PHYTOPLANKTON DIVERSITY

IN THE LOWER YORK RIVER, VIRGINIA

June 1960 - June 1961

SPECIAL SCIENTIFIC REPORT NO. 38

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Data on phytoplankton diversity obtained in connection with 37 productivity experiments conducted in the lower York River by the Planktology Department are reported. A single station situated about 300 yards from the VIMS pier was studied. Hydrographic, nutrient, chlorophyll, seston and productivity data obtained were summarized in Report No. 22 (1961) of this series.

The diversity indices employed have been fully described in Special Scientific Report No. 23 (1961), and also in J. Mar. Res. 20: 57-75 (1962). The basic data for their computation were obtained from water samples collected at the beginning of each experiment from the surface, 2 ft, 6 ft, 10 ft and bottom (30 ft mean low water). Sedgwick-Rafter mounts were made of the fresh material, and phytoplankters distinguished and counted. Results were tabulated as counts (n_i) per ml of each of the m taxa present ($i = i, 2, \ldots, m$). If N is the total of all organisms ($N = \sum_{i=1}^{m} n_i$), then the basic diversity expressions can be written as follows:

$$H_{max} = \log_2 N! - \log_2 [N-(m-1)]!$$

$$H_{min} = \log_2 N! - m \log_2 (N/m)!$$

$$H = \log_2 N! - \sum_{i=1}^{m} \log_2 n_i!$$

$$R = \frac{H_{max} - H}{H_{max} - H_{min}}$$

Computation of these variables as well as mean diversity per organism, $\bar{H}_{max}$, $\bar{H}_{min}$, $\bar{H}$, and the ratios H/H_{max} and H/H_{min} was performed on an IBM 1620 computer at the Narragansett Marine Laboratory under the direction of Dr. Saul B. Saila.

The most significant results were (i) marked reduction in community diversity (H) below 2 ft (Table 5), without a significant change in $\bar{H}$ with depth (Table 8), and (ii) corresponding increase of redundancy, R (Table 11).

Distribution of this report does not constitute publication, and the data are subject to correction and/or revision.

Bernard C. Patten
26 September 1962

EXPERIMENT DATES

Experiment No.	Dates
1	22-23 Jun 1960
2	29-30 Jun
3	6-7 Jul
4	13-14 Jul
5	19-20 Jul
6	27-28 Jul
7	3-4 Aug
8	10-11 Aug
9	17-18 Aug
10	24-25 Aug
11	31 Aug - 1 Sep
12	7-8 Sep
13	14-15 Sep
14	21-22 Sep
15	27-28 Sep
16	11-12 Oct
17	19-20 Oct
18	1-2 Nov
19	15-16 Nov
20	21-22 Nov
21	6-7 Dec
22	16-17 Dec
23	6-7 Jan 1961
24	24-25 Jan
25	10-11 Feb
26	24-25 Feb
27	3-4 Mar
28	10-11 Mar
29	17-18 Mar
30	25-26 Mar
31	30-31 Mar
32	6-7 Apr
33	14-15 Apr
34	21-22 Apr
35	5-6 May
36	19-20 May
37	1-2 Jun

Table 1. Number of phytoplankton taxa (m) recorded at different depths.

Expt. No.	S	2	6	10	B
1	11	9	13	9	13
2	15	13	9	10	3
3	14	15	10	9	14
4	13	12	12	13	11
5	15	16	13	11	9
6	15	17	11	13	8
7	14	9	10	7	8
8	16	18	10	15	6
9	18	14	16	15	12
10	15	12	9	12	7
11	16	10	8	8	11
12	17	12	8	5	6
13	--	--	--	--	--
14	15	13	9	9	8
15	9	9	5	6	5
16	10	9	9	11	12
17	13	13	11	7	8
18	7	6	13	4	5
19	--	--	--	--	--
20	15	18	12	10	10
21	12	10	9	11	13
22	14	19	16	16	15
23	11	14	11	12	14
24	15	14	16	17	18
25	18	25	17	19	20
26	18	11	16	16	12
27	15	15	17	17	20
28	24	25	18	16	21
29	19	21	20	23	29
30	16	19	18	20	21
31	16	15	11	11	15
32	13	11	16	15	14
33	15	12	14	14	14
34	8	10	10	12	6
35	10	2	3	7	8
36	--	--	--	--	--
37	9	8	8	3	7
$\bar{X}$	14.1	13.4	12.0	11.8	11.8

