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A COMPARISON BETWEEN THE PHYTOPLANKTON OF SOME BROWN WATER LAKES ENCLOSED WITH REED-BELT IN THE HUNGARIAN PART OF LAKE FERTŐ

Introduction

Our knowledge on the phytoplankton of the humic lakes in the Hungarian part of Neusiedlersee is very limited. The seasonal dynamics of the phytoplankton - and also the algal flora - shows great differences in comparison with the phytoplankton of other water types of the lake, namely, a spring minimum seems to be characteristic for these lakes (PADISAK 1981). This phenomenon is itself enough interesting to be the subject of further studies adding that except for floristical studies only few data are available on the brown-water lakes of Neusiedlersee (DOKULIL 1973, 1975, PADISAK 1982).

However, a systematical sampling project on these lakes can hardly be carried out. In winter it might be dangerous or even impossible to reach them. In summer one or another inner lake might not be accessible periodically due to either a low water level or other difficulties (e.g. canals might be impenetrable). That is why we have not yet been able to carry out a sufficiently frequent sampling project on these small lakes.

At this point a new question arises whether the seasonal patterns of phytoplankton in humic lakes are similar or not. In case a close similarity between them is to observe than we could compose a seasonal pattern based on pooled annual data of different small lakes. This approach is not completely correct theoretically, but considering the above mentioned difficulties it might be done supposing a relatively high level of similarity between the lakes.

The problem has theoretical aspect as well, namely, whether a more or less similar environmental background can definitely determine the phytoplankton community structure or there might be different community patterns existing within the water. So the studies on similarities and differences of the phytoplankton communities living in humic lakes have not only practical but theoretical significance as well.

Study area, methods

1982 was a fortunate year because the water level was constantly high enough and some old canals were reopened, so 7 inner lakes could be studied on five occassions all them being located in the western part of the Hungarian part (Fig. 1). Herrenlacke is the greatest one with a relatively large open water area. Oberlacke and Small Herrenlacke are similar in that their openwater area is not continous, but is dissected by many small stands of Phragmites. Three other lakes: Lake Hidegségi, Lake Nagyhatár and Lake Átjáró have a smaller but nearly continuous open-water surface. Lake Pitner is an intersting artificial lake - it used to be an open-air bath - with a water depth of 2 meters (all others are between 80 and 100 cm). On April 19th four lake were sampled: Herrenlacke, Lake Hidegségi, Lake Nagyhatár and Small Herrenlacke. On May 17th and on July 30th six lakes (Herrenlacke, Lake Hidegségi, Lake Nagyhatár, Small Herrenlacke, Lake Átjáró and Oberlacke), on June 21 four (Herrenlacke, Lake Hidegségi, Lake Nagyhatár and Oberlacke) and on October 27th all the seven lakes were sampled using a glass-tube sampler. The samples were fixed with Lugol`s solution and counted with an inverted microscope (UTERMÖHL 1958) to about 400 individuals giving a counting accurrancy, expressed in terms of 95 % confidence limits of $\pm$ 10 % (LUND et al. 1958) Several identification manuals (BARTHA et al. 1976, BOURRELLY 1966, 1968, 1970, FELFÖLDY 1972, 1981, HUBER-PESTALOZZI 1938-1961, HUSTEDT 1930, NEMETH 1980) and other publications (HUSTEDT 1959 a, 1959 b, 1959 c, KUSEL-FETZMANN 1974, 1979 a, 1979 b, PANTOCSEK 1912) were used during identification. Floristical data were analyzed using cluster analysis based on Jaccard`s measure of similarity (JACCARD 1908) and WPGMA fusion algorithm (SNEATH and SOKAL 1973).

Results

During the whole study 116 species of algae were recorded (Cyanophyta: 16, Euglenophyta: 10, Pyrrophyta: 3, Chrysophyta: 56 and Chlorophyta: 31). The presence-absence data are given in Table 1.

On April 19th four lakes were studied. The highest numbers were recorded in Lake Hidegségi, the lowest in Small Herrenlacke (Fig. 2). Rhodomonas predominated the Lake Nagyhatár and Small Herrenlacke while in the two other lakes Rhodomonas was only the second predominant. Quantities of species having a relative frequency of 5% are given in Table 2. Data are expressed in terms of relative frequency.

On May 17th six lakes were studied. Herrenlacke had both the greatest numbers of species and number of individuals. Small Herrenlacke was just the opposite. The two variables (numbers and number of individuals) seem to be positively correlated. Small Herrenlacke and Oberlacke are floristically similar based on the cluster diagram and a high predominance of Pyrrophytes occurred in them (Fig. 3). Lake Hidegségi, Lake Nagyhatár and Lake Atjáró were also dominated by Pyrrophytes but not so strongly than the other two lakes mentioned above, there was a good amount of diatoms besides them. The predominant species was Rhodomonas in five cases and it was the second predominant after Campylodiscus in Herrenlacke.

On the June 21rst only four lakes were sampled. Large differences in numbers and in number of species can be observed and these variables show a negative correlation (Fig. 4). Three lakes were dominated by Pyrrophytes and one by greens. The predominant species varied between the lakes, Lake Nagyhatár was dominated by only Rhodomonas, Oberlacke both by Rhodomonas and Cryptomonas. In Lake Hidegségi three species occurred in large amount: Rhodomonas, Chaetoceros and Cryptomonas while in Herrenlacke Schroederia, Cyclotella, Rhodomonas and Cryptomonas predominated the community.

On July 30th large differences in the values of the mentioned variables were also noted (Fig. 5). Oberlacke and Small Herrenlacke proved to be floristically similar, too. The other denser cluster core is formed by the data of Lake Hidegségi and Lake Nagyhatár. All of the lakes were dominated by different species of algae: Lake Nagyhatár by Rhodomonas, Small Herrenlacke by Cryptomonas, Oberlacke both by Cryptomonas and Nitzschia, Lake Hidegségi by Cryptomonas, Crucigenia and Scenedesmus, Herrenlacke by Dactylococcopsis and Schroederia while Lake Atjáró by Peridinium and Rhodomonas.
On October 27th large differences in numbers and in number of individuals also appeared, they show roughly a negative correlation (Fig. 6). We cannot observe such large differences considering the predominant species. Five lakes were dominated by Cryptomonas. In Lake Hidegségi both Cryptomonas and Rhodomonas were predominant. A rather different pattern was found in Lake Pitner: the community was predominated by Ankistrodesmus and Chlamydomonas and only the third predominant species was Cryptomonas.
As a summary of the studies it can be stated that not exclude two same quantitative seasonal patterns were found amongst the seven studied lakes, although, if we sampling only once Lake Pitner from consideration the phytoplankton abundance shows a summer maximum. The principle species in the spring phytoplankton is Rhodomonas, that of the autumn phytoplankton is Cryptomonas. Besides them, few other species of algae may be only occassionally predominant. The summer phytoplankton of the humic lakes shows a high diversity the predominant species.

