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1.3
Studies on the assessment of zoobenthos living on the sediment-surface

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Introduction: Fieldwork has been done between 1977-10-25 and 1977-12-07 using 10 box-traps (BRETSCHKO 1978). Purpose of the experiment was to evaluate the influence of the number of catching-openings on the trap. Therefore, 5 traps have been exposed with all six openings working and five with successive more holes closed until all six have been shut. Exposition time was three days throughout. Only number 22 (see table 4 in BRETSCHKO 1978) was exposed for four days and is therefore excluded from all further considerations.

So far, all samples are counted on the level of higher taxa. For this work I have to thank Mrs. H. FALLMANN. Before statistical treatment all counts have been transformed by a log (x+1) transformation (BRETSCHKO 1978).

After the samples have been processed it was discovered that the traps were not sealed tightly enough: even in cases when all six catching holes had been closed, quite a few animals were able to enter the trap. Thus, the aim of the experiment was not accomplished. Actually, the abundance curves of fully open traps and successively closed traps, respectively, followed each other very closely. As an example, the results on chironomids are set out in table 1.3.1. Significant differences between the two sets of traps have been found in exposures Nr. 24, 26, 27 and 28.

EXP. Nr.	n	$\bar{x}$	LL	UL	n	Mean	Lower Level	Upper Level	Trap holes closed
16	10	72,900	49,082	91,294	-	-	-	-	-
17	5	55,400	44,768	67,064	5	45,200	20,998	78,731	.
18	5	97,800	51,552	159,229	5	65,600	44,812	90,102	.
19	5	56,000	49,749	62,604	5	56,400	36,309	80,461	. .
20	4	75,250	41,225	124,284	3	63,667	57,653	70,225	. .
21	5	69,400	47,506	95,352	5	56,400	35,365	81,842	. .
22	5	130,400	108,775	153,874	5	129,400	99,796	162,883	. . .
23	5	145,000	85,762	216,193	5	94,400	70,612	121,493	. . .
24	5	114,800	91,092	141,141	5	73,600	41,939	114,343	. . . .
25	5	113,600	68,219	170,583	5	101,000	56,166	159,930	. . . .
26	4	131,500	81,161	200,365	5	78,200	48,328	114,852	. . ...
27	5	120,000	82,852	163,977	5	69,000	55,793	83,525	. . ...
28	5	154,800	143,287	166,734	5	32,200	16,746	51,699	. .....
29	10	133,400	109,515	154,317	-	-	-	-	-

Table 1: Catches of Chironomidae with boxes with 6 trap-holes always open (left block of the table) and with boxes with successively fewer trap-holes (right block of the table).

Assuming an uncontrolled but constant "leaking" of animals into and out of the traps some information from the experiment can be gained. Knowing the high variability of the samples and the fact that only one exposure was made with 5 traps fully open and 5 traps fully closed a calculation of the "leaking-effect" is not feasible. The 6 most frequent taxa results of the one experiment are set out in table 1.3.2.

Oligochaeta	3.25
Hydracarina	4.00
Ephemeroptera	3.67
Plecoptera	1.33
Trichoptera	?
Chironomidae	4.81

Table 1.3.2: The figures are quotients of the arithmetic means (n-5) of catches in fully open and fully closed traps, respectively. In Trichoptera the catch in fully closed traps was zero.

Results: The relative frequency distribution of higher taxa is very similar to that found in the summer (BRETSCHKO 1978). The eight most frequent taxa accounting for 98,7% in fall and 92,1% in this summer, respectively (table 1.3. 3), are nearly the same, besides, that ostracods became more scarce and oligochaets more frequent. The dominant role of chironomids is much more pronounced in fall than in summer (86,6% and 62,1%, respectively). Inside the eight most frequent taxa, there was only one major change: Trichoptera moved from the 7th class in summer up to the 2nd class in fall (table 3).

Class (C)	Taxon	%	Σ%	Reference class (RC)	Σ%	C/RC
1	Chironomidae	86,6	86,6	1	62,1	1,00
2	Trichoptera	3,4	90,0	7	64,8	0,29
3	Plecoptera	2,9	92,9	2	76,2	1,50
4	Hydracarina	2,0	94,9	3	82,3	1,33
5	Ephemeroptera	1,5	96,4	4	86,8	1,25
6	Oligochaeta	1,4	97,8	9	87,8	0,67
7	Cyclopoidea	0,5	98,3	6	90,8	1,17
8	Harpacticoidea	0,4	98,7	8	92,1	1,00
9	Nematoda	0,3		13		0,69
10	Tricladida	0,2		10		1,00
11	Tipuliformae	0,2		11		1,00
12	Simuliidea	0,2		16		0,75
13	Hydra	0,1		17		0,76
14	Ostracoda	0,1		5		2,80
15	Gammaridae	0,1		12		1,25
16	Collembola	0,1		15		1,07
17	Cottidae	0,1		5		-
18	Coleoptera	s		Ø		-

Table 1.3. 3: Relative frequency distribution of taxa. Reference classes are the results of the exposition-series 77-06-17 to 77-07-29 (table 3 in BRETSCHKO 1978).

