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# Freshwater Diatom Biogeography of the Canadian Arctic Archipelago

by
Giselle Bouchard

A Thesis submitted to the
Faculty of Graduate & Postdoctoral Studies
in partial fulfillment of the requirements for the
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# Abstract

The biogeography of diatoms in 62 lakes across the Canadian Arctic Archipelago was studied. A total of 326 taxa was found, with up to 85 and as low as 8 taxa identified in any one lake. Rarefaction-estimated richness correlated with lake size. Although diatom assemblages showed regional patterns, between-lake variability in any region was high, indicating that local factors are important in determining the assemblages. Newly delineated genera showed interpretable geographic patterns and could be related to environmental factors, suggesting that this more natural grouping may enhance our understanding of diatom ecology. Some taxa showed southern and regionally limited distributions. Many taxa prefer colder temperatures while others were more influenced by lake water parameters. Assemblages with zero or low abundance of fragilaroid taxa tended to occur in larger lakes with higher silica. These lakes had more diverse assemblages including *Gomphonema*, *Encyonema*, and *Encyonopsis* taxa, suggesting a possible relationship between non-fragilaroid taxa and lake size and silica. Geographic, physical, and chemical factors are needed to explain diatom distributions in the Arctic.

# Resumé

La biogéographie des diatomées dans 62 lacs à travers l'arctique canadien est étudiée. Au total, 326 taxa ont été identifés, avec certains lacs atteignant jusqu'à 85 taxa et d'autres aussi peu que 8 taxa. La richesse specifique, estimée par analyse de raréfaction, est corrélée avec la superficie des lacs. Les assemblages de diatomées montrent des distributions régionales. Toutefois, la variabilité entre les lacs à l'intérieure d'une région est élevée, ce qui suggère que les facteurs locaux ont aussi une influence sur la composition des assemblages. Les genres récemment définis montrent des distributions régionales qui pourraient être liées aux facteurs environnementaux, suggérant que ces regroupements taxonomiques pourraient augmenter notre compréhension de l'écologie des diatomées. Plusieurs taxa préfèrent des températures froides, tandis que d'autres sont influencés par les conditons lacustres. Les plus grands lacs, avec des concentratations de silice élevées, contiennent moins de taxa du groupe " *fragilaroid* ". Les assemblages dans ces lacs sont générallement plus diversifiés et contiennent des taxa tels que *Gomphonema, Encyonema* et *Encyonopsis*. Il y a donc possiblement un rapport entre ces derniers taxa, la superficie des lacs et la concentration de silice. Les facteurs géographiques, physiques et chimiques sont essentiels pour expliquer la distribution des diatomées dans l'Arctique.

# Acknowledgements

I've been very fortunate to work with Prof. Gajewski over the past few years. I'd like to thank him for his continued guidance, support, and invaluable wealth of knowledge that he has shared with me during my studies in Ottawa. Konrad's dedication to research and genuine interest in nature's complexity has been a huge source of motivation, in addition to his wittiness and downright terrific sense of humour, particularly when hanging out on the tundra with a heard of muskoxen. Most of all, Konrad has taught me to always look at things differently: "*If you think that's what you SHOULD do, than don't do it!*"

This experience would not have been the same without the past and present members of the LPC. Konrad's lab has provided much more than just the resources needed to do my research. The members there create an environment where one can explore and discuss ideas, seek advice and second opinions on your work, and even debate politics and the end of the world! Moreover, the lab has been a good source of comradeship and good humour. I'd like to thank all of the LPC members for their support and friendship.

I'd also like to acknowledge Paul Hamilton for introducing me to diatoms and to Konrad. Paul encouraged me from the very beginning to pursue a Master's degree and learn as much as I could about nature. He never failed to pass on his enthusiasm for studying and understanding diatoms in all of the times we worked together figuring out the identity of those little critters and discussing what might be going on in their little world. Thanks Paul for showing me that research could be so exciting!

My mom, dad, and sister have supported me throughout this process with great understanding of how important this project has been to me. I'm deeply grateful for their encouraging words, unbridled support, and interest in my endeavors.

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rehearse my thesis seminar over and over again. I'm sure she could have given my talk with ease! I also thank all of my friends, those in Ottawa, and my Guelph girls now all over Canada, for being my biggest cheerleaders!

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Having the opportunity to fly over large parts of the Arctic, camp in it's vastness, and see and breathe the beauty of it all made this project so much more meaningful to me. I'm sure I'll be talking about this experience for my entire life! This would not have been possible without the field supplies, logistical support, and helpful staff of the Polar Continental Shelf Project (PCSP). They made Resolute (and the Arctic) an instant home largely due to the brilliant cooks at the base! My field work was also made possible by the Northern Scientific Training Program, an Arctic Institute of North America Grant-in-Aid, and a CANA Phycology Fellowship. This research was also supported by an NSERC grant to K. Gajewski.

*Life is animated water.*

- Vladimir Vernadsky, in M.I. Budyko,
S.F. Lemeshko and V.G. Yanuta,
*The Evolution of the Biosphere*

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# 1. Introduction

## *1.1 Introduction*

Diatoms are unicellular microscopic algae that are important primary producers in aquatic ecosystems. As with any organism, they have particular habitat preferences and tolerances, and thus respond to stress and environmental changes (Schindler, 1987). Due to their short generation time and abundant numbers, they are important organisms used to study aquatic ecosystems. Because their siliceous cell walls are fossilized in lake sediments, diatoms may be used for the reconstruction of past environmental conditions.

Diatoms are dispersed by wind and organism vectors, namely aquatic birds (see review by Kristiansen, 1996). For example, both living and dead algae have been recovered from the feet and feathers of cormorants (Foged, 1953) and arctic terns (Schlichting et al., 1978). Atkinson (1972) reported living, benthic algae from the gut contents of waterbirds. Several studies reported viable algae from the contents of air and dust filters (Kristiansen, 1996). However, data of diatom dispersal are limited, particularly for living cells (Kociolek & Spaulding, 2000). Other factors controlling diatom distributions include historical aspects, biological interactions, including parasitism and predation, and environmental conditions.