Table 2. Cell counts (N) in units (cells, chains, or colonies) per ml

Expt. No.	S	2	6	10	B
1	3003	4107	954	1052	2437
2	3786	4020	1115	1337	279
3	6440	6068	3832	1892	1534
4	2109	2247	1559	1219	1818
5	6208	6336	2047	2039	2336
6	2666	4348	896	790	553
7	5022	3017	3999	635	1273
8	2964	4682	794	892	849
9	5622	5577	2582	4896	1691
10	1916	1692	989	531	503
11	2034	1261	649	245	650
12	1423	1406	371	35	231
13	---	---	---	---	---
14	2742	7540	8565	906	371
15	1837	1281	1044	1203	98
16	1616	2309	3297	1206	948
17	5946	1434	1766	1057	245
18	913	502	948	349	703
19	---	---	---	---	---
20	2623	2499	2444	1961	2393
21	948	1079	920	725	753
22	1851	1393	956	1417	1378
23	1092	677	1010	1288	1346
24	1516	1365	2185	2011	3096
25	2478	3049	2073	2009	2491
26	1263	1670	4833	3291	3078
27	2330	2740	2405	1844	1709
28	2688	2593	1838	1811	2273
29	2852	2900	3039	4089	2085
30	3358	3178	2830	3381	2586
31	1227	697	934	994	747
32	3526	5012	6732	2881	1927
33	4146	3925	2325	2281	2059
34	1053	398	448	210	856
35	2877	77	285	579	314
36	---	---	---	---	---
37	1685	718	516	286	496
$\bar{X}$	2758	2700	2094	1510	1356

Table 3. $H_{max.}$, bits/ml.

Expt. No.	S	2	6	10	B
1	10388.6	13018.8	3530.2	3334.7	9017.9
2	14791.4	14875.7	3534.4	4441.4	442.2
3	24519.3	23706.9	12729.6	5997.5	5840.5
4	7804.2	8055.4	5588.9	4510.8	6289.2
5	24253.9	25343.9	7574.8	7053.8	7404.9
6	10415.7	17777.2	3099.6	2923.3	1659.0
7	19120.5	9563.6	13284.3	1782.7	3819.0
8	11855.0	19523.5	2637.6	3484.9	2194.6
9	23443.2	21266.5	10328.0	19128.1	6062.1
10	7485.6	6065.7	3135.0	1903.6	1412.1
11	8136.0	4188.9	1947.0	2248.6	735.0
12	5816.4	5040.4	1113.0	81.3	597.1
13	----	----	----	----	----
14	10712.7	27901.2	27150.3	2871.9	1113.0
15	5823.1	4060.7	2424.1	3109.7	227.5
16	5368.2	7319.3	10451.2	4172.1	3398.5
17	22002.7	5306.4	6109.3	2963.4	735.0
18	2563.1	1297.6	3508.0	698.0	1632.3
19	----	----	----	----	----
20	10247.7	10420.6	8761.6	6514.3	7949.3
21	3398.5	3584.3	2916.3	2508.1	2786.4
22	7047.4	5917.3	3824.0	5668.0	5383.7
23	3777.7	2577.6	3494.0	4617.4	5124.7
24	5922.8	5197.0	8740.0	8219.9	12910.0
25	10333.0	14159.1	8473.3	8534.1	10765.9
26	5266.6	5777.2	19331.9	13164.0	11034.5
27	9103.0	10704.8	9830.3	7537.2	7386.1
28	12324.3	12041.5	7664.3	7244.0	9983.7
29	12115.0	12737.7	13134.3	18496.8	10128.9
30	13432.0	13499.9	11800.8	14612.4	11358.5
31	4908.0	2723.1	3231.1	3438.7	2918.4
32	13047.7	17338.6	26927.9	11255.7	7336.7
33	16197.9	14070.9	8852.1	8506.0	7839.3
34	3159.0	1322.1	1488.2	752.8	2212.7
35	9557.1	77.0	451.7	1625.4	942.0
36	----	----	----	----	----
37	5341.3	2154.0	1548.0	453.3	1392.4
$\bar{X}$	10578.8	10253.4	7606.3	5701.6	5004.2

Table 4. H_{min}, bits/ml.

