

Composition and Characteristics of Plankton Communities in Lake Ok-Jeong

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玉井湖의 Plankton 群集組成과 그 特徵

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玉井湖에 있어서 1年間の plankton 資料에 立脚하여 主要種의 表와 圖版을 提示하고, 또 이 湖中の 優占種으로부터 判斷하여 玉井湖는 當營養化가 進行되었음을 나타냄을 推定할 수 있다. 여기서 나타난 몇가지 種類에 대하여 分類上 및 分布上 注意할 점이 있음을 檢討指摘하여 둔다.

Introduction

The Lake Ok-Jeong, located along the border between Jeonra-bugdo and Jeonra-namdo, south-western part of the Korean peninsula, is one of the major man-made lakes in Korea. This lake, initially constructed in 1928, and enhanced and enlarged in 1955, is one of the oldest artificial lakes in the country. The locality and general features of the lake are as previously shown (Song, 1982).

Song, one of the present authors, has carried out a series of limno-biological surveys of plankton, and Mizuno, the other author, has cooperated in the identification and analysis of the samples.

The investigation on the planktonic flora and fauna in the south-western part of Korea is in the state of infancy. Therefore, an elaborate investigation on the composition of plankton in this lake will play a significant role for the lim-

nological study in the future.

Though general descriptions on the limnological aspects of the Lake Ok-Jeong were previously reported by one of the authors(Song, 1982), here stressed is some specific concern on the flora and fauna of the plankton in the lake.

Method and Materials

The study was based on the plankton samples monthly collected at 3 sampling stations from September 1980 to August 1981. For the analysis of phytoplankton 6l of water was taken by using a Van Dorn water sampler from different water depths. Phytoplankton was preserved in 5% neutral formalin, and the sedimentation was subsampled for cell counting. Plankton net (Muller gauze #25) was towed to collect zooplankton.

Identification was followed by Hutchinson (1957, 1967), Pennak (1978), Edmonson (1959), Mizuno (1980) and Chung (1979).

Result and Discussion

1. Composition of the planktonic community

The following list (Table 1) shows important species that appeared throughout year. There appear seasonal fluctuations in some species which are marked with a bold circle (●) and those that need further considerations on the taxonomy and geographical distribution are marked with an asterisk (*) in the table.

Table 1. Major species of plankters appeared during one year collection

[PHYTOPLANKTON]	
Cyanophyta	
●	<i>Microcystis aeruginosa</i> Kützing
●	<i>Anabaena spiroides</i> var. <i>crassa</i> Lemmermann
	<i>Oscillatoria tenuis</i> C. A. Agardh
Bacillariophyta	
●	<i>Melosira granulata</i> (Ehrenberg)
●	<i>M. granulata</i> var. <i>angustissima</i> Müller
*	<i>M. granulata</i> var. <i>angustissima</i> f. <i>spiralis</i>
*	● <i>Asterionella gracillima</i> (Hantzsch) Heiberg
●	<i>Synedra ulna</i> (Nitzsch) Ehrenberg
	<i>S. acus</i> Kützing
	<i>Cymbella tumida</i> (Brébisson) Van Heurck
	<i>Bacillaria paradoxa</i> Gmelin
	<i>Cyclotella comta</i> (Ehrenberg) Kützing
	<i>C. meneghiniana</i> Kützing
	<i>Gyrosigma</i> sp.
Chlorophyta	
●	<i>Pediastrum duplex</i> Meyen
	<i>P. simplex</i> (Meyen) Lemmermann
	<i>Crucigenia quadrata</i> Morren
	<i>Phormidium mucicola</i> Naumann et Huber
	Pestalozzi
	<i>Scenedesmus denticulatus</i> Lagerheim
	<i>Cosmarium maximum</i> (Börge) West
	<i>Dictyosphaerium pulchellum</i> Wood
	<i>Spirogyra</i> sp.
[ZOOPLANKTON]	
Protozoa	

●	<i>Eudorina elegans</i> Ehrenberg
	<i>Pleodorina illinoiensis</i> Kofoid
●	<i>Ceratium hirundinella</i> O.F. Müller
	<i>Dinobryon divergens</i> Imhof
	<i>Euglena</i> sp.
●	<i>Diffflugia corona</i> Wallich
*	<i>Diffflugia</i> sp.
	<i>Tintinnopsis cratera</i> (Leidy) Hada
	<i>Vorticella</i> sp.
	<i>Carchesium polypinum</i> Ehrenberg
	<i>Euglypha alveolata</i> Dujardin
Rotifera	
●	<i>Brachionus calyciflorus</i> Palla
* ●	<i>B. angularis</i> Gosse
	<i>B. forficula</i> Wierzejski
*	<i>Trichocerca capucina</i> (Wierzejski et Zacharias)
●	<i>Filinia longiseta</i> (Ehrenberg)
●	<i>Conochilus unicornis</i> Rousselet
●	<i>Conochiloides natans</i> (Seligo)
	<i>C. coenobasis</i> Skorikov
* ●	<i>Polyarthra trigla</i> (Ehrenberg)
	<i>Hexarthra (Pedalia) mira</i> (Hudson)
* ●	<i>Asplanchna sieboldi</i> (Leydig)
* ●	<i>A. herricki</i> De Guerne
	<i>Ploesoma truncatua</i> (Levander)
	<i>Keratella valga</i> (Ehrenberg)
	<i>Pompholyx complanata</i> Gosse
Cladocera	
* ●	<i>Bosmina longirostris</i> (O.F. Müller)
●	<i>Bosminopsis deitersi</i> Richard
	<i>Diaphanosoma brachyurum</i> (Liévin)
Copepoda	
* ●	<i>Heliodyptomus kikuchii</i> Kiefer
●	<i>Thermocyclops taihokuensis</i> Harada