Interpretations of diatom biogeography are largely affected by the methods in taxonomy and species concept used as the basis of classification. Recent advances in taxonomy aided by the use of the scanning electron microscope (SEM) have refined generic groupings based on ultrastructural characters (e.g. Round et al., 1990; Bukhtiyarova & Round, 1996). In these more natural classifications, ecological and structural characteristics are consistent and seem to be always present among the taxa. This taxonomic work improves our understanding of diatom ecology (Morales et al., 2001; Kingston, 2003) and allows for more precise assessments of the environmental variables influencing taxa distributions. However, the accuracy of diatom taxonomy and the recent establishment of many new species has been the focus of much debate (Williams, 1995; Round, 1997; Kociolek, 1996; Mann & Droop, 1996).

Our understanding of how diatoms respond to changes in their environment is still limited. Diatom assemblages and distributions are influenced by competition for resources caused by limiting nutrients and the combined effects of physical and chemical variables (Tillman 1982; Tillman et al., 1982). Controlled experiments investigating diatom response to light and temperature have increased our understanding of diatom ecophysiology (Patrick, 1971; Kilham, 1986; Dauta et al., 1990). These laboratory studies provide valuable insights into the optimal ranges of diatoms with respect to some environmental variables. An alternative method for investigating diatom-environment relationships is to determine empirical relations between diatom communities and environmental variables in a spatial series of lakes. Environmental preferences or optima are calculated for diatom taxa using various statistical techniques that relate taxa to the environmental conditions that surround them (ter Braak, 1986).

Recent studies have focused on understanding diatom-environment relationships in arctic and treeline regions (Pienitz & Smol, 1993; Pienitz et al., 1995; Douglas & Smol, 1993, 1995; Hamilton et al., 1994a; Gregory-Eaves et al., 1999; Fallu et al., 2000; Joynt & Wolfe, 2001; Weckström & Korhola, 2001; Lim et al., 2001a, b; Rühland & Smol, 2002; Wilson & Gajewski, 2002; Bigler & Hall, 2002; Rühland et al., 2003a; see review in Stoermer & Smol, 1999) since the impacts of climate change are predicted to be pronounced in these northern regions (IPCC, 1990; Watson et al., 1995). These changes may greatly affect the physical and chemical characteristics of aquatic systems, therefore impacting the local biota. Many of these studies have focussed on defining diatom optima and tolerances to various environmental factors for use in paleoenvironmental reconstructions. Often, these diatom-environment relationships are studied using a set of lakes in small geographic regions. Optima derived from these studies are therefore based on limited gradients that likely do not represent the full ecological range of each taxon, a problem often noted (e.g. Pienitz et al., 1995; Joynt & Wolfe, 2001; Weckström & Korhola, 2001).

The ability to use diatoms as "bioindicators" depends on a knowledge of the distribution of the various taxa, however few studies have documented the distribution of arctic taxa over a large geographic region. The comparison by Michelutti et al. (2003a) noted differences between southern and northern arctic assemblages while other studies report high similarities among diatom floras of circumpolar arctic regions (Foged, 1964; Laing et al., 1999).

Many diatoms are considered 'cosmopolitan' species, a view supported by the use of European taxonomic publications in the identification of North American species. However, many studies have reported endemic taxa, with distributions restricted to certain geographic regions (Hustedt, 1938, 1942; Low & Kociolek, 1984; Lange-Bertalot & Metzeltin, 1996; Vyverman, 1996). Although many taxa found in northern and alpine environments are also common in temperate regions, some appear to be limited to northern regions only. For example, *Neidium distinctepunctatum* Hustedt is most commonly found in circumpolar arctic regions (Hamilton et al., 1996). Numerous taxa encountered in arctic regions have been unidentifiable and may therefore have restricted distributions (Hamilton et al., 1994a; Douglas & Smol, 1993). Establishing biogeographic patterns of genera and taxa found in arctic regions will improve our understanding of their ecology.

The objectives of this research are to: (i) investigate the spatial distribution of diatoms across a large geographic region in the Canadian Arctic; (ii) characterize the physical and chemical properties of the lake environments in which these diatoms are found; (iii) examine relationships between diatoms and environmental variables.

### *1.2 Diatoms (class Bacillariophyceae)*

Diatoms are found in freshwater, marine, and terrestrial habitats where there is sufficient moisture (Round et al., 1990). Diatoms are photoautrophs, meaning they posess chloroplasts containing photosynthetic pigment molecules, namely chlorophyll-*a* and -*c*, enabling them to absorb carbon dioxide, water, and sunlight. As such, they are the primary energy source for organisms higher in the food chain. Surrounding the vegetative cell of the diatom are two silica-impregnated valves, which together are called a frustule and can be described as fitting together like the two halves of a petri dish. The pattern of tiny pores, slits, and depressions on the diatom frustule is taxon-specific and therefore used for identification. When the alga dies, the empty siliceous cell walls are deposited in the sediments of lakes and preserved as microfossils.

Diatoms are often abundant in the algal community of arctic surface waters perhaps due to their functional role as opportunists. Biogeographic studies of other freshwater algae suggest many species are cosmopolitan while others have limited distributions. For example, Sheath et al. (1996) did not report any endemic macroalgae from tundra streams in North America. In contrast, Hoffmann (1996) reports pantropic distributions of blue-green taxa and suggested their distribution is largely controlled by temperature. Although mechanisms of diatom dispersal are not well understood, diverse floras have been reported from high latitude regions. However, arctic ecosystems are little known and diatom floras in particular are poorly documented (Douglas & Smol, 1999).