Expt. No.	S	2	6	10	B
1	115.5	96.0	118.7	80.3	135.0
2	166.4	143.6	80.9	93.4	16.2
3	164.5	175.9	107.1	87.1	137.5
4	132.4	122.4	116.6	112.9	108.2
5	176.4	189.4	131.9	109.9	89.5
6	159.3	193.3	98.0	115.4	63.7
7	159.8	92.4	107.7	55.8	72.2
8	172.9	207.2	86.6	137.0	48.6
9	211.7	161.8	170.0	171.6	117.9
10	152.6	117.9	79.6	99.4	53.8
11	164.8	92.7	65.3	55.4	93.3
12	167.5	115.0	59.7	20.2	39.2
13	---	---	---	---	---
14	159.8	154.6	104.5	78.5	59.7
15	86.7	82.5	40.1	51.1	26.3
16	95.9	89.4	93.5	102.3	108.7
17	150.4	125.8	107.8	60.2	55.4
18	59.0	44.8	118.6	25.3	37.8
19	---	---	---	---	---
20	158.9	191.8	123.8	98.4	101.0
21	108.7	90.6	78.7	94.9	114.5
22	141.0	187.8	148.3	156.9	145.9
23	100.9	122.0	99.7	113.6	135.0
24	147.8	135.3	166.3	175.5	197.1
25	191.6	277.6	176.2	197.4	214.3
26	175.0	107.0	183.5	175.2	127.4
27	156.5	159.8	179.6	173.5	203.9
28	216.9	272.0	184.2	162.2	222.9
29	206.5	229.9	219.7	263.8	308.4
30	175.6	209.3	194.8	222.7	226.6
31	153.8	132.0	98.6	99.5	133.4
32	141.4	122.9	190.7	160.8	141.8
33	168.2	131.3	145.3	176.3	143.0
34	70.2	77.6	79.1	84.4	48.7
35	103.4	6.2	16.3	55.0	57.9
36	---	---	---	---	---
37	85.7	66.4	63.0	16.3	53.7
$\bar{X}$	147.0	138.9	118.6	109.0	115.5

Table 5. Community diversity, H, in bits/ml.

Expt. No.	S	2	6	10	B
1	6329.0	7288.9	2540.1	2978.1	7513.4
2	10126.9	10284.1	3294.7	3545.0	419.0
3	13622.2	18778.9	8409.1	4590.2	5622.2
4	6416.3	6814.8	4252.5	3653.3	4906.0
5	17572.7	16107.2	5062.3	4093.8	3429.5
6	7318.1	11653.2	2904.1	2694.4	1464.6
7	11351.0	5489.4	3978.3	1490.3	2140.6
8	7877.6	14756.8	1936.0	2718.6	1564.2
9	16888.7	16496.1	9037.1	8748.8	4881.0
10	5655.7	4814.7	2666.9	1554.2	1147.8
11	7088.8	3735.3	1495.2	559.1	2026.9
12	5204.2	4370.4	962.4	81.3	467.6
13	----	----	----	----	----
14	7293.9	20368.3	6407.4	2796.6	962.4
15	2216.4	2413.0	1854.8	1471.5	140.6
16	4010.3	4350.7	4268.8	3834.4	2203.0
17	16562.7	3334.8	4232.6	2111.3	559.1
18	2133.5	1005.9	2768.7	671.3	1342.4
19	----	----	----	----	----
20	6520.7	7411.1	7192.7	5426.0	5548.1
21	2430.9	2244.7	2254.2	2125.4	1693.1
22	5040.3	4617.4	3077.7	4946.0	3923.6
23	2206.1	2104.0	2205.8	2951.3	4400.6
24	4157.2	3704.3	6901.2	5101.6	9383.4
25	6727.4	10316.4	5449.9	6234.6	7281.9
26	2981.6	5128.8	11226.4	6274.9	7577.4
27	6157.8	7540.6	7685.0	6152.5	6005.1
28	9350.0	8400.3	6553.8	5786.9	8338.9
29	5306.4	9120.1	8956.6	12835.8	8877.7
30	9997.4	9029.4	7976.0	8651.4	7806.1
31	4136.7	1938.6	2563.8	2863.1	2439.2
32	5291.7	8334.4	9953.5	7456.8	4978.3
33	9654.7	8939.0	6661.0	6168.1	5769.8
34	2162.9	830.9	1292.8	565.4	1169.7
35	5803.4	33.8	325.4	1029.5	658.6
36	----	----	----	----	----
37	4198.4	1598.2	1112.7	274.2	1286.8
$\bar{X}$	7052.4	7156.1	4631.1	3880.5	3762.6

Table 6. $\bar{H}_{max}$, bits/ml.