Discussion

It is not too easy to give any adequate explanation of the results, however, it is clear without doubt that the data of different lakes must not be pooled in order to obtain any seasonal cycle, due to the high level of dissimilarities in abundances and in predominance relations as well. And at this point a new question arises, and it is concerned with the theoretical aspect of this study,namely, why these great differences may occur.
Species dominating in the lakes on different occassions can be divided

into three groups. The first contains the flagellates. Cryptomonas, Rhodomonas and Peridinium are often found in lakes which have a brown water colour and are protected against the stirring-up effect of wind. Their ability to choose a narrow water layer in which they live may be a great adventage in those water types. The situation is just the same in the enclosed lakes of Neusiedlersee. Moreover, the two largest lakes - Herrenlacke and Lake Hidegségi - are especially dominated by other groups of algae and they are the ones that are supposed to be the most disturbed by wind. There are data on the high growth rates of the species belonging to the genera Rhodomonas and Cryptomonas in other Hungarian shallow lakes (PADISAK et al.1982, TÓTH unpublished). In certain studies they are stated to be r-selectionists due to their small cell sizes and/or to their ability for active movement (Sommer 1981). Large Chlamydomonas dominance is often observed in small, nutrient-rich astatic waters which are very suitable for r-selectionist species (KISS 1958) Members of the second group: Schroederia, Scenedesmus, Ankistrodesmus and Dactylococcopsis may reach a large predominance in shallow lakes (even in nutrient rich fish-ponds) as well as in the other parts of Neusiedlersee (DOKULIL 1979, TEVANNÉ BARTALIS 1980, PADISAK 1981). They all have small body sizes so that the phenomenon of r-selection can also be expected. The third group, the diatoms can reach a large level of predominance in other lakes but for example Campylodiscus and Chaetoceros can hardly be considered as r-selectionists. Meanwhile, in our study the dominance of diatoms was observed only in exceptional cases and there was not one sampling site or date when diatoms predominated only.

Though these brown water lakes are protected against the incessant stirring-up effect of wind, they are under the effect to other water movements. In cases of winds blowing in a north-northwestern direction, the water moves into the southern reed-belt from the open areas. This movement may have the effect on the brown water content (or a large amount of it) moves off towards the southern part of the lake together with the phytoplankton community living in it. The basin of the small lake fills up with the interstitial water of the reed belt located

north from it. In cases of wind having a southern direction, or even after the wind from the opposite direction stops, the water movement reverses. Neusiedlersee from time to time shows these movements in ice-free periods.
Based on the Phenomena discussed above it can be easily imagined that such types of water movements provide a permanent environmental background for species having an r-selectionist character, adding that the relatively small sizes of the basins of the brown-water lakes may make possible phenomenon of "ecological drift". So the large differences in numbers and in predominance relations might be explained in these ways. The explanation outlined above can only be proved by carrying out day to day studies not only on the phytoplankton structure but on meteorlogical conditions and water chemistry as well.

Zusammenfassung
Im ausgedehnten Schilfbestand des ungarischen Teiles des Fertö (Neusiedlersee) sind mehrere, vom offenen Wasser abgeschlossene, schwarzwässrige Kleingewässer zu finden. Im Winter sind diese Teiche gänzlich unerreichbar, aber auch im Sommer nur schwer zu erreichen (die Kanäle verschließen sich, oder andere Hindernisse verbauen einem den Weg). Eben deshalb ist es äußerst schwierig, über die saisonale Sukzession ihres Phytoplanktons Daten-Serien von genügender Daten-Häufigkeit zu gewinnen. Wenn wir die mehr oder weniger gleichartige Zusammensetzung und quantitativen Verhältnisse des Phytoplanktons dieser kleinen abgeschlossenen Teiche beweisen könnten, dann wäre es möglich, einzelne saisonale Daten-Serien von Teilergebnissen mehrerer kleiner Teiche zusammenzustellen. Während des Jahres 1982 ist es uns gelungen bei fünf Gelegenheiten insgesamt aus sieben solchen, sich im Schilfbestand befindenden Kleingewässern parallel Proben zu entnehmen. Von den Proben konnten insgesamt 101 Arten, bzw. subspezifische Taxa festgestellt werden. In beiden, aus dem Frühling stammenden Proben waren die Algen-Arten der Gattungen Rhodomonas und Cryptomonas dominant. In einer

der Teiche war Campylodiscus clypeus var. bicostate in größeren Mengen anzutreffen. Im Herbst war bei sechs Teichen die Dominanz von Cryptomonas kennzeichnend, im siebenten konnte dagegen die Dominanz von Ankistrodesmus und Chlamydomonas festgestellt werden. Im Sommer waren die Dominanz-Verhältnisse sehr abweichend, in den verschiedenen Teichen konnten größere Mengen der Artengruppen Peridinium, Rhodomonas, Cryptomonas, Chaetoceros, Cyclotella, Schroederia, Nitzschia, Scenedesmus und Dactylococcopsis angetroffen werden. Dabei konnten auch größenordnungsmäßig verschiedene Individuenzahlen des Phytoplanktons festgestellt werden. Die erhaltenen sehr abweichenden Angaben machen es unmöglich, aus den Daten-Serien der einzelnen Teiche irgendein gemeinsames saisonales Gesamtbild zu schaffen. Außer der oben angeführten Feststellung hat das Problem noch eine theoretische Beziehung, nämlich: Warum gestaltet sich das Phytoplankton der einzelnen Teiche derart verschieden in einem in physikalisch- und chemischer Hinsicht in großen Zügen ähnlichen Umgebung. Über die in größerer Zahl angetroffenen Arten kann - anhand von Literaturangaben - festgestellt werden, daß sie mit großer Wahrscheinlichkeit r-strategische Arten sind, deren Vermehrung durch die sich oft verändernden Umgebungsverhältnisse gefördert wird. Es kann angenommen werden, daß bei Nordwind vom offenen Wasser durch das Schilf in Richtung südliches Ufer, beim Aufhören des Nordwindes bzw. bei Südwind aber in entgegengesetzter Richtung, mit einer bedeutenden Wasserströmung zu rechnen sei, und in dieser Weise das Wasser der schilfumschlossenen Teiche sich im ständigen Austausch befindet. Das Einströmen des interstitiellen Wassers des Schilfbestandes in die Becken der einzelnen Kleingewässer bedeutet eine ständige Nährstoffzufuhr. Es wird angenommen, daß diese Wasserbewegung den fortwährenden umweltlichen Hintergrund für die Anwesenheit der r-strategischen Arten bildet. Die Frage könnte nur mit Hilfe täglicher algologischer, meteorologischer und wasserchemischer Meßwerte eindeutig geklärt bzw. bewiesen werden.