### *1.3 Arctic limnology*

Early limnological research in the Canadian Arctic was conducted on Baffin and Ellesmere Islands in the 1960's (Oliver, 1964; McLaren, 1964, 1967). Detailed limnological research didn't begin until 1968, as part of the International Biological Programme (Welch & Kalff, 1974) followed by few other studies (i.e. Schindler et al., 1974). Other work by government scientists, for example associated with the Department of Fisheries and Oceans, are frequently published in technical reports and are not easily accessible (see Hamilton et al., 2001 for review). Due to the lack of information on the physical and chemical characteristics of Canadian arctic surface waters, a number of recent studies have focussed directly on describing the characteristics of ponds and lakes in this region (Hamilton et al., 1994a; Douglas & Smol, 1993; Ludlam, 1996; Lim et al., 2001c; Michelutti et al., 2002a, b; Hamilton et al., 2001; Antoniades et al., 2003). Limnological surveys have also been performed on surface waters in Alaska (Kling et al., 1992; Cornwell & Banahan, 1992; Gregory-Eaves et al., 2000) and in subarctic and treeline regions (Pienitz et al., 1997; Moser et al., 1998; Rühland & Smol, 1998; Rühland et al., 2003b). Similar studies have characterised the limnological properties of lakes and ponds in Arctic Lapland (Weckström & Korhola, 2001), Sweden (Rosén et al., 2000) and Siberia (Laing et al., 1999).

The chemical composition of inland lakes is largely determined by local geology and climatic factors as well as proximity to the ocean (Kalff, 2002). For example, minerals and nutrients are brought to surface waters from precipitation while evaporation causes ionic concentrations to increase. Bedrock geology remains perhaps the most important factor influencing lake water characteristics (Wetzel, 2001). This has been shown in arctic limnological surveys (Pienitz et al., 1997; Hamilton et al., 2001; Lim et al., 2001c).

Climate warming, as a result of increasing greenhouse gasses from the burning of fossil fuels, is predicted to have its greatest impact in polar regions (IPCC, 1990). These changes could affect the physical and chemical characteristics of surface waters in arctic regions. Potential impacts include increases in nutrient levels and ion content as a result of changes in leaching rates and catchment erosion (Rouse et al., 1997). In order to understand how anthropogenic activities, such as those associated with climatic change, can affect aquatic environments it is important to know the current state of these freshwater systems (Hamilton et al., 2001). Changes in limnological characteristics may have a large effect on diatom distributions, diversity, and community structure (Weckstöm & Korhola, 2001). For example, arctic surface waters are generally phosphorous limited (Hamilton et al., 2001; Michelutti et al., 2002a, b). Increases in nutrient concentrations may cause assemblages to shift according to nutrient preferences of various taxa. Those tolerant of higher concentrations would thrive and outcompete taxa that prefer oligotrophic waters.

### *1.4 Diatom & diatom-environment studies in arctic regions*

A review of pioneering diatom studies in high-arctic regions is provided by Douglas & Smol (1999). Notable studies by Foged described diatoms and their ecology in Greenland (Foged, 1953, 1955, 1958, 1972), Alaska (Foged, 1981), and Iceland (Foged, 1974). Since then, studies have reported diatom floras from several areas of the North American Arctic including Ellesmere (Douglas & Smol, 1993; Hamilton et al., 1994a; Smith, 2002), Baffin (Wolfe, 1996; Joynt & Wolfe, 2001), and Bathurst (Lim et al., 2001a, b) Islands of the Canadian Arctic Archipelago as well as Alaska (Gregory-Eaves et al., 1999). Numerous studies have examined diatom-environment relationships further south at treeline (Pienitz et al., 1995; Fallu et al., 2002; Rühland et al., 2003a). Others have described diatoms from arctic and subarctic Europe (Rosén et al., 2000; Bigler & Hall, 2002; Weckström & Korhola, 2001) and Russia (Laing et al., 1999; Cremer & Wagner, 2003). Many of these studies have discussed environmental factors that influence diatom communities and defined the ecological tolerances of many diatom species. These are based, however, on the limited geographic range of the particular study. Habitat availability also has an important role in determining diatom communities (Lim et al., 2001a; Van de Vijver et al., 2003; Michelutti et al., 2003a).

A variety of environmental variables influence diatom community compositions in northern lakes. Early works by Hustedt (1942) and Foged (1964) suggested pH and temperature are the most important factors controlling diatom communities from Swedish Lappland and Spitsbergen respectively. Temperature was thought to be most important in determining the number of diatoms present. More recently, Joynt & Wolfe (2001) found that pH, conductivity, summer lake-water temperature, and mean annual air temperature were four variables that effectively explained diatom abundance on Baffin Island. Lim et al. (2001b) also suggested that pH and water temperature are important influences on diatom assemblage composition as well as $Fe^{3+}$, total dissolved phosphorous and total nitrogen. Some other factors that influence diatom community composition include Total Organic Carbon (TOC; Weckström & Korhola, 2001), Dissolved Inorganic Carbon (DIC), lake depth, and Dissolved Organic Carbon (DOC; Pienitz et al., 1995; Rosén et al., 2000; Fallu et al., 2000). Water temperature is repeatedly cited as an important control of diatom assemblages. Temperature optima and tolerances have been estimated for selected taxa found in northern regions (Pienitz et al., 1995; Weckström et al., 1997; Rosén et al., 2000; Joynt & Wolfe, 2001; Bigler & Hall, 2002).

Thermal requirements of diatoms were documented by Hustedt (1942, 1956, 1957). Ecophysiological studies of diatoms showed how water temperatures affect algal life processes and community structure (Patrick, 1971; Raven & Geider, 1988; Dauta et al., 1990). These and many more studies indicate that diatom growth and abundance are both influenced by temperature. Seaburg et al. (1981) concluded that minimum temperature was the most important factor controlling algal growth in cold habitats. It should be noted that these studies focused on how diatoms adapt to living at low temperatures, leaving the response of diatoms to increased temperature unstudied (Weckström & Korhola, 2001).