-
- Dominant species in a limited period of a year
 - * Species of special interest in taxonomy and distribution

2. Characteristics of the plankton communities

As a whole, among a number of species of plankton existed, especially abundant are *Microcystis aeruginosa* and *Anabaena spiroides* in Cya-

Composition and Characteristics of Plankton Communities in Lake Ok-Jeong

nophyta, *Melosira granulata* and its variety, and *Asterionella gracillima* in Diatom (Plates I, II).

Among zooplankton, rotifers occurred most abundant in both numbers of species and individuals, and their dominant species were *Brachionus calyciflorus*, *Filinia longiseta*, *Conochilus unicornis*, *Conochiloides natans* and *Asplanchna herricki* (Plates V, VI).

Among protozoa, *Diffflugia corona* and *Eudorina elegans*, and sometimes *Ceratium hirundinella* heavily broke out (Plate IV).

In Cladocera, *Bosmina longirostris* and *Bosminopsis deitersi* were fairly abundant (Plate VII), as well as *Heliodiaptomus kikuchii* and *Thermocyclops taihokuensis* in Copepoda (Plate VIII).

Most of the above mentioned dominant species are those which generally occur in waters rich in organic contaminants, therefore this man-made lake seems to have been fairly eutrophicated coincided with an age of a fairly long time.

Some more to be also mentioned are some problems on the classification and distribution. First, *Melosira granulata* and its variety are extremely abundantly occurring including some spiral forms, which might be confused with some forms of Cyanophyta or Chlorophyta by its filamentous appearance. But, it is identified to be a form of *M. granulata* var. *angustissima* by observing it under high magnification. *Asterionella*, which occurs most abundantly in October, is identified to be *A. gracillima* by observing the surface of the test. Other species of Diatom were scarcely found in number of individuals.

Among the genus *Trichocerca* of rotifers, *T. capucina* was very abundant in this lake, instead of more cosmopolitan *T. cylindrica* and *T. longiseta* which were usually found in a large number at other waters. *T. capucina* has its characteristic large triangular project at the frontal end. In *Polyarthra*, *P. euryptera* has been widely reported from many regions in Korea, but *P. trigla* was found in this lake (Plate V).

Especially, as of the genus *Asplanchna*, though

A. priodonta has been exclusively reported to be found from Korean waters, *A. herricki* was abundant in this lake, and *A. sieboldi* occurred in June and July. The external characteristics of these three species are very similar, but by comparing the trophi extruded by pressing the test these species are easily identified (Plate VI).

Genus *Bosmina* in cladocerans is generally thought to be easily identified, but the species in this genus found in this lake is similar to *B. coregoni* (cool water northern species), sense hair being located near the base of the gut opening. But, this species is identified as *B. longirostris* by two arc lines around the base of the 2nd appendage (antennae). Because this species resembles *B. fatalis*, it should be carefully identified (Plate VII).

Among Copepoda, *Heliodiaptomus kikuchii* and *Thermocyclops taihokuensis* were commonly found. The presence of *H. kikuchii* in this lake is an interesting phenomenon compared to the general occurrence of *Neurodiaptomus okadae* (northern cool water species) in the Chuncheon and Soyang lakes located at the upper part of the North Han River, north-eastern part of South Korea.

Furthermore, *Brachionus angularis* is somewhat different from those generally found by having granular projections on the surface of the test, and a question is left whether this specimen be a new variety or not. And some specimens of *Diffflugia* in Protozoa, have undulate margin at the mouth part, leaving species name unidentified, though this species has widely been collected from many parts of Korean waters (Plate IV).

Summary

Major species of zooplankters were identified from the specimens collected from Lake Ok-Jeong for 1 year period and the descriptions are given together with the list of the species and some drawings. Assuming from the dominant species present in the lake, the Lake Ok-Jeong is

considered to be a fairly progressed eutrophic lake. For a few species, some questions are presented in taxonomical and biogeographical view points.