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sampling site/date	I.					II.					III.					IV.				V.				VI.					VII.
species	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	4	5	1	2	4	5	1	2	3	4	5	5
CYANOPHYTA																													
1. Anabaena constricta				+											+	+		+					+						
2. Aphanocapsa delicatissima																			+										
3. Chroococcus minutus					+					+									+										
4. Chroococcus turgidus		+																											
5. Coelosphaerium kuetzingianum																		+											
6. Dactylococcopsis raphidioides	+		+	+	+				+					+	+			+											
7. Lyngbya cryptovaginata																						+							
8. Lyngbya limnetica					+	+				+						+	+	+	+				+				+	+	
9. Merismopedia punctata		+														+													
10. Microcystis flos-aquae			+	+	+																								
11. Oscillatoria acutissima						+												+					+				+		
12. Oscillatoria sp. 1.										+				+	+	+		+	+				+				+		
13. Oscillatoria sp. 2.						+				+	+				+	+		+	+			+	+				+	+	+
14. Oscillatoria amphibia																+													
15. Spirulina maior																+													
16. Spirulina subsalsa									+						+	+		+	+										
EUGLENOPHYTA																													
17. Astasia sp.																							+						
18. Colacium sp.																	+												
19. Euglena acus					+									+	+				+										+
20. Euglena tripteris				+												+													
21. Euglena sp. small	+			+	+											+			+		+	+			+				
22. Euglena sp. large										+		+		+	+		+	+	+		+	+	+						
23. Phacus brevicaudatus														+															
24. Phacus hamatus																											+		
25. Phacus inflexus														+				+											
26. Trachelomonas sp.																					+		+						

Table 1.: Presence-absence data of species found during this study
Explanation: I: Herrenlacke; II: Lake Hidegségi; III: Lake Nagyhatár; IV: Small Herrenlacke; V : Lake Átjáró; VI : Oberlacke; VII: Lake Pitner; 1: 19.04.1982; 2: 17.05.1982; 3: 21.06.1982; 4: 30.07.1982; 5: 27.10.1982

table 1. cont.

	I.					II.					III.					IV.				V.				VI.					VII.
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	4	5	1	2	4	5	1	2	3	4	5	5
PYRROPHYTA																													
27. Cryptomonas sp.	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+	+	+
28. Peridinium sp.				+				+														+					+		
29. Rhodomonas sp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+	+	+
CHRYSOPHYTA																													
30. Achnanthes lanceolata	+				+	+				+	+	+			+								+						
31. A. lanceolata var. elliptica	+					+				+																			
32. A. minutissima			+			+		+	+	+	+			+		+		+	+			+	+			+	+	+	
33. Amphora ovalis		+			+	+			+	+	+	+			+	+					+		+			+			
34. A. ovalis var. pediculus																+													
35. Amphiprora costata		+							+			+				+													
36. Bacillaria paradoxa																+													
37. Caloneis amphisbaena																+													
38. Caloneis permagna																+													
39. Caloneis silicula																											+		
40. Campylodiscus clypeus											+																		
41. C. clypeus var. bicostata		+	+		+																								
42. Chaetoceros muellerii			+		+			+						+					+			+							
43. Cocconeis pediculus										+												+							
44. Cyclotella meneghiniana	+	+	+	+	+	+	+	+	+		+			+	+	+		+	+		+	+	+			+	+		
45. Cyclotella ocellata	+										+				+				+				+						
46. Cymbella cystula	+																					+							
47. Cymbella lacustris	+					+									+							+							
48. Cymbella ventricosa						+		+														+							
49. Cymbella sp.	+																+		+										
50. Diatoma elongatum											+										+					+			
51. Diatoma vulgare	+																												
52. Dinobryon sertularia										+																		+	
53. Epithemia sp.	+													+		+					+					+			
54. Eunotia gracilis																						+							
55. Fragilaria sp.	+	+			+	+			+		+					+										+			

table 1. cont.

	I.					II.					III.					IV.				V.				VI.					VII.
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	4	5	1	2	4	5	1	2	3	4	5	5
56. Gomphonema olivaceum						+																					+		
57. G. olivaceum var. calcarea																+						+	+			+			
58. Gomphonema sp.					+											+					+								
59. Goniochlorys smithii																					+		+						
60. Gyrosigma spencerii						+																							
61. Hantzschia amphioxys																										+			
62. Melosira varians														+				+							+				
63. Navicula cryptocephala	+	+						+			+	+			+	+			+		+		+			+	+		
64. Navicula cuspidata															+								+						
65. Navicula dicephala						+				+	+				+	+										+			
66. Navicula gracilis	+					+				+					+		+		+		+	+	+						
67. N. oblonga var. subcapitata						+									+														
68. N. pupula var. capitata		+								+	+					+		+								+			
69. Navicula radiosa																+													
70. Navicula sp.	+														+			+				+				+		+	
71. Nitzschia acicularis	+				+	+																							
72. Nitzschia filiformis																						+							
73. N. lorenziana var. subtilis	+																												
74. Nitzschia ignorata																										+			
75. Nitzschia sigmoidea						+																					+		
76. Nitzschia tryblionella						+										+													
77. Nitzschia sp. small	+	+	+		+	+	+	+	+		+	+	+	+	+	+	+	+			+	+	+		+	+	+	+	
78. Nitzschia sp. large						+															+							+	
79. Pinnularia molaris		+																											
80. Rhoicosphaenia curvata	+					+		+			+							+	+			+	+			+	+		
81. Rhopalodia gibba		+																	+										
82. Synedra acus	+					+				+	+	+				+										+	+		+
83. Synedra capitata																		+				+							
84. Synedra ulna		+			+	+					+			+				+				+	+			+	+		
85. Tetraedriella acuta																											+		

table 1. cont.