Chironomids do show a very clear abundance pattern (fig. 1.3.1). From 1977-10-25 up to 1977-11-12 the mean abundance is 71,3 individuals per catch, later (1977-11-12 bis 1977-12-07) mean abundance amounts to 130,8 individuals per catch. Both are significantly different (t=8,790, DF=71). There were no significant differences between catches of one period besides the exposure 18 which is intermediate. No reason could be found for this sudden increase in abundance.

There is a sharp decrease in the abundance of Hydracarina over the first 4 exposure-periods. Later, abundance varied arround a mean of 0.9 individuals per catch (fig. 1.3.2). The abundance of Ephemeroptera is roughly the same over the entire study-period, with a grand mean of 1,7 individuals per catch (fig. 1.3.2). Oligochaeta, Plecoptera and Trichoptera do not show any abundance pattern at all (fig. 1.3.3).

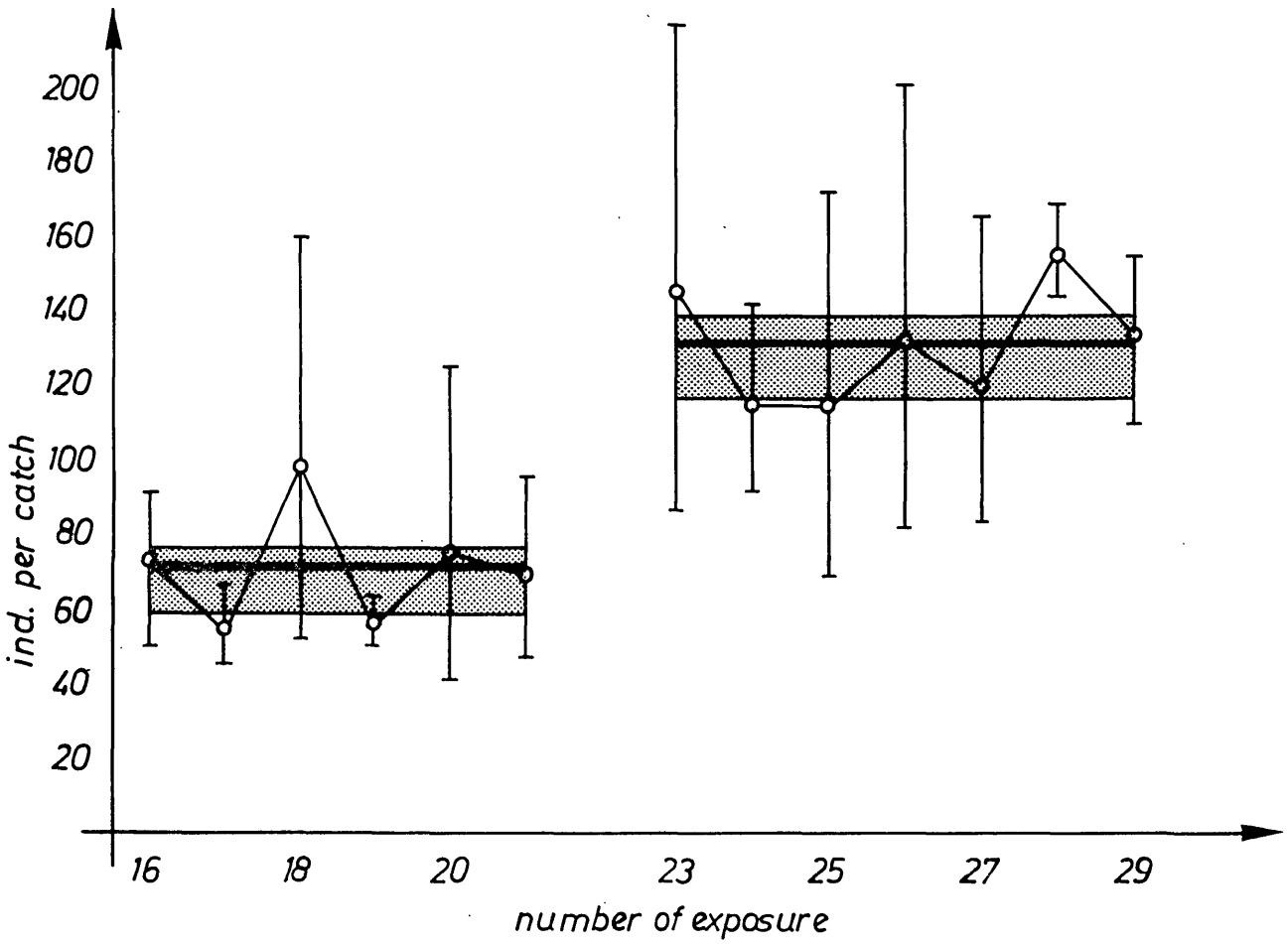

Figure 1.3.1: Chironomids. Horizontal lines: grand mean; shaded area: 95 % confidence interval. Circles: mean per exposition; vertical bars: 95 % confidence limits.

