fluctuated between 0 and 2 m according to the fluctuation of ship's speed. Both samples were simultaneously obtained by *R/V Mizuho-maru* on her MZ 73-05 cruise at the monthly reference station in the vicinity of Sado Island in the Japan Sea in August 1973. The original photo of Fig. 3 is in color, and the difference between both samples are much more recognizable. The result of tentative analysis of both samples (Table 1) emphasizes more clearly the difference between them. The blue-colored pontellid copepods are to be the typical representatives of the neustonic plankters in tropical and subtropical waters (HEINRICH, 1960; 1974), and Table 1 may prove the effectiveness of "Hopping Boy" as a neuston net. The advanced copepodite stages of *Pontella chierchiae* are predominated among the pontellids.

Table 1 also suggests that the upper most surface stratum of the Japan Sea in summer is highly populated with neustonic life, and this is not confirmable without a proper neuston net. As far as one uses a tow net from the stern, he can sample only the populations of epiplankters

Table 1. Individual number of zooplankters per cubic meter, collected by "Hopping Boy" (a) and MTD net surface tow (b) at the monthly reference station at the mouth of Ryotsu Bay, Sado Island (38°14′N, 138°37′E: 20 August 1973: *R/V Mizuho-maru*, Cruise No. MZ73-05)

Gear	(a) "Hopping Boy"	(b) MTD net	(a)/(b)
Sampling time	08:44-08:59	08:52-09:07	
Volume of water filtered (m^3)	42.2	116.0	
Total biomass (mg/m^3)	282.0	4.48	6.3
Noctiluca scintillans	125.9	73.4	1.7
Chaetognaths	0.4	6.2	0.1
Cladocerans	2.5	5.4	0.5
Pontellid copepods†	**184.3**	4.4	**41.9**
Acrocalanus gibber	6.8	21.1	0.3
Other calanoids	2.3	2.0	1.2
Cyclopoids	4.0	3.4	1.2
Harpacticoids	3.8	0.2	19.0
Doliolids and appendicularians	1.0	3.0	0.3
Anchovy egg	7.8	4.2	1.9

† Dominancy: Advanced stages of *Pontella chierchiae*

diluted with sub-surface water in which the different community exists.

Recently the hydrosphere oil pollution has been the world wide serious problem, and a bulk of informations and articles on it are being circulated day by day. In oil pollution survey in the sea, FORRESTER (1971) showed that plankton sampler is a useful tool to collect tar particles which are derived from spilled petroleum through aging. MORRIS (1971) designed a quantitative neuston net and applied in for estimating tar quantity afloat in the northwestern North Atlantic.

The present "Hopping Boy" was primarily designed as a tar particle collector on the wreckage of a Liberian tanker "*Juliana*" on the shore of Niigata (COMMITTEE OF THE SURVEY ON THE *JULIANA* OIL SPILLAGE AND ITS INFLUENCES UPON THE LOCAL FISHERIES, 1973). Quantitative collection of tar particles is not always easy because short-aged particles are still soft, and adhere, tangle, clogg on and into netting, and also entangle plankters (ODATE and HAYASHI, 1973). "Hopping Boy" was proved to be satisfactorily usable for tar par-ticle collection Fig. 4 shows the tar distribution along the traverse lines in the central Japan Sea which was obtained by *R/V Shyunyo-maru* in the summer of 1972 using "Hopping Boy".

"Hopping Boy" holds many advantages such as simple structure, low cost, ease in handling, stability at the surface, capability of usage on small craft, and so on. However, it is not suitable for high speed samplng of larger forms. In addition, a sheering device is required to avoid more affirmatively the disturbance of the wave caused by bow, and also a device to estimate sea water filtered is neccessary for quantitative sampling. In this meaning, "Hopping Boy" still remains in young stage but adult.

We are indebted to Mr. Yoshihiro Yamagishi, Hakodate Fisheries Laboratory of Hokkaido, for his kind helps and useful discussions in making the neuston net.

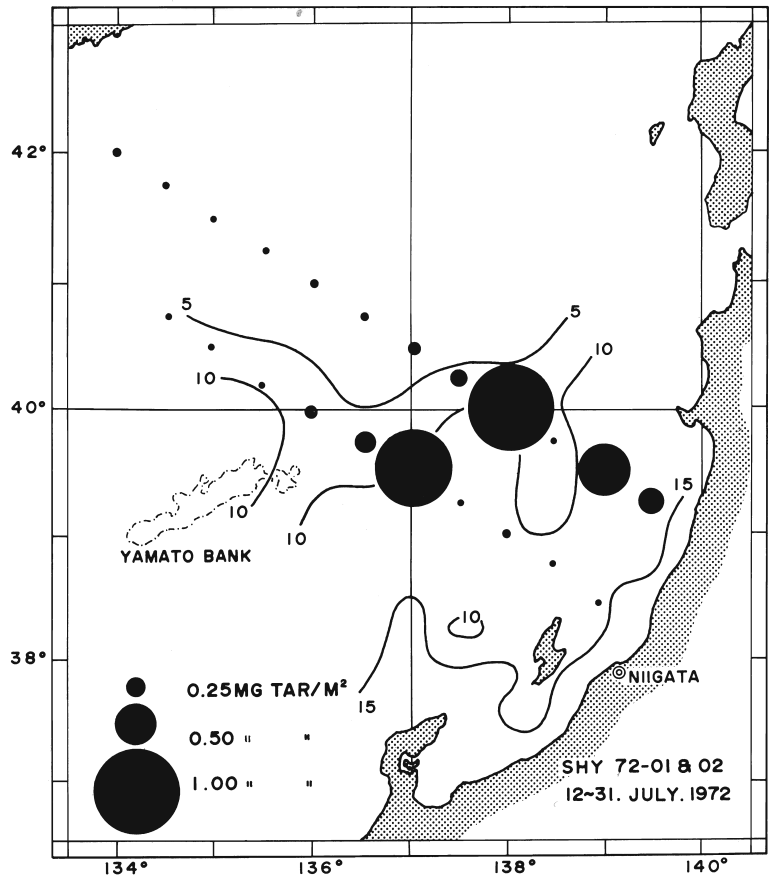

Fig. 4. Distribution of tar in the central Japan Sea estimated from the samples collected by "Hopping Boy" on board the *R/V Shyunyo-maru*. Isotherms (°C) are those at 50 m level.

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