	I.					II.					III.					IV.				V.				VI.					VII.
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	4	5	1	2	4	5	1	2	3	4	5	5
CHLOROPHYTA																													
86. Ankistrodesmus angustus		+			+	+	+					+															+		+
87. Ankistrodesmus pseudobraunii		+	+	+			+		+												+								
88. Ankisrtodesmus braunii																							+						
89. Carteria sp.								+	+					+					+							+			+
90. Characium sp.								+																					
91. Chlamydomonas sp.				+									+										+			+			+
92. Cladophora sp.																						+							
93. Closterium parvulum											+											+							
94. Coelastrum microporum																						+							+
95. Cosmarium meneghinii					+																	+							
96. Crucigenia apiculata																												+	
97. Crucigenia quadrata		+			+			+	+	+								+				+	+			+			
98. Elakatothrix lacustris		+	+	+	+			+	+	+				+				+			+				+			+	
99. Hyaloraphidium contortum																		+											
100. Nephrochlamys subsolitaria															+														
101. Oocystis sp.			+	+				+	+			+		+				+									+		
102. Scenedesmus acuminatus							+																						
103. Scenedesmus acutus		+	+																			+	+						
104. Scenedesmus ecornis		+	+	+	+		+	+	+	+	+	+		+		+		+	+		+	+	+			+	+		
105. Scenedesmus intermedius		+		+					+																				
106. Scenedesmus quadricauda					+	+	+	+	+	+		+		+		+			+		+	+	+				+	+	
107. Schroederia planctonica						+	+																						
108. Schroederia robusta	+			+	+		+	+	+						+			+										+	
109. Schroederia setigera								+				+	+	+															
110. Sch. setigera f. minor			+	+	+	+	+	+				+			+			+				+							
111. Sphaerocystis schroeterii			+	+					+													+							
112. Staurastrum alternans																						+							
113. Tetraedron caudatum var. incisum																						+							
114. Tetraedron minimum		+			+				+																				
115. Tetraedron triangulare	+	+																+	+										
116. Tetrastrum glabrum					+				+																				

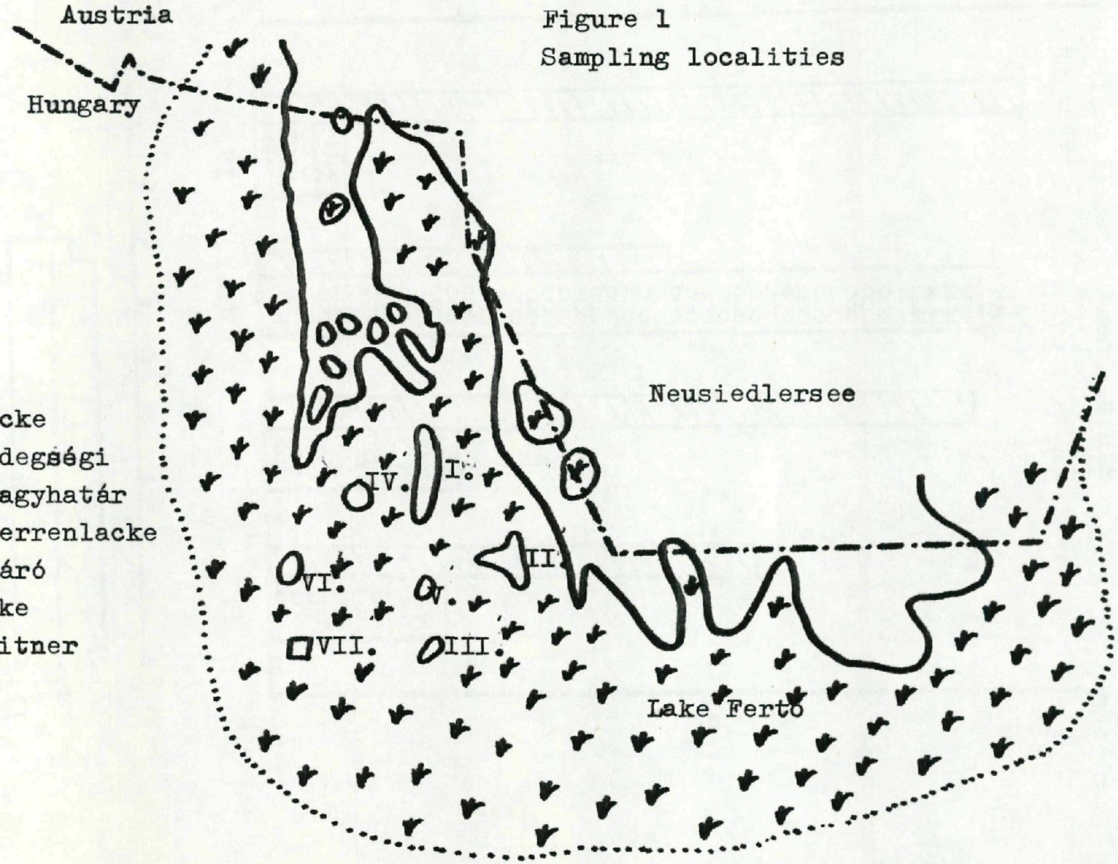
Table 2: Relative frequencies of species having a relative frequency of 5% in any cases
Explanation: see in Table 1