Expt. No.	S	2	6	10	B
1	3.459	3.170	3.700	3.170	3.700
2	3.907	3.700	3.170	3.322	1.585
3	3.807	3.907	3.322	3.170	3.807
4	3.700	3.585	3.585	3.700	3.459
5	3.907	4.000	3.700	3.459	3.170
6	3.907	4.087	3.459	3.700	3.000
7	3.807	3.170	3.322	2.807	3.000
8	4.000	4.170	3.322	3.907	2.585
9	4.170	3.807	4.000	3.907	3.585
10	3.907	3.585	3.170	3.585	2.807
11	3.000	3.322	3.000	3.000	3.459
12	4.087	3.585	3.000	2.322	2.585
13	---	---	---	---	---
14	3.907	3.700	3.170	3.170	3.000
15	3.170	3.170	2.322	2.585	2.322
16	3.322	3.170	3.170	3.459	3.585
17	3.700	3.700	3.459	2.807	3.000
18	2.807	2.585	3.700	2.000	2.322
19	---	---	---	---	---
20	3.907	4.170	3.585	3.322	3.322
21	3.585	3.322	3.170	3.459	3.700
22	3.807	4.248	4.000	4.000	3.907
23	3.459	3.807	3.459	3.585	3.807
24	3.907	3.807	4.000	4.087	4.170
25	4.170	4.644	4.087	4.248	4.322
26	4.170	3.459	4.000	4.000	3.585
27	3.907	3.907	4.087	4.087	4.322
28	4.585	4.644	4.170	4.000	4.392
29	4.248	4.392	4.322	4.524	4.858
30	4.000	4.248	4.170	4.322	4.392
31	4.000	3.907	3.459	3.459	3.907
32	3.700	3.459	4.000	3.907	3.807
33	3.907	3.585	3.807	4.087	3.807
34	3.000	3.322	3.322	3.585	2.585
35	3.322	1.000	1.585	2.807	3.000
36	---	---	---	---	---
37	3.170	3.000	3.000	1.585	2.807
$\bar{X}$	3.747	3.627	3.494	3.445	3.402

Table 7. $\overline{H}_{min}$, bits/ml.

Expt. No.	S	2	6	10	B
1	0.038	0.023	0.124	0.076	0.055
2	0.044	0.036	0.073	0.070	0.058
3	0.025	0.030	0.028	0.046	0.090
4	0.063	0.054	0.075	0.101	0.060
5	0.028	0.030	0.064	0.054	0.038
6	0.060	0.044	0.109	0.146	0.115
7	0.032	0.031	0.027	0.088	0.057
8	0.058	0.044	0.109	0.154	0.057
9	0.038	0.029	0.066	0.035	0.070
10	0.080	0.070	0.080	0.187	0.107
11	0.081	0.073	0.101	0.226	0.144
12	0.118	0.082	0.161	0.576	0.170
13	--	--	--	--	--
14	0.058	0.020	0.012	0.087	0.161
15	0.047	0.064	0.038	0.042	0.269
16	0.059	0.039	0.028	0.085	0.115
17	0.025	0.088	0.061	0.057	0.226
18	0.064	0.089	0.125	0.072	0.054
19	--	--	--	--	--
20	0.060	0.077	0.051	0.050	0.042
21	0.115	0.084	0.086	0.131	0.152
22	0.076	0.135	0.155	0.111	0.106
23	0.092	0.180	0.099	0.088	0.100
24	0.098	0.099	0.076	0.087	0.064
25	0.077	0.091	0.085	0.098	0.086
26	0.138	0.064	0.038	0.053	0.041
27	0.067	0.058	0.075	0.094	0.119
28	0.097	0.105	0.100	0.090	0.098
29	0.072	0.079	0.072	0.064	0.148
30	0.052	0.066	0.069	0.066	0.088
31	0.125	0.189	0.106	0.100	0.179
32	0.040	0.024	0.028	0.056	0.073
33	0.040	0.033	0.062	0.085	0.069
34	0.067	0.195	0.177	0.402	0.057
35	0.036	0.081	0.057	0.095	0.184
36	--	--	--	--	--
37	0.051	0.092	0.122	0.057	0.108
$\overline{X}$	0.065	0.073	0.080	0.113	0.105

Table 8. Diversity per organism, $\bar{H}$, in bits/ml.