The effect of climate variables on diatoms can be direct or indirect. Smol (1983) suggested that high-arctic air temperatures control the extent of ice cover on lakes and ponds, which in turn determines what habitats become available for diatoms. As the climate warms, ice cover decreases and more habitats become available. A variety of habitats become available with warmer temperatures, including a larger littoral area, increased macrophyte and moss growth, and a greater amount of lake bottom exposed to light. With warmer temperatures, prolonged ice-free periods result in a longer growing season, which then allows for the development of a more complex and diverse diatom assemblage (i.e. the presence of stalked and tube-dwelling forms) compared with colder years which have short ice-free periods (Douglas & Smol, 1999; Lotter & Bigler, 2000). Direct effects of the environment on diatom growth can be estimated using experimental or statistical methods. Difficulty in determining diatom-temperature relationships both experimentally and statistically is largely due to the confounding effects of other variables (Patrick, 1971; Laing & Smol, 2000). The difficulties in identifying statistical relations and the limited knowledge of diatom physiology has led to scepticism about conclusions (Anderson, 2000) and cautious interpretations of defined optima and tolerances to environmental variables (e.g. Weckström & Korhola, 2001).

### *1.5 Description of region & study sites*

In the Arctic, biological production occurs during a short growing season in the summer months of June to September. Ice break-up begins in June when air temperatures rise to above freezing and solar radiation is able to reach the ice (Hobbie, 1984). Lakes generally freeze over in September at rates dependent on air temperature.

The region is underlain by continuous permafrost, which minimises the influence of groundwater on the study lakes (Woo, 1991). Climate patterns in the Canadian Arctic do not follow latitudinal gradients. The coldest temperatures occur in the northwest while temperatures similar to mid-arctic regions are found in the Fosheim region of Ellesmere and Axel Heiberg Islands in the north (Edlund & Alt, 1989; Atkinson & Gajewski, 2002).

This study includes 62 lakes from eight islands and one peninsula in the Canadian Arctic. The study area spans a north-south transect through the Arctic Archipelago (Figure 1.1, Table 1.1) from Boothia Peninsula to northern Ellesmere Island. Only lakes of depth ≥2 m were used in this study to eliminate the possibility of sediments disturbed by winter freezing (Nichols, 1967), wind or animals. Lakes vary in size and depth thus including a wide range of pelagic, littoral, and benthic habitats. Site elevations range from 15 to 732 metres a.s.l. Many sites are situated close to the ocean while some are located up to 62 km from the coast.

#### *Bedrock geology & surrounding vegetation*

The geological history of much of the Canadian Arctic Archipelago has been summarized in Trettin (1991a). The region can be divided into six geological provinces (Wheeler et al., 1997; Figure 1.1B) broadly categorized by bedrock characteristics. Much of the Archipelago is part of the Arctic Platform comprised of Paleozoic sedimentary rocks containing carbonate-rich materials. Many study lakes, namely those on Devon and Cornwallis Islands and sites on Boothia Peninsula, are underlain by this bedrock of shallow, marine origin. The Churchill and Bear provinces are both comprised of Precambrian rocks of the Canadian Shield. Sections of Somerset Island have undivided sedimentary and volcanic bedrock of the Churchill Province, similar to Baffin Island. Some lakes are situated in this region (Table 1.1). All sites on Victoria Island are situated in the Bear Province where the oldest bedrock in this study (i.e. Mesoproterozoic-Neoproterozoic) is found. Evaporitic sediments underlie the KR lakes (Frisch & Trettin, 1991). WB lakes on Victoria Island are underlain by limestone (Fyles, 1963) except for WB01 and WB02, which are situated on Neoproterozoic mafic intrusive rocks of diorite and gabbro.

The Innuitian Orogen includes Carboniferous sections of the Sverdrup Basin occurring in the Fosheim region of Ellesmere and Axel Heiberg Islands (Trettin, 1991b). In this study, the "Fosheim" refers to the Fosheim Peninsula on Ellesmere Island and adjacent areas including sites on Axel Heiberg Island. Lakes are underlain primarily by Mesozoic and Mesozoic-Cenozoic sedimentary rocks, composed largely of clastic materials, including many of non-marine origin (Wheeler et al., 1997). In general, six classes of bedrock are included in this study with most of the lakes situated on undivided sedimentary bedrock (Table 1.1).

The majority of the Canadian Arctic is a polar desert, with some regions exhibiting richer vegetation (Edlund & Alt, 1989). Historically, arctic vegetation has been divided into Low-, Mid-, and High-Arctic vegetation zones based on the number of species and plant density (Polunin, 1951). A recent study of the circumpolar arctic vegetation has classified the vegetation into more detailed classes based on remote sensing (CAVM, 2003). Four of the five broad classifications are represented in this study including Barren tundra, Graminoid tundra, Prostrate-shrub tundra, and Wetlands.