Dactylococcopsis raphidioides	I/4: 53%
Oscillatoria sp. I.	V/5: 6%
Oscillatoria sp. II.	IV/4: 6%
Colacium sp.	IV/2: 7%
Euglena acus	I/5: 5%
Cryptomonas sp.	I/3: 16%, I/5: 60%, II/1: 17%, II/3: 11%, II/4: 29%,II/5: 52%, III/1: 52%,III/4: 7%, III/5: 71%, IV/1: 38%, IV/2: 17%, IV/4: 66%, IV/5: 72%, V/2: 6%,V/4: 10%, V/5: 60%, VI/2: 9%, VI/3: 40%, VI/4: 46%, VI/5: 72%, VII/5: 23%
Peridinium sp.	V/4: 43%
Rhodomonas sp.	I/1: 67%, I/2: 23%, I/3: 12%, I/4: 6%, II/1: 47%, II/2: 69%, II/3: 49%, II/4: 8%, II/5: 40%, III/1: 30%, III/2: 54%, III/3: 93%, III/4: 70%, IV/1: 14%, IV/2: 64%, IV/5: 5%, V/2: 56%, V/4: 19%, VI/2: 81%, VI/3: 46%, VI/4: 9%, VI/5: 18%
Campylodiscus clypeus var. bicostata	I/2: 34%
Chaetoceros muellerii	II/3: 18%
Cyclotella meneghiniana	I/2: 9%, I/3: 17%, II/3: 6%, II/4: 8%, V/2: 15%

table 2. cont.

Fragilaria sp.	II/1: 6%
Nitzschia sp.	I/1: 7%, I/2: 10%, II/1: 17%, II/2: 18%, II/3: 5%, III/2: 16%, III/5: 7%, IV/1: 11%, IV/4: 6%, V/2: 7%, VI/2: 5%, VI/3: 5%, VI/4: 31%
Ankistrodesmus angustus	VII/5: 46%
Chlamydomonas sp.	VII/5: 29%
Crucigenia quadrata	II/4: 19%
Scenedesmus ecornis	I/5: 5%, II/4: 14%
Scenedesmus quadricauda	II/4: 9%, III/2: 8%, III/4: 9%
Schroederia setigera f. minor	I/3: 41%, I/4: 28%
Sphaerocystis schroeterii	I/3: 6%

Figure 1
Sampling localities



I. Herrenlacke
II. Lake Hidegségi
III. Lake Nagyhatár
IV. Small Herrenlacke
V. Lake Átjáró
VI. Oberlacke
VII. Lake Pitner

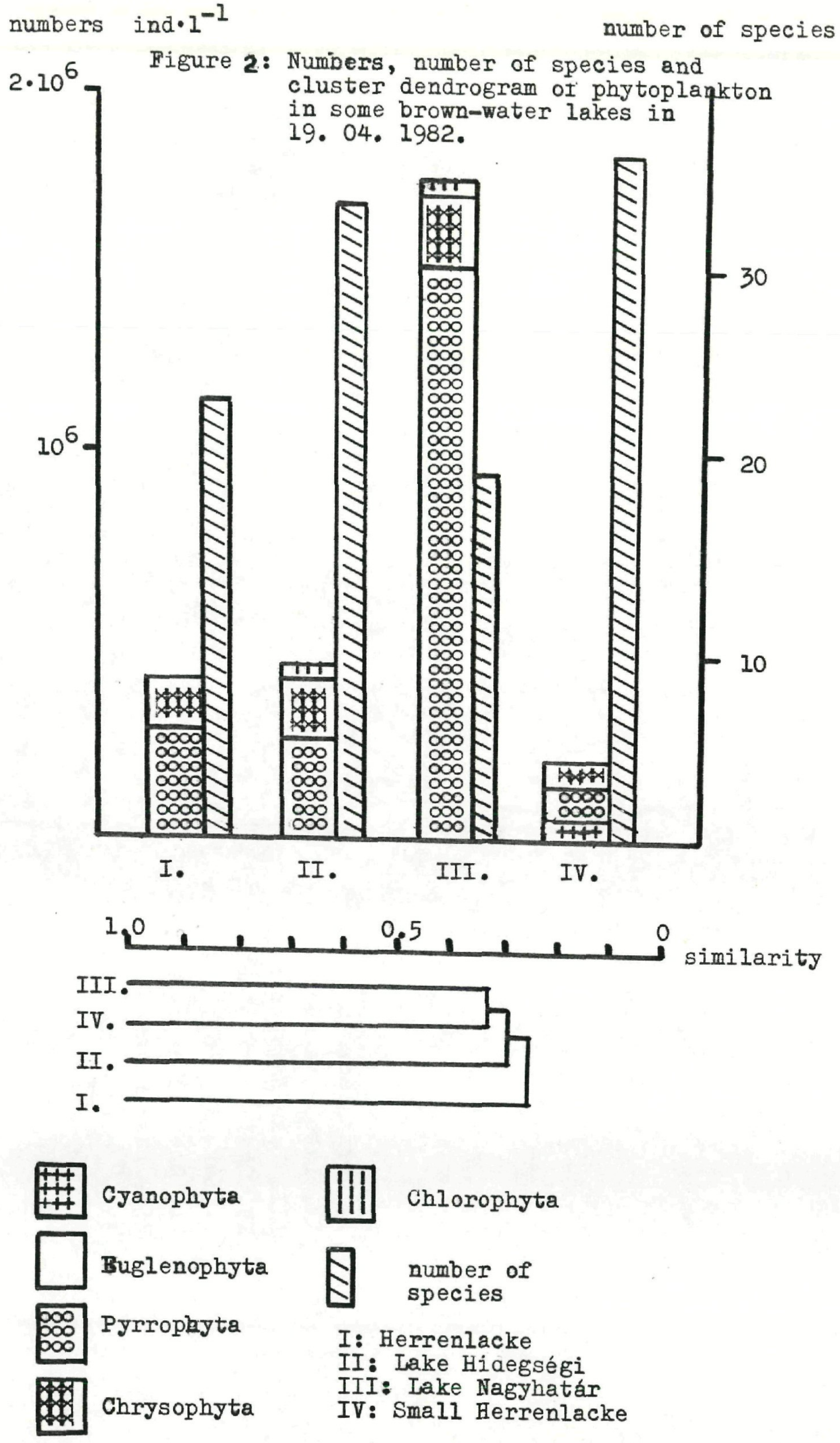
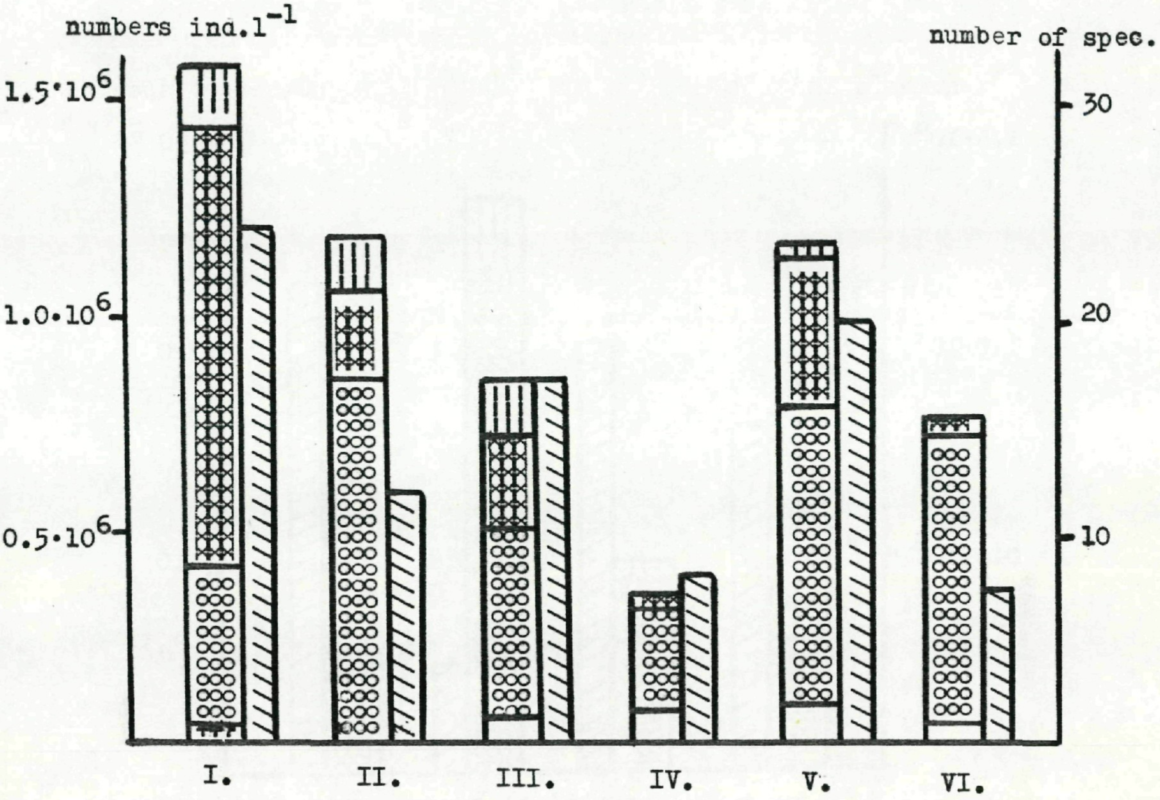
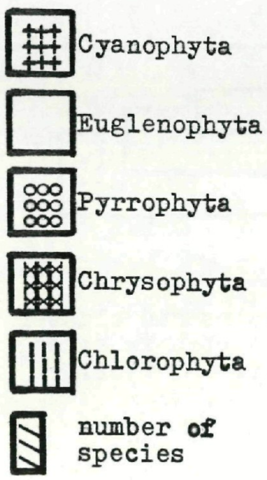