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PLATE I

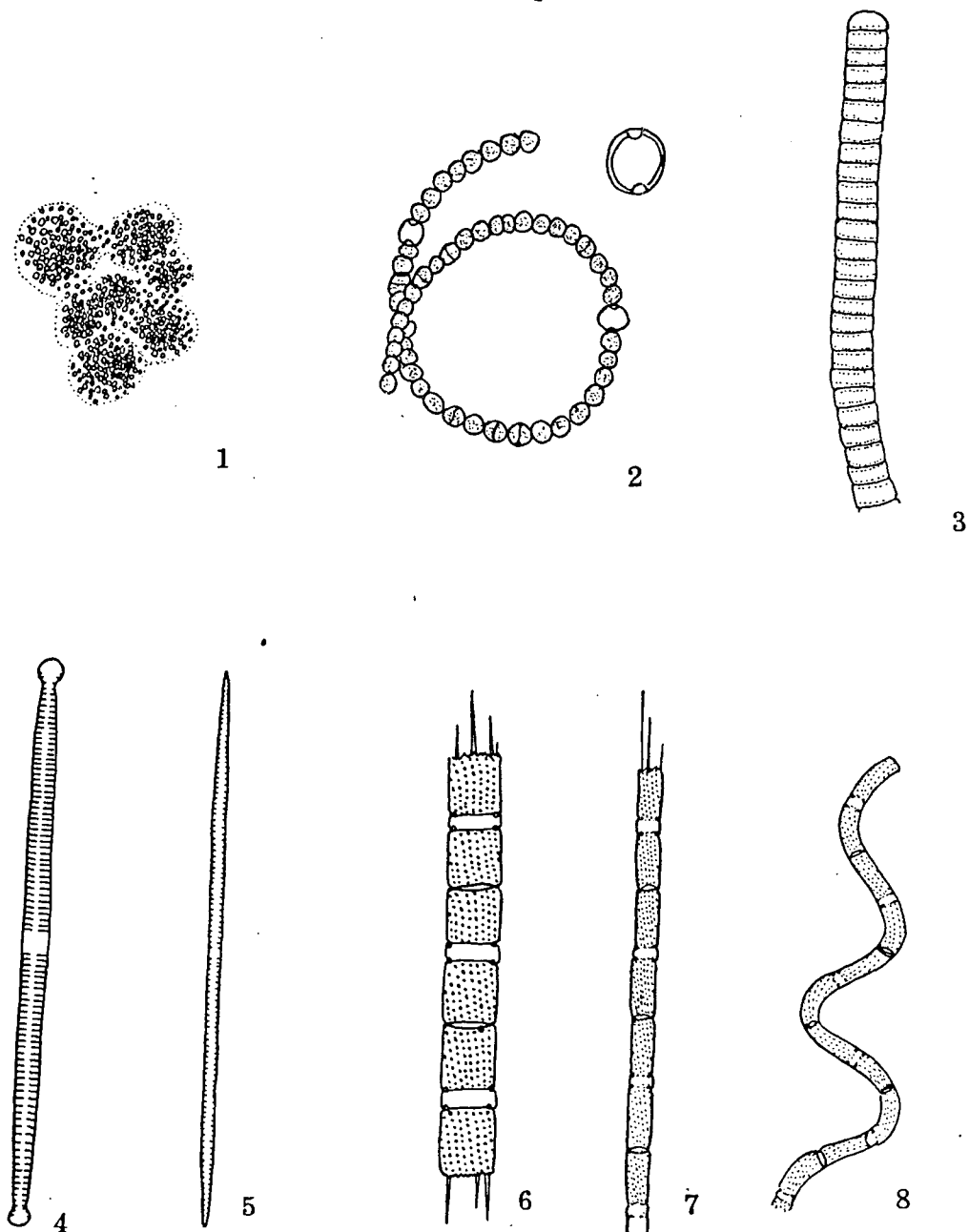


PLATE 1. Cyanophyta and Bacillariophyta - 1

- | | |
|--|--|
| 1. <i>Microcystis aeruginosa</i> Kützing | 2. <i>Anabaena spiroides klebahn</i> var. <i>crassa</i> Lemmermann |
| 3. <i>Oscillatoria tenuis</i> C.A. Agardh | 4. <i>Synedra ulna</i> (Nitzsch) Ehrenberg |
| 5. <i>S. acus</i> Kützing | 6. <i>Melosira granulata</i> (Ehrenberg) Ralfs |
| 7. <i>M. granulata</i> var. <i>angustissima</i> Müller | |
| 8. <i>M. granulata</i> var. <i>angustissima</i> f. <i>spiralis</i> Habitusbild | |