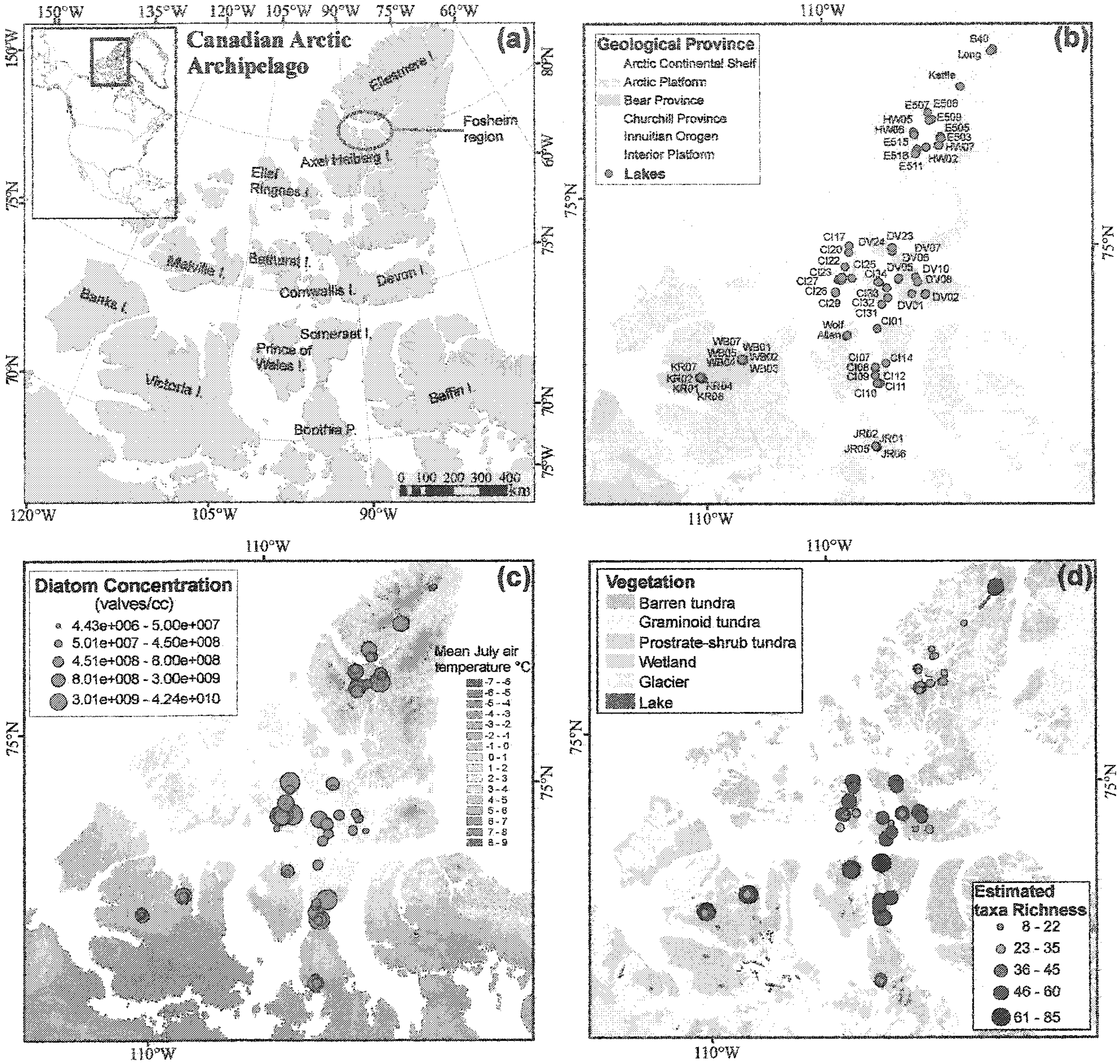


Figure 1.1. Maps of (a) The study area in the Canadian Arctic Archipelago, (b) Site locations displayed with geological provinces of the region, (c) Diatom concentrations (valves cc$^{-1}$) in relation to mean July air temperature, and (d) Rarefaction estimated richness of the diatom assemblage with terrestrial vegetation. Vegetation data are adapted from CAVM team (2003). Mean July air temperature (40-year) from Atkinson & Gajewski (2002). Geology data from Wheeler et al. (1997).

Table 1.1. Locations and physical characteristics of 62 study lakes in the Canadian Arctic Bedrock sub-rocktypes are Miogeoclinal (MIO), Undivided (US) and Non-marine (NMS) sedimentary, Undivided sedimentary and volcanic (USV), Mafic intrusive (MI), and Evaporite (E). Vegetation complexes are Barren (BAR), Graminoid tundra (GRA), Prostrate-shrub tundra (PRO), and Wetland (WET).