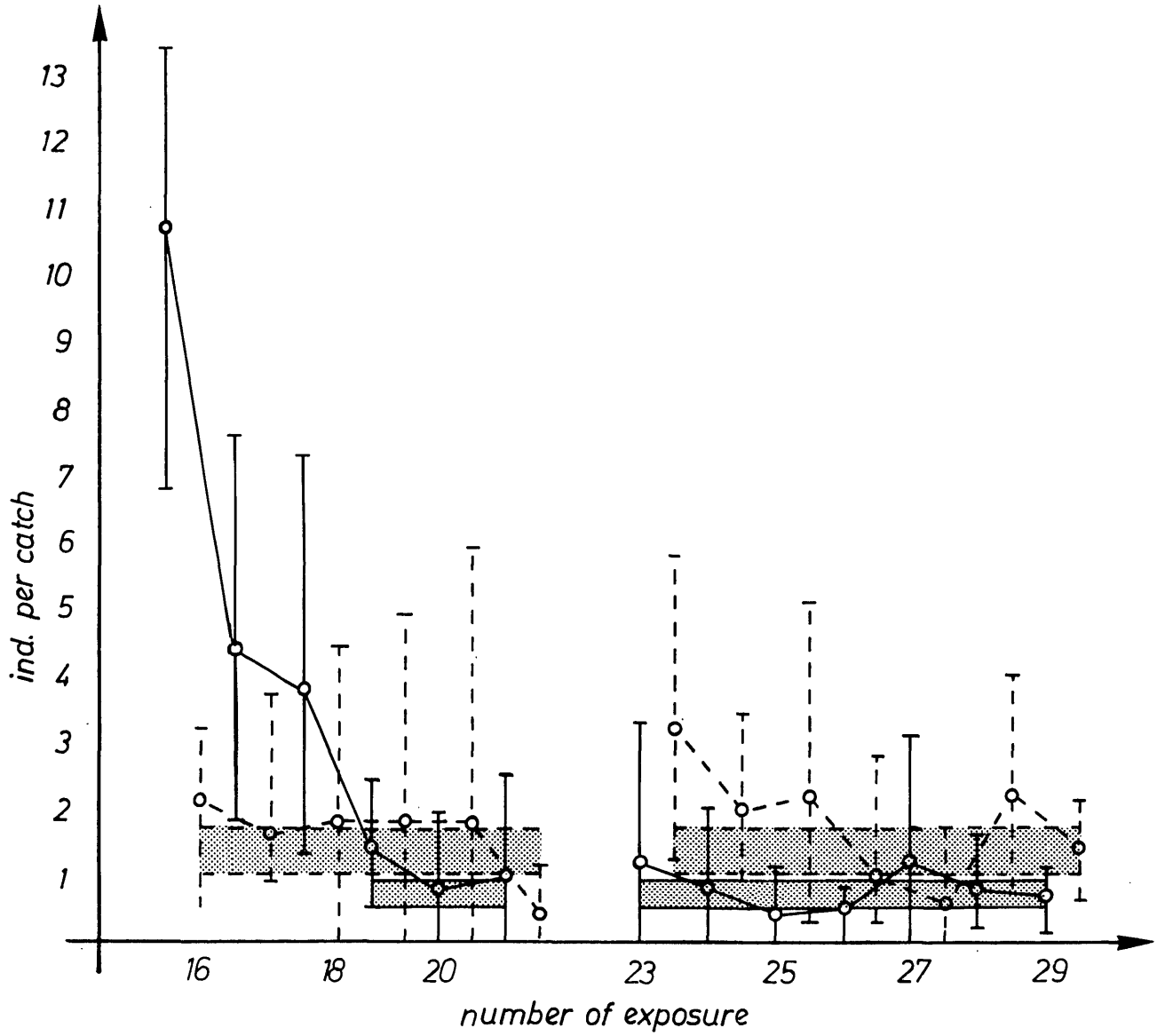

Figure 1.3.2: Full lines: Hydracarina; broken lines: Ephemeroptera. Otherwise, captions as in figure 1.

Consequences: With a seal made out of rubber it was possible to make the traps animal-tight, except the trap-holes. This could be proved with two traps during the time from 1979-01-11 until 1979-02-13. It is also necessary to clean the outer surface of the traps very carefully with a stiff handbrush.