PLATE II

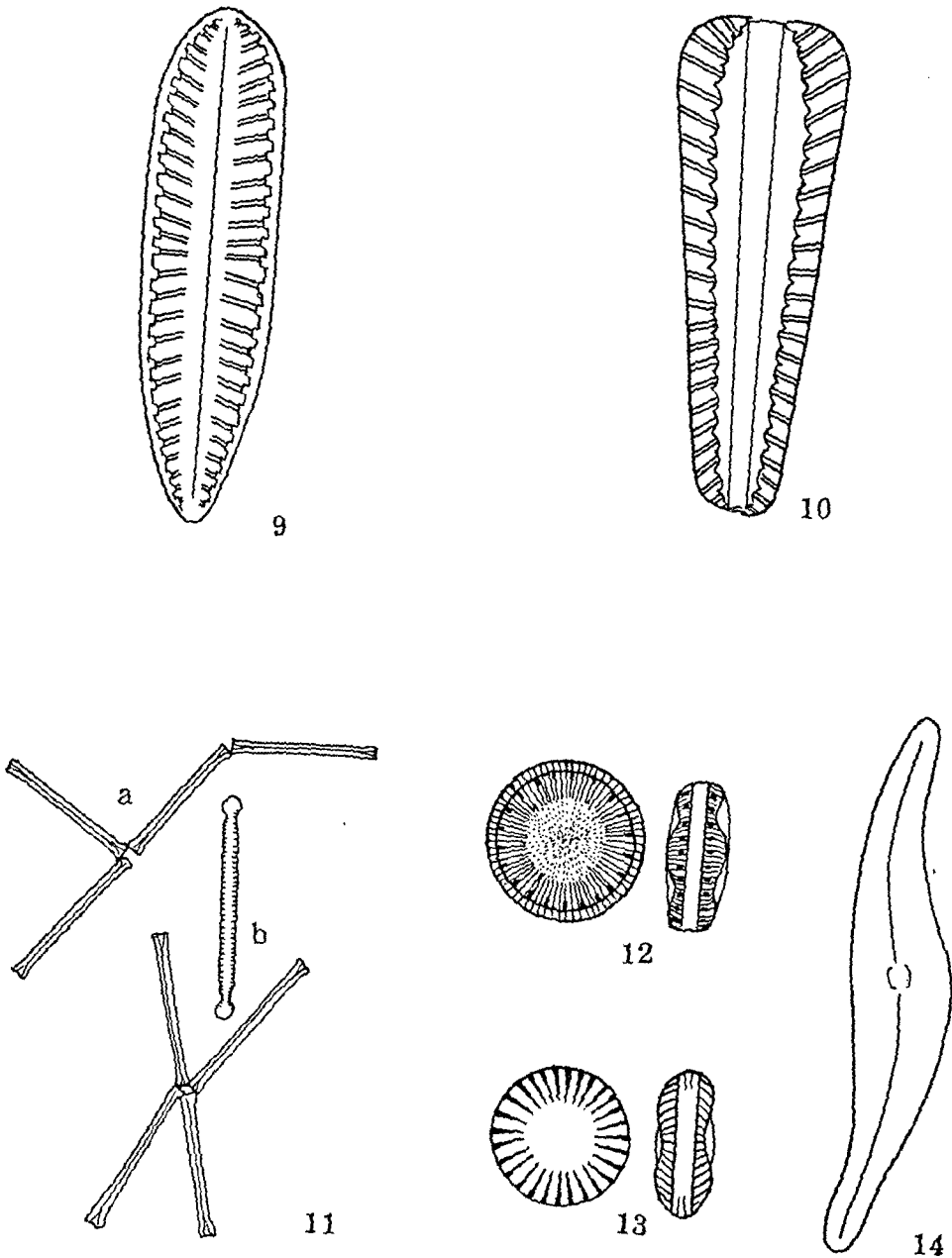


PLATE 2. Cyanophyta and Bacillariophyta - 2

- 9, 10. *Surirella elegans* Ehrenberg 9. Valve view 10. Girdle view
11. *Asterionella gracillima* (Hantzsch) Heiberg a. Girdle view b. Valve view
12. *Cyclotella comta* (Ehrenberg) Kützing 13. *C. meneghiniana* Kützing 14. *Gyrosigma* sp.