| **Lake** | **Lat** (d.d.) | **Long** (d.d.) | **Elev** (m) | **Island** | **DFC** (m) | **AT** (°C) | **SfcA** (km$^2$) | **Dep** (m) | **Bedrock** | **Vegetation complex** |
|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 82.13 | -66.98 | 418 | Ellesmere | 47,100 | 3.06 | 0.0493 | 2.0 | MIO | GRA |
| **Long** | 82.11 | -67.50 | 455 | Ellesmere | 49,400 | 2.93 | 2.1830 | 3.5 | NMS | GRA |
| **Kettle** | 81.40 | -76.75 | 218 | Ellesmere | 2,700 | 4.87 | 0.0727 | 6.0 | US | GRA |
| **E509** | 80.83 | -84.45 | 213 | Ellesmere | 15,600 | 5.52 | 0.0225 | 4.0 | NMS | BAR |
| **E507** | 80.58 | -83.97 | 122 | Ellesmere | 4,200 | 6.25 | 0.0001 | 3.3 | US | GRA |
| **E506** | 80.57 | -84.47 | 305 | Ellesmere | 6,500 | 4.84 | 0.1575 | 14.0 | NMS | BAR |
| **HW06** | 80.26 | -87.77 | 137 | Axel Heiberg | 4,250 | 6.68 | 0.3120 | 3.5 | US | PRO |
| **HW05** | 80.18 | -87.69 | 91 | Axel Heiberg | 1,550 | 6.78 | 0.1145 | 3.7 | NMS | GRA |
| **E505** | 79.98 | -82.97 | 305 | Ellesmere | 4,400 | 6.03 | 0.0040 | 2.5 | NMS | GRA |
| **E503** | 79.92 | -82.93 | 381 | Ellesmere | 7,600 | 5.71 | 0.0048 | 3.5 | NMS | GRA |
| **HW03** | 79.73 | -85.81 | 137 | Ellesmere | 3,400 | 3.85 | 0.1500 | 13.0 | US | BAR |
| **HW02** | 79.73 | -83.47 | 396 | Ellesmere | 29,550 | 5.39 | 0.0729 | 4.5 | US | PRO |
| **HW07** | 79.72 | -83.52 | 366 | Ellesmere | 30,500 | 5.75 | 0.0613 | 6.0 | US | PRO |
| **E516** | 79.69 | -87.51 | 122 | Axel Heiberg | 8,000 | 5.76 | 0.6330 | 3.0 | US | GRA |
| **E515** | 79.65 | -87.75 | 213 | Axel Heiberg | 10,300 | 6.17 | 0.2114 | 12.0 | NMS | GRA |
| **E511** | 79.55 | -87.91 | 732 | Axel Heiberg | 8,990 | 4.24 | 0.1948 | 11.0 | US | BAR |
| **CI17** | 76.60 | -98.87 | 46 | Bathurst | 1,100 | 4.86 | 0.1250 | 3.5 | NMS | PRO |
| **CI20** | 76.37 | -98.81 | 146 | Bathurst | 6,000 | 4.65 | 1.6125 | 9.0 | US | GRA |
| **CI22** | 75.90 | -99.21 | 170 | Bathurst | 9,800 | 4.57 | 0.0844 | 8.0 | US | GRA |
| **CI23** | 75.53 | -98.21 | 130 | Bathurst | 5,400 | 4.50 | 0.3125 | 9.5 | US | BAR |
| **CI25** | 75.52 | -99.53 | 30 | Bathurst | 3,000 | 4.78 | 0.2250 | 3.0 | US | BAR |
| **CI27** | 75.46 | -99.91 | 30 | Bathurst | 1,800 | 4.87 | 0.1963 | 4.0 | US | GRA |
| **CI26** | 75.43 | -99.65 | 150 | Bathurst | 7,200 | 4.54 | 0.1104 | 6.0 | US | GRA |
| **CI29** | 75.03 | -100.20 | 76 | Bathurst | 3,000 | 4.78 | 0.1772 | 6.5 | NMS | GRA |
| **DV23** | 76.56 | -92.72 | 91 | Devon | 2,900 | 4.78 | 0.4625 | 11.0 | US | PRO |
| **DV24** | 76.44 | -92.63 | 43 | Devon | 13,600 | 4.84 | 3.5800 | 13.2 | US | BAR |
| **DV10** | 75.53 | -89.75 | 183 | Devon | 2,600 | 4.71 | 0.3125 | 11.0 | US | BAR |
| **DV05** | 75.52 | -92.05 | 30 | Devon | 5,600 | 4.51 | 0.1875 | 11.0 | US | PRO |
| **DV06** | 75.51 | -91.99 | 122 | Devon | 7,400 | 4.44 | 0.1875 | 4.0 | US | PRO |
| **DV07** | 75.53 | -91.97 | 183 | Devon | 5,600 | 4.44 | 0.2188 | 5.0 | US | BAR |
| **DV08** | 75.37 | -89.49 | 152 | Devon | 17,500 | 4.73 | 0.1375 | 3.0 | US | BAR |
| **DV01** | 74.98 | -90.36 | 396 | Devon | 15,100 | 4.30 | 0.0438 | 4.5 | US | BAR |
| **DV02** | 74.93 | -88.68 | 152 | Devon | 4,300 | 4.84 | 0.0375 | 7.5 | US | BAR |
| **CI34** | 75.40 | -94.67 | 70 | Cornwallis | 20,000 | 4.48 | 0.1963 | 4.5 | US | GRA |
| **CI33** | 75.22 | -93.65 | 120 | Cornwallis | 2,400 | 3.87 | 0.0491 | 6.0 | US | BAR |
| **CI32** | 74.91 | -93.52 | 200 | Cornwallis | 3,300 | 4.25 | 0.1650 | 8.0 | US | BAR |
| **CI31** | 74.68 | -94.27 | 15 | Cornwallis | 1,800 | 4.33 | 0.9063 | 17.0 | US | BAR |
| **Allen** | 73.62 | -98.47 | 49 | Prince of Wales | 15,500 | 4.83 | 8.1600 | 4.0 | US | WET |
| **Wolf** | 73.58 | -98.48 | 110 | Prince of Wales | 19,400 | 4.86 | 0.4069 | 6.0 | US | BAR |
| **CI01** | 73.88 | -94.87 | 130 | Somerset | 4,000 | 4.55 | 0.1375 | 2.1 | US | BAR |
| **CI14** | 72.70 | -93.87 | 190 | Somerset | 10,000 | 4.00 | 0.2131 | 5.0 | US | GRA |
| **CI07** | 72.59 | -95.06 | 170 | Somerset | 6,800 | 5.37 | 0.3188 | 5.5 | US | BAR |
| **CI08** | 72.49 | -95.09 | 240 | Somerset | 3,800 | 5.23 | 0.1250 | 4.0 | US | GRA |
| **CI09** | 72.27 | -95.09 | 190 | Somerset | 3,300 | 5.37 | 0.2131 | 4.0 | USV | GRA |
| **CI12** | 72.03 | -94.62 | 120 | Somerset | 1,700 | 5.73 | 0.0950 | 9.5 | USV | BAR |
| **CI11** | 72.02 | -94.75 | 130 | Somerset | 1,300 | 5.81 | 0.0491 | 6.5 | USV | BAR |
| **CI10** | 72.01 | -94.87 | 90 | Somerset | 2,600 | 5.63 | 0.0491 | 19.0 | UG | BAR |
| **WB07** | 72.29 | -109.87 | 295 | Victoria | 17,000 | 5.72 | 0.0245 | 11.5 | US | PRO |
| **WB01** | 72.29 | -109.99 | 140 | Victoria | 17,700 | 6.28 | 1.8725 | 20.0 | MI | PRO |
| **WB05** | 72.29 | -109.83 | 185 | Victoria | 17,300 | 6.08 | 1.5350 | 14.3 | US | PRO |
| **WB02** | 72.29 | -109.97 | 140 | Victoria | 17,900 | 6.28 | 0.0231 | 7.5 | MI | PRO |
| **WB04** | 72.28 | -109.94 | 140 | Victoria | 18,500 | 6.29 | 0.0874 | 4.0 | US | PRO |
| **WB03** | 72.26 | -109.97 | 315 | Victoria | 21,200 | 5.96 | 0.2150 | 4.0 | US | PRO |
| **KR07** | 71.36 | -113.81 | 196 | Victoria | 55,100 | 6.28 | 0.3600 | 5.6 | E | GRA |
| **KR02** | 71.34 | -113.78 | 229 | Victoria | 58,100 | 6.18 | 0.0079 | 6.1 | E | PRO |
| **KR01** | 71.34 | -113.82 | 171 | Victoria | 54,400 | 6.37 | 4.3425 | 5.0 | E | PRO |
| **KR04** | 71.31 | -113.94 | 175 | Victoria | 52,500 | 6.79 | 1.0375 | 7.1 | E | GRA |
| **KR08** | 71.31 | -113.67 | 190 | Victoria | 62,000 | 6.39 | 0.1250 | 3.3 | E | PRO |
| **JR02** | 69.92 | -94.97 | 170 | Boothia | 29,400 | 6.97 | 2.1000 | 3.0 | US | PRO |
| **JR01** | 69.90 | -95.07 | 150 | Boothia | 27,500 | 7.07 | 0.2100 | 5.4 | US | PRO |
| **JR05** | 69.87 | -95.00 | 140 | Boothia | 25,400 | 7.11 | 0.0900 | 4.5 | US | PRO |
| **JR06** | 69.87 | -94.92 | 140 | Boothia | 25,800 | 7.06 | 0.1350 | 4.0 | US | PRO |
| **Mean** | 75.32 | -94.76 | 183 | | 15,188 | 5.29 | 0.5727 | 6.8 | | |
| **Median** | 75.29 | -94.71 | 151 | | 7,800 | 5.05 | 0.1711 | 5.5 | | |
| **Minimum** | 69.87 | -113.94 | 15 | | 1,100 | 2.93 | 0.0001 | 2.0 | | |
| **Maximum** | 82.13 | -66.98 | 732 | | 62,000 | 7.11 | 8.1600 | 20.0 | | |
| **s.d.** | 3.51 | 10.37 | 123 | | 16,241 | 0.99 | 1.2776 | 4.2 | | |