Expt. No.	S	2	6	10	B
1	2.108	1.775	2.663	2.831	3.083
2	2.675	2.558	2.955	2.651	1.502
3	2.115	3.095	2.194	2.426	3.665
4	3.042	3.033	2.728	2.997	2.698
5	2.831	2.542	2.473	2.008	1.468
6	2.745	2.680	3.241	3.410	2.648
7	2.260	1.820	0.995	2.347	1.682
8	2.658	3.152	2.438	3.048	1.840
9	3.004	2.958	3.500	1.787	2.886
10	2.952	2.846	2.697	2.927	2.282
11	3.485	2.962	2.303	2.282	3.111
12	3.657	3.108	2.594	2.322	2.024
13	---	---	---	---	---
14	2.660	2.701	0.748	3.087	2.594
15	1.206	1.884	1.777	1.223	1.434
16	2.482	1.884	1.295	2.765	2.324
17	2.786	2.326	2.397	1.997	2.292
18	2.337	2.004	2.920	1.924	1.910
19	---	---	---	---	---
20	2.486	2.966	2.943	2.767	2.318
21	2.564	2.080	2.450	2.932	2.248
22	2.723	3.315	3.219	3.490	2.847
23	2.020	3.108	2.184	2.291	3.269
24	2.742	2.714	3.158	2.537	3.031
25	2.715	3.384	2.629	3.103	2.923
26	2.361	3.071	2.323	1.907	2.462
27	2.643	2.752	3.195	3.336	3.514
28	3.478	3.240	3.566	3.195	3.669
29	1.860	3.145	2.947	3.139	4.258
30	2.977	2.841	2.818	2.559	3.019
31	3.371	2.781	2.745	2.880	3.265
32	1.501	1.663	1.478	2.588	2.583
33	2.326	2.277	2.865	2.964	2.802
34	2.054	2.088	2.886	2.692	1.366
35	2.017	0.439	1.142	1.778	2.098
36	---	---	---	---	---
37	2.492	2.226	2.156	0.959	2.594
$\bar{X}$	2.569	2.571	2.489	2.563	2.579

Table 9. H/H_{max}.

Expt. No.	S	2	6	10	B
1	0.609	0.560	0.720	0.893	0.833
2	0.685	0.691	0.932	0.798	0.948
3	0.556	0.792	0.660	0.765	0.963
4	0.822	0.846	0.761	0.810	0.780
5	0.724	0.636	0.668	0.580	0.463
6	0.702	0.656	0.937	0.922	0.883
7	0.594	0.574	0.299	0.836	0.560
8	0.664	0.756	0.734	0.780	0.712
9	0.720	0.777	0.875	0.475	0.805
10	0.756	0.794	0.851	0.816	0.813
11	0.871	0.892	0.768	0.761	0.899
12	0.895	0.867	0.865	1.000	0.783
13	---	---	---	---	---
14	0.681	0.730	0.236	0.974	0.865
15	0.381	0.594	0.765	0.473	0.618
16	0.747	0.594	0.408	0.799	0.648
17	0.753	0.628	0.693	0.711	0.761
18	0.832	0.775	0.789	0.962	0.822
19	---	---	---	---	---
20	0.636	0.711	0.821	0.833	0.698
21	0.715	0.626	0.773	0.847	0.608
22	0.715	0.780	0.805	0.873	0.729
23	0.584	0.816	0.631	0.639	0.859
24	0.702	0.713	0.790	0.621	0.727
25	0.651	0.729	0.643	0.730	0.676
26	0.566	0.888	0.581	0.477	0.687
27	0.676	0.704	0.782	0.816	0.813
28	0.759	0.698	0.855	0.799	0.835
29	0.438	0.716	0.682	0.694	0.876
30	0.744	0.669	0.656	0.592	0.687
31	0.843	0.712	0.793	0.833	0.836
32	0.406	0.481	0.370	0.662	0.678
33	0.595	0.635	0.752	0.725	0.736
34	0.685	0.628	0.869	0.751	0.529
35	0.607	0.439	0.720	0.633	0.699
36	---	---	---	---	---
37	0.786	0.742	0.719	0.605	0.924
$\bar{X}$	0.679	0.701	0.712	0.750	0.787