PLATE III

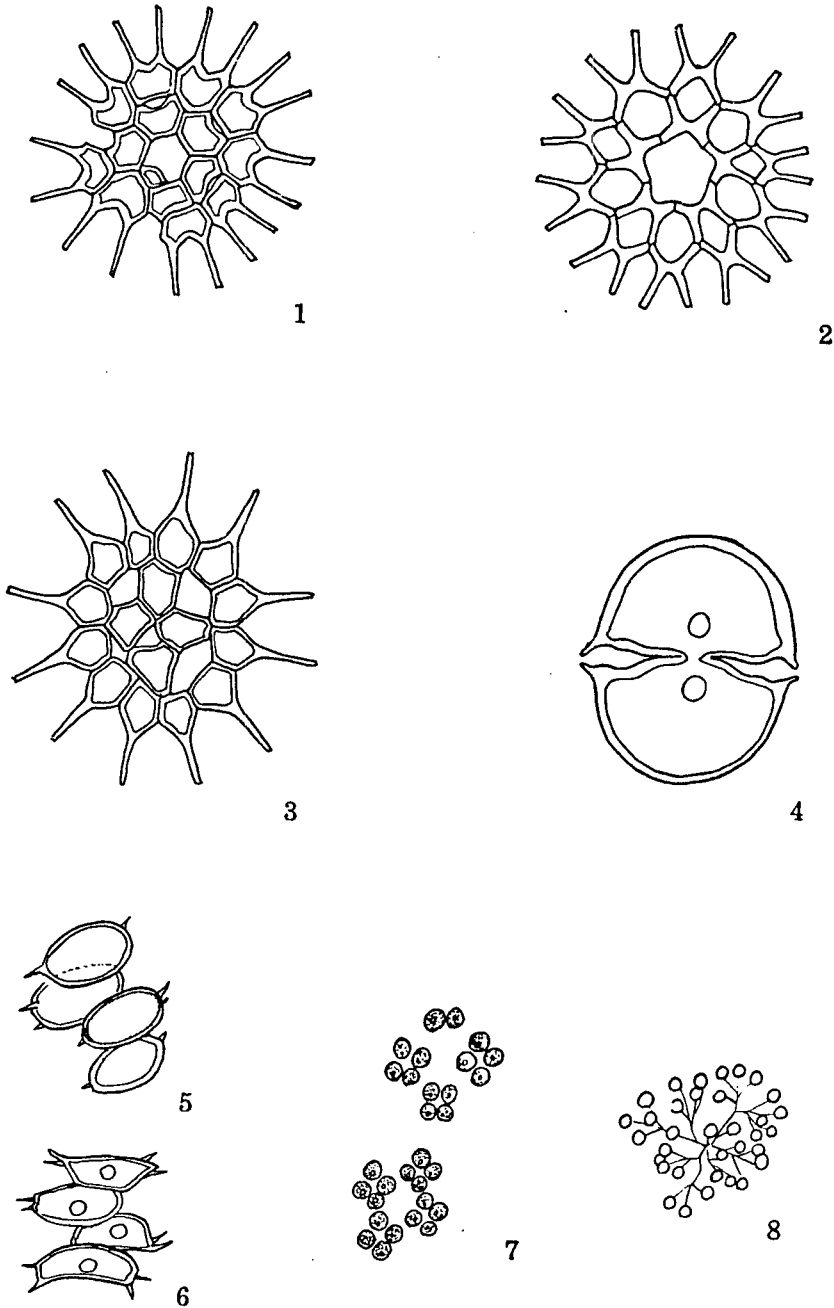
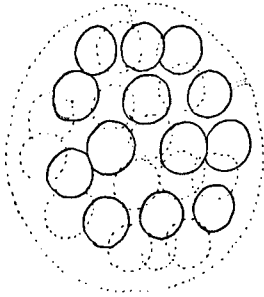


PLATE 3. Chlorophyta

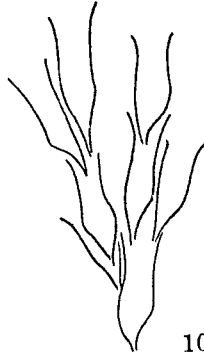
- 1, 2. *Pediastrum duplex* Meyen
4. *Cosmarium maximum* (Börge) West
7. *Crucigenia quadrata* Morren

3. *Pediastrum simplex* (Meyen) Lemmermann
5, 6. *Scenedesmus denticulatus* Lagerheim
8. *Dictyosphaerium pulchellum* Wood

PLATE IV



9



10



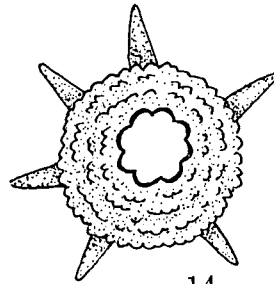
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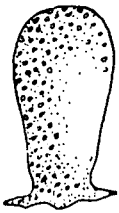
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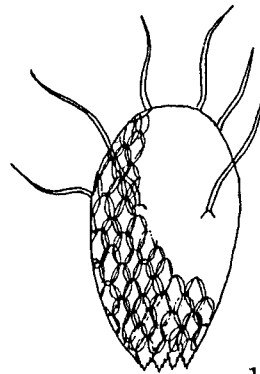
13



14



15



16

PLATE 4. Protozoa

9. *Eudorina elegans* Ehrenberg

12. *Ceratium hirundinella* O.F. Müller

14. *Diffugia corona* Wallich

16. *Euglypha alveolata* Dujardin

10, 11. *Dinobryon divergens* Imhof

13. *Carchesium polypinum* Ehrenberg

15. *Diffugia* sp.