Figure 2: Numbers, number of species and cluster dendrogram of phytoplankton in some brown-water lakes in 19. 04. 1982.





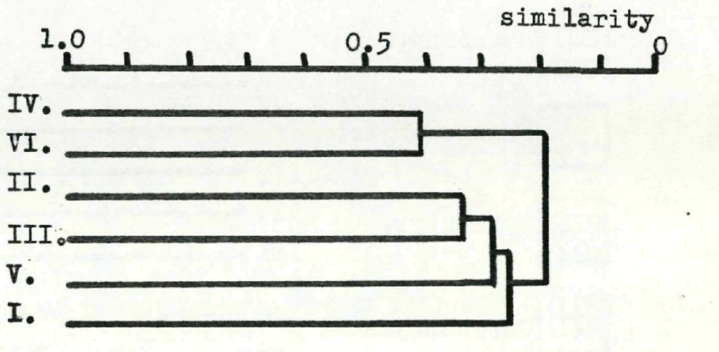


Figure 3

Numbers, number of species and cluster dendrogram of phytoplankton in some brown-water lakes in 17. 05. 1982.

I: Herrenlacke II: Lake Hidegségi
III: Lake Nagyhatár IV: Small Herrenlacke
V: Lake Átjáró VI: Oberlacke

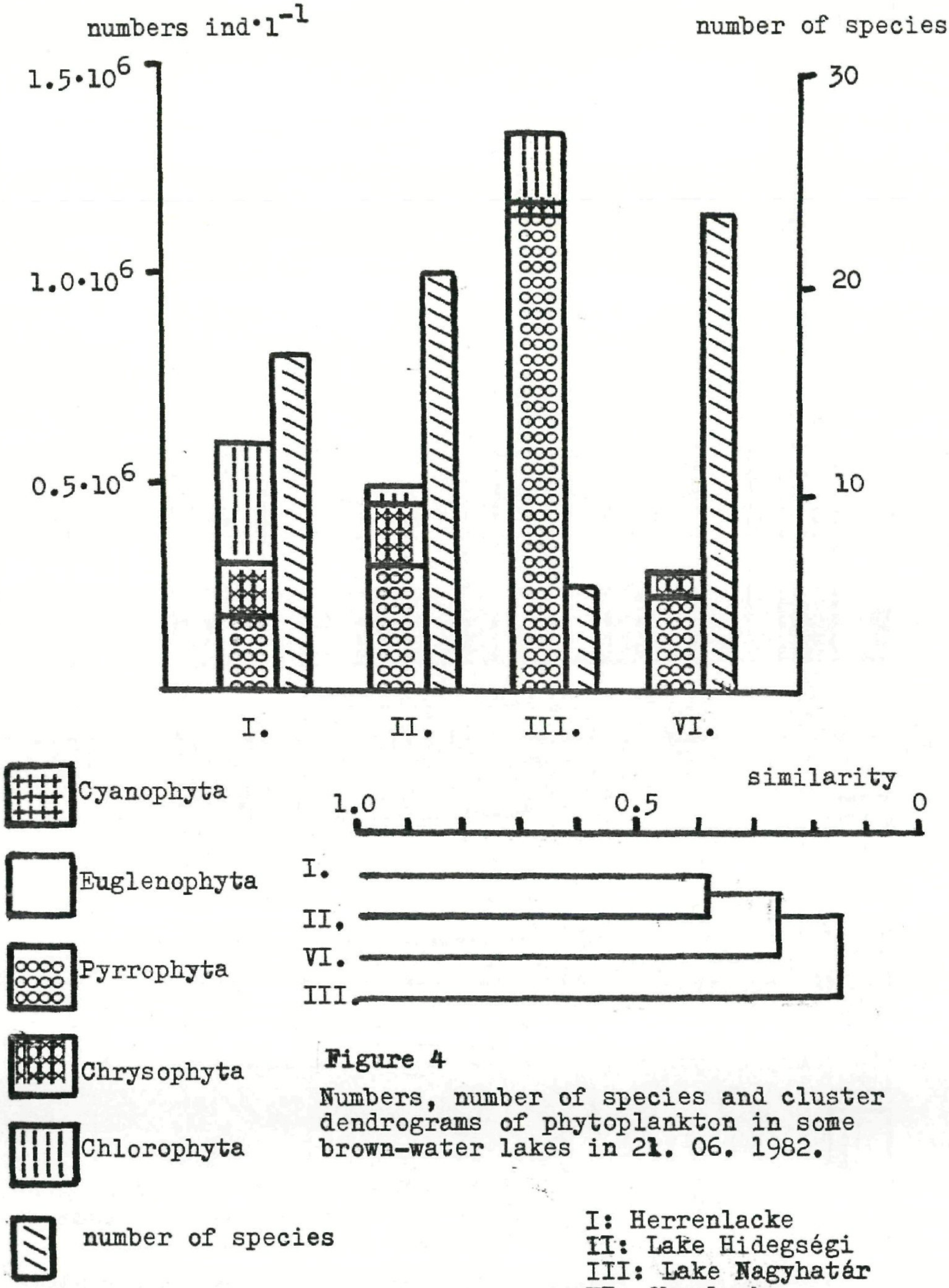


Figure 4

Numbers, number of species and cluster dendrograms of phytoplankton in some brown-water lakes in 21. 06. 1982.