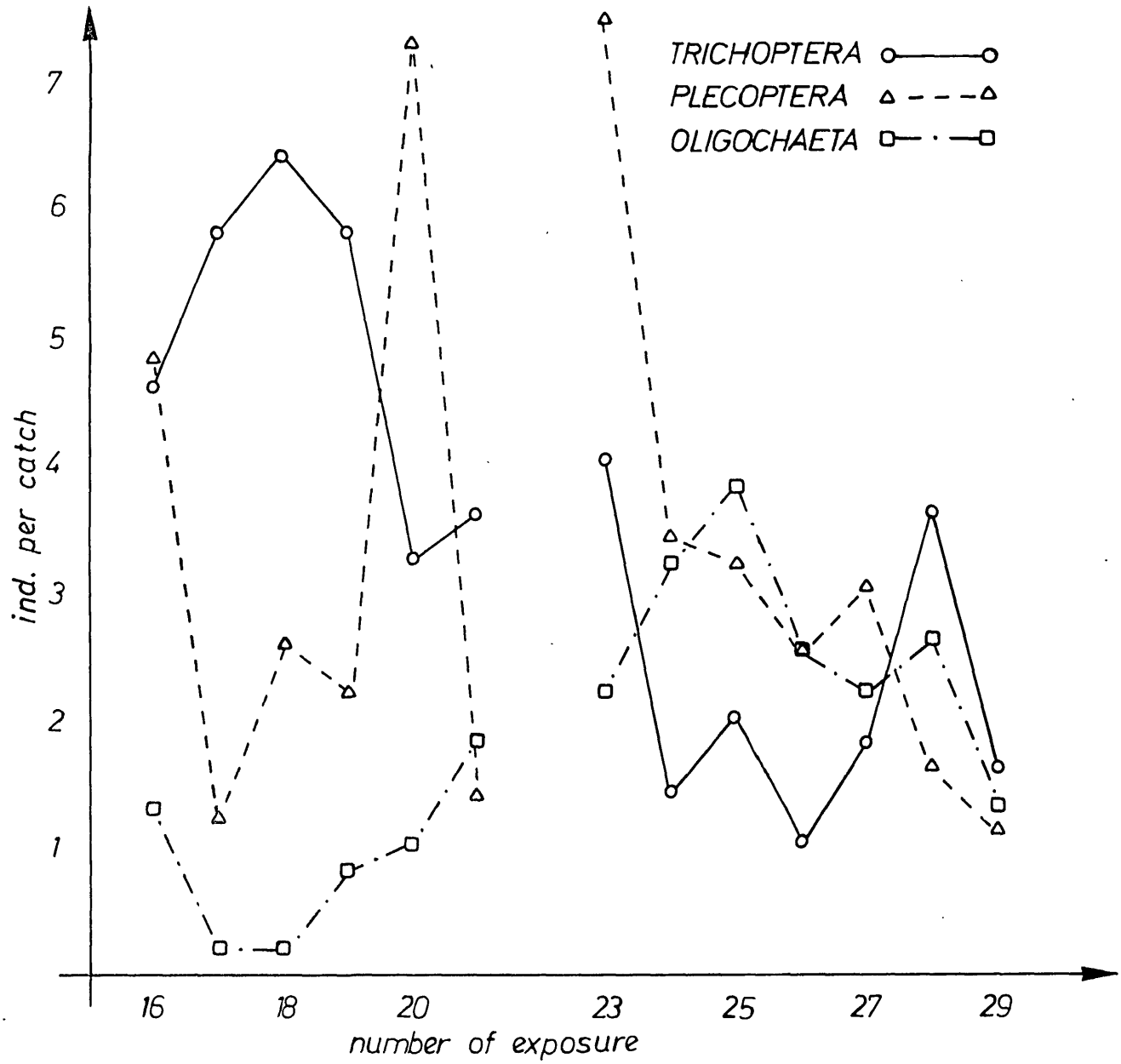

Figure 1.3.3: Mean abundances of Oligochaeta, Plecoptera and Trichoptera.

In case of frequent control, the sediments are heavily disturbed in the vicinity of the traps. To prevent that, a tin-frame, tightly fitting the traps is permanently installed. Now trap-controls are possible without any disturbance of the surrounding sediments.

To prevent anoxic conditions in the traps during longer exposure-times two windows were cut into opposite trap walls. The windows correspond with the holes in the tin-frames and are sealed with a 100 micron netting.

The experiments will be continued.

Literature:

BRETSCHKO,G., 1978: Methodenstudie zur Messung der an der Sedimentoberfläche lebenden benthischen Bachorganismen.- Jber.Biol.Stat.Lunz 1: 36-45