# 2. Methodology

## *2.1. Field methods*

Samples used in this thesis include several collected specifically for this study and others previously collected and archived. Sediment and water samples were collected between 1989 and 2002 from eight islands and the Boothia Peninsula in the Canadian Arctic Archipelago. Sampling was done in mid-June to early August from a boat when lakes were ice-free or the ice surface otherwise. Ice breakup from year to year was notably variable.

Lakes with the prefix KR, located in the Kuujjua River area of Victoria Island, were sampled in 2001 from the ice surface. A transect of sites in the central Arctic across Somerset, Bathurst, and Cornwallis Islands was collected in 2002 from a helicopter and given the prefix CI. Sampling methods for all sites have remained comparable over the 13-year time-span.

Samples were taken from the central part of the lake that is estimated to be the deepest. Two 1-L bottles were rinsed in the lake and filled with water collected 0.5 – 0.6 m below the surface or 0.6 – 0.8 m below the ice surface if an ice cover was present. Lake depth (Dep) was measured using a Hydrolab datasonde attached to a calibrated rope. Water temperature, conductivity (Cond), and pH values were measured using handheld metres (calibrated daily) on site or at the base camp within 10 hours of collection. Two hundred and fifty ml aliquots of water from each site were pumped through 0.22 $\mu$m membrane filters and poured into a separate bottle for the analysis of dissolved nutrients and elements. Samples prepared for the analysis of phosphorous were preserved with sulphuric acid. The remaining water was divided into two other bottles. One litre of water was filtered through a 0.45 μm glass membrane filter, wrapped in foil and kept frozen for determination of Chlorophyll-*a* (uncorrected for phaeopigments; CHLa). At the base camp, samples were kept in a cooler placed atop the permafrost table or in a pile of ice on the river shore. When working out of the Resolute Bay base camp, samples were prepared at the Polar Continental Shelf Project (PCSP) and kept in cold storage until hours before departure to Ottawa.

Surface sediment samples were collected using a Glew (1991) mini-corer and/or an Ekman dredge. The topmost 1 cm of sediment contains a composite sample of diatom assemblages from all lake habitats (i.e. littoral, benthic, pelagic). With the dredge, subsamples of the uppermost cm were taken immediately upon collection, while cores were extruded in 1 or 0.5 cm increments using an extruder at the camp.

### *2.2. Laboratory methods*

#### *Limnology*

Samples collected before 1997 were analysed at the National Water Research Institute (Burlington, Ontario). Starting in 1997, water samples were analyzed at the Surface Water Quality Laboratory for the region of Ottawa-Carleton in Ottawa. Methods for analysis follow Environment Canada (1994) protocols. The lake water was analysed for nutrients (total unfiltered phosphorous (TPuf), total dissolved phosphorous (TPf), nitrate-nitrite (NN), soluble reactive phosphorous (SRP), total Kjeldahl nitrogen (TKN), ammonia ($NH_3$), silica ($SiO_2$)), carbon (dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), particulate organic carbon (POC)), major ions ($Ca^{2+}$, $Na^+$, $Mg^{2+}$, $K^+$, $SO_4^{2-}$, $Cl^-$), and trace metals ($Al^{3+}$, $Cd^{2+}$, $Co^{2+}$, Cr, $Cu^{2+}$, $Fe^{3+}$, $Mn^{2+}$, Mo, Ni, $Pb^{2+}$, $Sr^{2+}$, V, $Zn^{2+}$, Sb, Bi). Filtered water was used for the measurement of dissolved elements (i.e. SRP, TPf, NN, DOC, DIC, and $NH_3$). Calculations to compute parameters such as DIC and particulate phosphorous (PP) are discussed in Appendix A. Chlorophyll-*a* extraction was completed at the Canadian Museum of Nature or the University of Ottawa following the methods of Jeffrey & Humphrey (1975).