I: Herrenlacke
II: Lake Hidegségi
III: Lake Nagyhatár
VI: Oberlacke

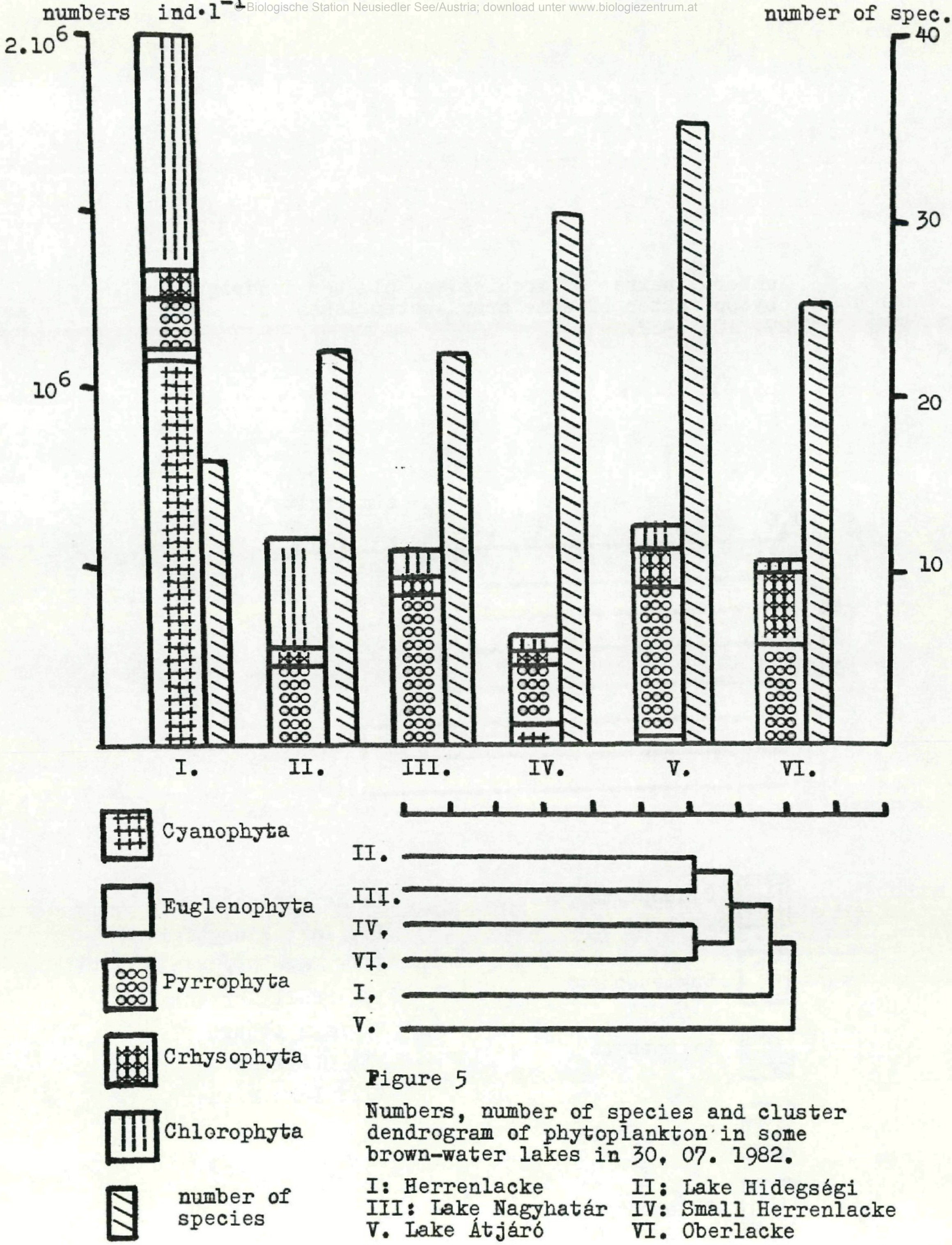


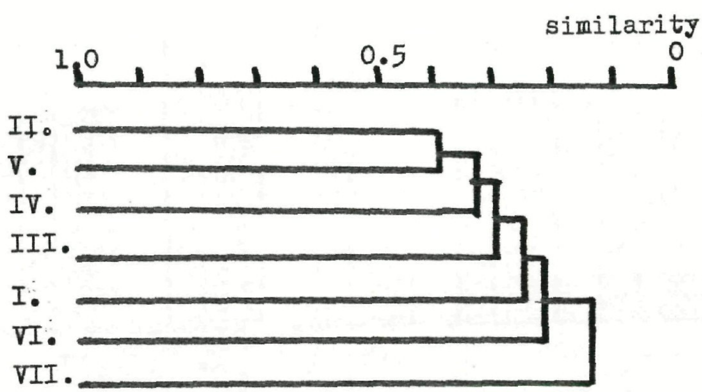
Figure 5

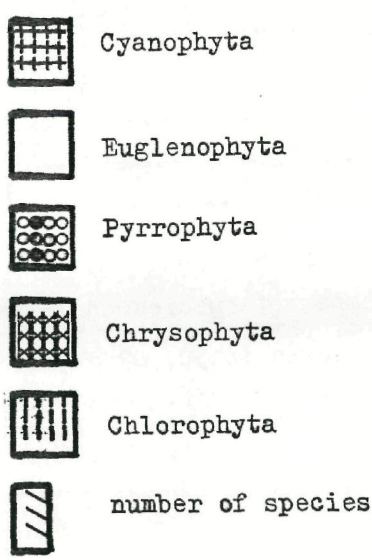
Numbers, number of species and cluster dendrogram of phytoplankton in some brown-water lakes in 30. 07. 1982.

I: Herrenlacke
II: Lake Hidegségi
III: Lake Nagyhatár