PLATE V

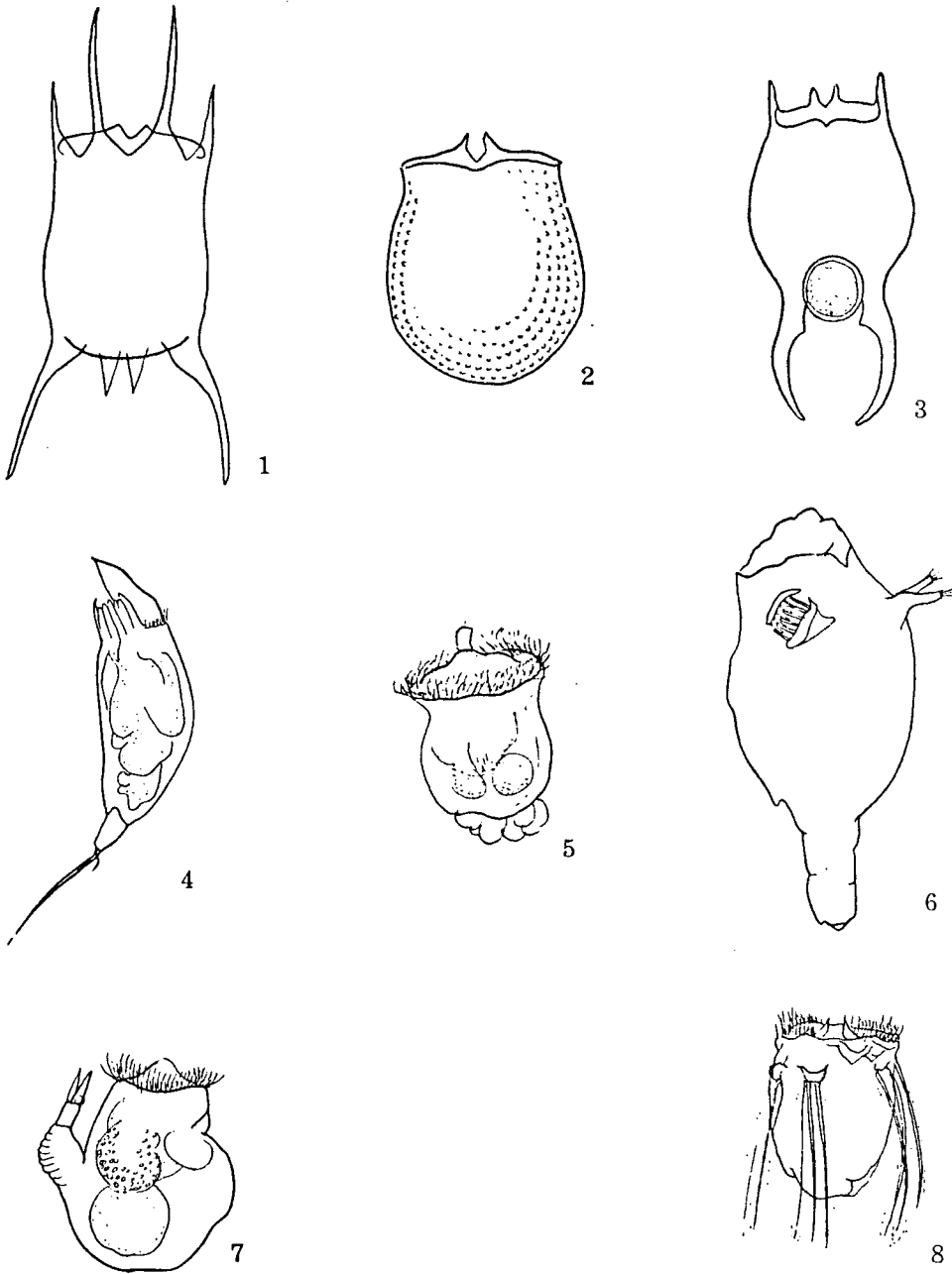


PLATE 5. Rotifera - 1

- | | |
|--|--|
| 1. <i>Brachionus calyciflorus</i> Palla | 2. <i>B. angularis</i> Gosse |
| 3. <i>B. forficula</i> Wierzejski | 4. <i>Trichocerca capucina</i> Wierzejski et Zacharias |
| 5. <i>Conochilus unicornis</i> Rousselet | 6. <i>Conochiloides natans</i> Seligo |
| 7. <i>C. coenobasis</i> Skorikov | 8. <i>Polyarthra trigla</i> Ehrenberg |