Table 10. $H/H_{min.}$

Expt. No.	S	2	6	10	B
1	54.80	75.91	21.41	37.10	55.67
2	60.87	71.59	40.70	37.95	25.80
3	106.75	78.50	52.72	40.89	48.44
4	48.44	55.66	36.47	29.72	45.32
5	99.63	85.04	38.37	37.25	38.32
6	45.95	60.27	29.64	23.35	22.99
7	71.03	59.37	36.95	26.70	29.66
8	45.55	71.21	22.35	19.84	32.13
9	79.76	101.98	53.17	50.99	41.40
10	37.07	40.83	33.52	15.63	21.34
11	43.02	40.31	22.88	10.09	21.66
12	31.08	38.01	16.13	4.03	11.94
13	---	---	---	---	---
14	45.63	131.79	61.31	35.61	16.13
15	25.56	29.23	46.25	29.77	5.34
16	41.82	48.68	45.66	32.59	20.27
17	110.10	26.52	39.26	35.04	10.09
18	36.18	22.44	23.35	26.51	35.50
19	---	---	---	---	---
20	41.02	38.64	58.11	55.14	54.93
21	22.37	24.77	28.64	22.39	14.78
22	35.74	24.58	20.75	31.52	26.89
23	21.87	17.24	22.12	25.99	32.59
24	28.12	27.38	41.49	29.07	47.62
25	35.11	37.16	30.93	31.59	33.98
26	17.04	47.93	61.16	35.81	59.46
27	39.34	47.18	42.78	35.46	29.45
28	35.70	30.88	35.57	35.67	37.41
29	25.69	39.66	40.76	48.65	28.78
30	56.92	43.13	40.93	38.85	34.45
31	26.90	14.68	26.00	28.78	18.28
32	37.43	67.82	52.19	46.36	35.11
33	57.34	68.08	45.84	34.99	40.34
34	30.79	10.71	16.34	6.70	24.02
35	56.13	5.41	19.96	18.71	11.36
36	---	---	---	---	---
37	48.98	24.08	17.66	16.81	23.98
$\bar{X}$	47.05	47.26	35.92	30.46	30.45

Table 11. Redundancy, R

Expt. No.	S	2	6	10	B
1	0.395	0.443	0.290	0.100	0.169
2	0.319	0.312	0.069	0.206	0.054
3	0.447	0.209	0.342	0.238	0.038
4	0.181	0.156	0.244	0.195	0.224
5	0.277	0.367	0.338	0.428	0.543
6	0.302	0.348	0.065	0.081	0.122
7	0.400	0.430	0.706	0.169	0.448
8	0.340	0.247	0.275	0.229	0.295
9	0.282	0.225	0.127	0.548	0.199
10	0.250	0.210	0.153	0.193	0.194
11	0.131	0.111	0.240	0.259	0.105
12	0.118	0.136	0.143	0.000	0.232
13	---	---	---	---	---
14	0.323	0.271	0.767	0.027	0.143
15	0.629	0.414	0.239	0.536	0.432
16	0.258	0.410	0.597	0.206	0.363
17	0.249	0.380	0.313	0.294	0.259
18	0.172	0.283	0.218	0.040	0.182
19	---	---	---	---	---
20	0.369	0.294	0.182	0.170	0.306
21	0.115	0.383	0.233	0.158	0.409
22	0.291	0.227	0.203	0.131	0.279
23	0.427	0.193	0.380	0.370	0.145
24	0.306	0.295	0.214	0.388	0.277
25	0.356	0.277	0.364	0.276	0.330
26	0.449	0.114	0.423	0.530	0.317
27	0.329	0.300	0.222	0.188	0.192
28	0.246	0.309	0.148	0.206	0.168
29	0.572	0.289	0.323	0.310	0.127
30	0.259	0.336	0.330	0.414	0.319
31	0.162	0.303	0.213	0.172	0.172
32	0.601	0.523	0.635	0.342	0.328
33	0.409	0.368	0.252	0.281	0.269
34	0.322	0.395	0.139	0.280	0.482
35	0.397	0.610	0.290	0.379	0.320
36	---	---	---	---	---
37	0.217	0.266	0.122	0.410	0.079
$\bar{X}$	0.321	0.307	0.288	0.258	0.251