IV: Small Herrenlacke
V. Lake Átjáró
VI. Oberlacke

Figure 6

Numbers, number of species and cluster dendrogram of phytoplankton of some brown-water lakes in 27. 10. 1982.





I: Herrenlacke
II: Lake Hidegségi
III: Lake Nagyhatár
IV: Small Herrenlacke
V: Lake Átjáró
VI: Oberlacke
VII: Lake Pitner

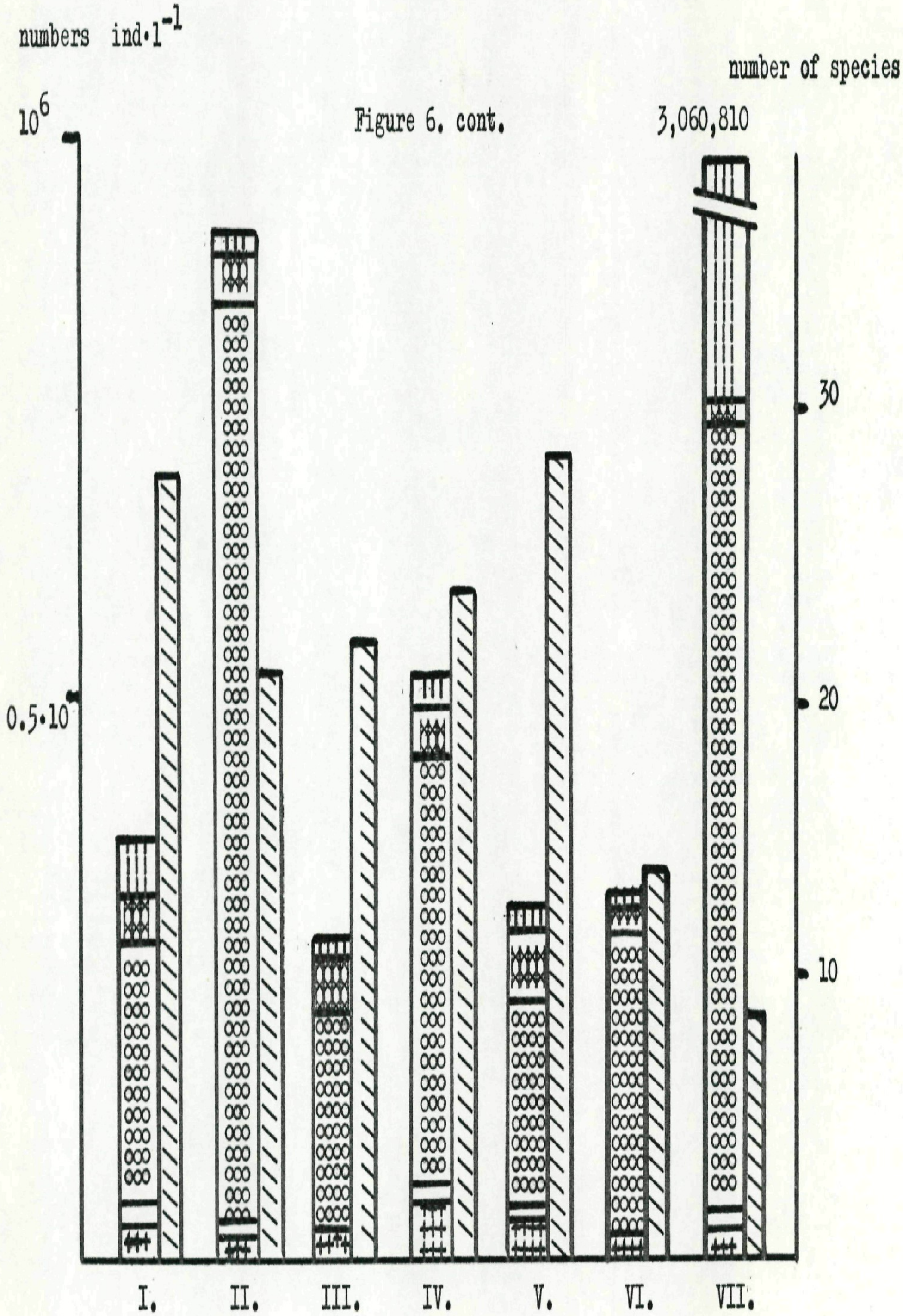


Figure 6. cont.