PLATE VI

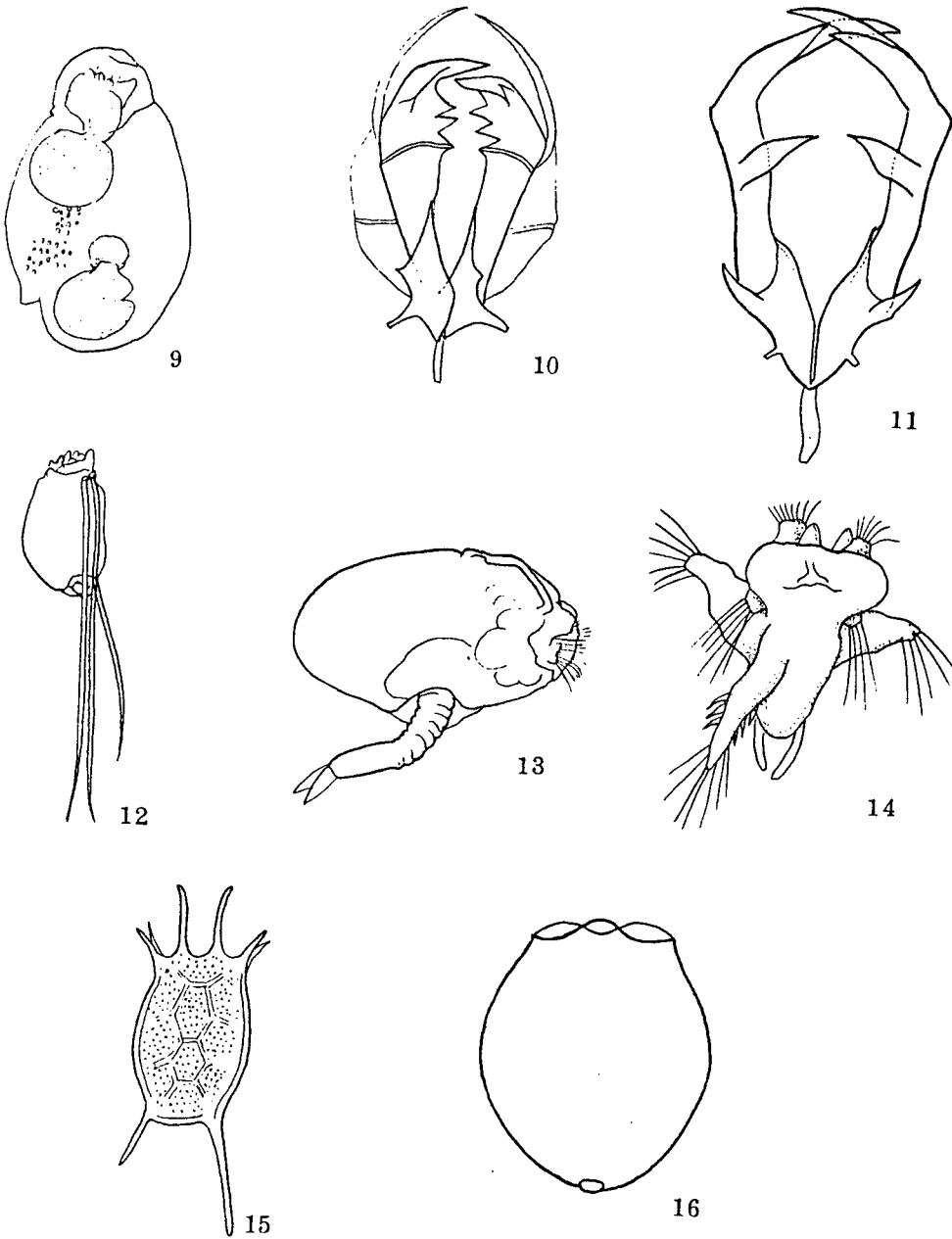


PLATE 6. Rotifera - 2

- | | |
|---|--|
| 9. <i>Asplanchna herricki</i> De Guerne | 10. <i>A. herricki</i> (Trophi of <i>A. herricki</i>) |
| 11. <i>A. sieboldi</i> (Leydig) (Trophi of <i>A. sieboldi</i>) | 12. <i>Filinia longiseta</i> Ehrenberg |
| 13. <i>Ploesoma truncata</i> Levander | 14. <i>Hexarthra Pedalia mira</i> Hudson |
| 15. <i>Keratella valga</i> Ehrenberg | 16. <i>Pompholyx complanata</i> Gosse |

PLATE VII

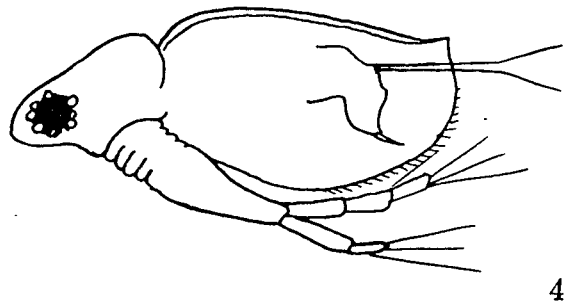
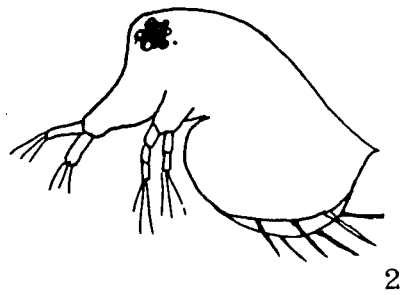
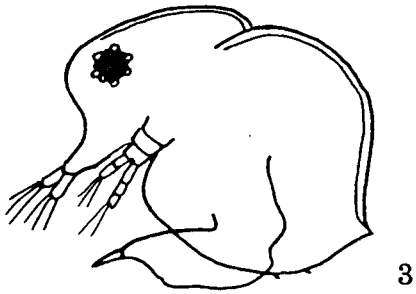
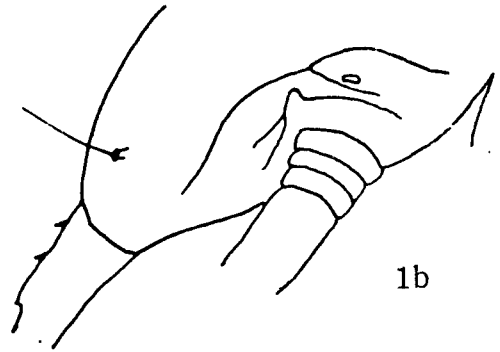
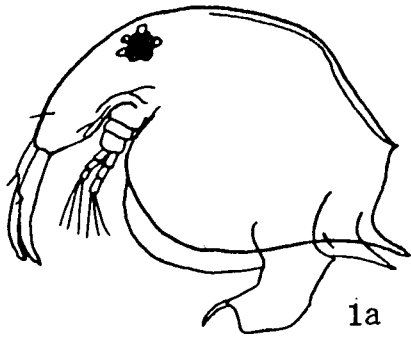


PLATE 7. Cladocera

- 1 a. *Bosmina longirostris* O.F. Müller b. Crescent shaped line of head
2. *Bosminopsis deitersi* Richard (Larva) 3. *B. deitersi* Richard (Adult)
4. *Diaphanosoma brachyurum* Lievin

PLATE VIII

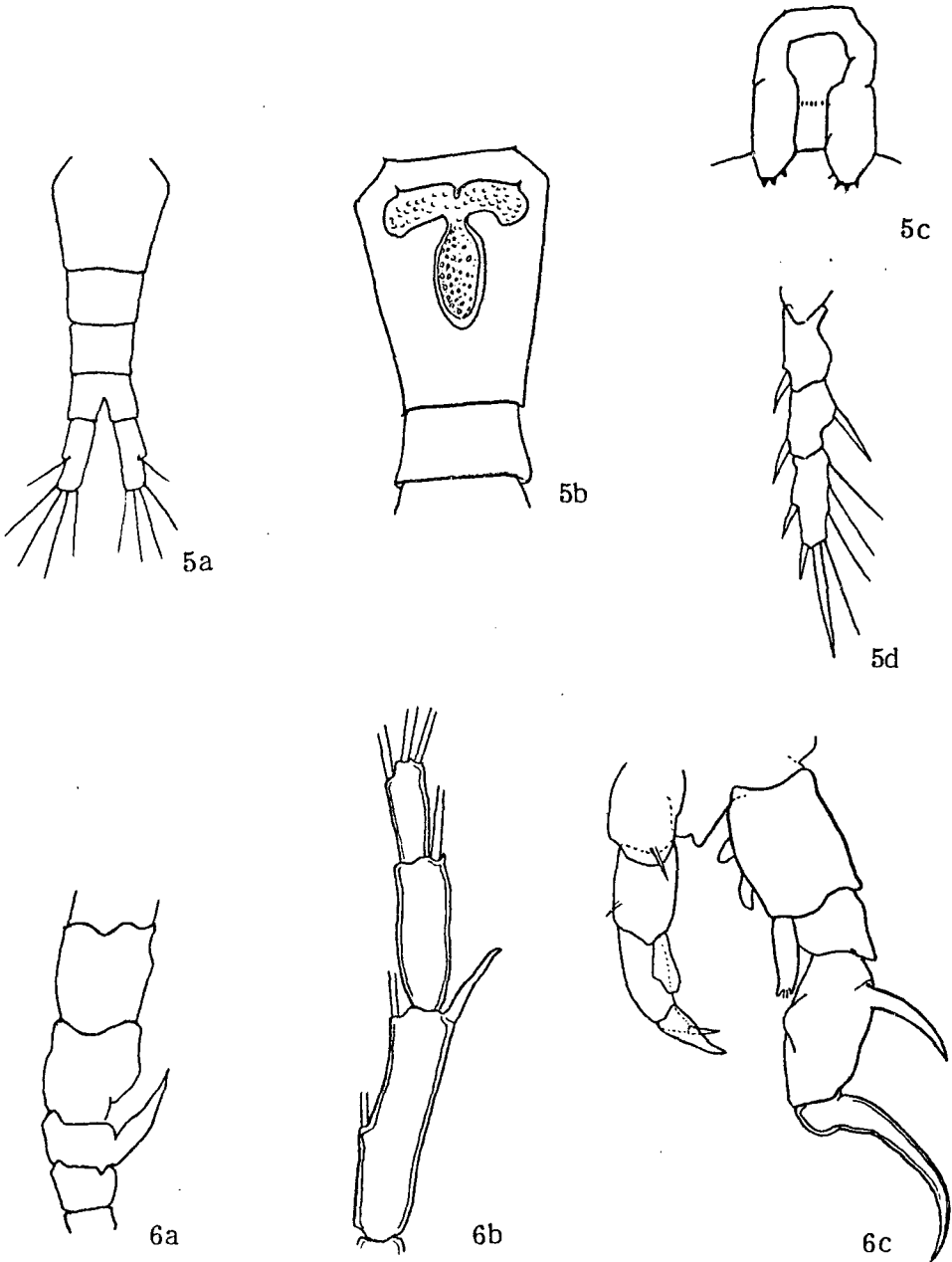


PLATE 8. Copepoda

- 5 a. *Thermocyclops taihokuensis* Harada b. Sperm reservoir c. Connection plate
d. Terminal segment of endopod of leg 4.
6 a. *Heliodiaptomus kikuchii* Kiefer (Spine of segment 13 of 1st antenna)
b. Spine of segment 3 of 1st antenna c. Terminal segment of leg 5