Values of mean July air temperatures (AT) obtained from the climate model of Atkinson & Gajewski (2002) were attributed to each site based on spatial location using a Geographic Information System (GIS). The semi-emperical model computed temperature values resolved at the mesoscale and averaged over a 40-year period. Data of the surrounding vegetation (CAVM team, 2003; www.geobotany.uaf.edu/cavm/) and underlying bedrock (Wheeler et al., 1997) was imported into the GIS (ESRI ArcMap 8.2) and extracted for each site using a spatial join. Information on the distance from coast (DFC), elevation (Elev), and the presence of a stream inflow was obtained from topographic maps (1:50 000 where available and 1:250 000 otherwise).

#### *Diatoms*

Lake sediments were processed for the quantitative analysis of diatom assemblages. Sub-samples of 0.5 cc or 1 cc from the topmost 0-1cm sediment layer of each lake were measured using a volumetric sampler, weighed, and placed in labelled 20 ml glass vials with leakproof lids. A drop of 10% Hydrochloric acid (HCl) was added to the vial in order to determine the presence of $CaCO_3$ in the sediment that might obscure diatom valves on the slide (Battarbee et al., 2001). Where samples reacted, a total of 15 ml of HCl was subsequently added. Fifteen ml of deionized water (DI) was added to the samples that did not exhibit the presence of carbonates.

After 24 hours, the water/acid waste was aspirated leaving the bottom 5 ml of sample intact. Samples were then washed four times to remove remaining acid. Washing involves adding DI water to the sample, stirring the slurry with a glass rod (one rod per sample) and allowing sufficient time (approximately 24 hours) for the diatoms to settle to the bottom of the vial before aspirating out the water/acid mixture. Care was taken not to remove any portion of the diatom slurry.

The remaining steps follow standard procedures for the removal of organic material from sediments by strong acid digestion (Battarbee et al., 2001). Fifteen ml of a 50:50 sulphuric/nitric acid mixture was added to each sample vial, which was then left covered with a glass plate for 24 – 48 hours. Samples were then placed in an 85 - 92 °C water bath for approximately 4 hours. After sitting for 24 hours at room temperature, the samples were washed seven to nine times as described above, leaving a final slurry of 5 ml upon completion.

Serial dilutions were made by pipetting 1 ml of the original slurry and adding it to a known volume of deionized water (e.g. 20 ml). One ml of this slurry was taken and placed into a second centrifuge tube of known volume and this was repeated until four or five dilutions were made for each sample. Selection of which plated dilution was most suitable for diatom counting was done based on the cloudiness of the slurry and the density of valves on the slide. In some samples, the presence of clastic material made stronger dilutions necessary.

In preparation for making slides, vials were shaken by hand and placed in a vortex mixer for five seconds just prior to pipetting 1 ml of the diatom slurry onto an 18x18 mm cover slip that was subsequently air dried in a fumehood. Cover slips were plated onto labelled glass microscope slide using Naphrax®, a permanent mounting medium with the high refractive index of 1.74. Using a glass rod, one drop of Naphrax® was applied to the slide while being heated on a hot plate. The cover slip was placed over the Naphrax® and pressure applied to remove all air bubbles until the medium no longer boiled (approximately 15 seconds). Excess mountant around the cover slip was scraped off to prevent scratching of the microscope objectives.

### *2.3. Diatom enumeration & calculation*

A minimum of 600 diatom valves were counted from randomly selected transects (including material at the cover slip edges) using 1000x phase contrast optics under oil immersion on a Leica DML Light Microscope (LM). Depending on the density of valves, between 1 and 13 transects were scanned. Transect boundaries were delineated using the eyepiece micrometer. For better consistency among samples, counting rules were as follows. Whole valves, valves that included a central area and an apex, and in rare cases fragments of larger diatoms (>70 μm) that did not comprise half a valve were counted as one valve. All valves within or half-way within the micrometer limits were included in the count. If a chain of diatom valves was 50% within the micrometer frame all valves in that chain were counted whereas only valves within the frame were counted when chains were less than 50% within the frame.

For a more accurate census of the richness (total number of species) in each lake, the following procedures were used.

1) In lakes dominated (approximately 90%) by the small *Staurosira, Staurosirella, Fragilaria,* and *Pseudostaurosira* taxa (here termed fragilaroid taxa since they all once belonged to the genus *Fragilaria*) or a combination of two dominant taxa, an additional transect was included where all species except these dominant forms were counted. Valves of species not previously encountered on the slide were added to the final count for that lake without including the additional area of that transect in the calculation of diatom concentrations ($\text{valves} \cdot \text{cc}^{-1}$). Fragilaroid taxa are known to dominate cold, oligotrophic lakes and ponds (Douglas & Smol, 1999). Due to their small size (approximately 2-20 $\mu$m) and ability to form chains, a count sum normally suitable for assessing taxa diversity in a lake is quickly reached due to the high numbers of these particular taxa. This problem has been recognized in the literature where it is suggested that techniques could be used to correct for this (Battarbee et al., 2001).

2) All other slides were scanned for fifteen minutes and additional species not yet encountered in that lake were noted as present. These valves were not included in the count sum of the lake. These additional species were included in the count as 'present' and represented in the data table by a value of 0.01 (as opposed to 1 valve) resulting in a negligible effect on the total concentration and percentages of any species in a lake.

The density of valves belonging to fragilaroid taxa in one lake (CI11) was very high, making the count difficult. In this case, valves of this taxa were counted for half of the transect, calculated for the remaining transect area, and then added to the total count.

Diatom nomenclature has advanced significantly in recent years resulting in considerable changes at both the generic and species levels. Specific examples of taxonomic identifications in this work are provided in Chapter 3. Literature used for the taxonomic identification of diatoms in this study include Foged (1953, 1958, 1964, 1972, 1974, 1981), Lange-Bertalot & Moser (1994), Lange-Bertalot & Metzeltin (1996), Metzeltin & Witkowski (1996), Round & Bukhtiyarova (1996), Bukhiyaroa & Round (1996), Krammer (1997a, b, 2000, 2002), Lange-Bertalot (1996, 2001), and Lange-Bertalot & Genkal (1999). Other important work included Patrick & Reimer (1966), Simonsen (1987), Krammer & Lange-Bertalot (1986-1991), Round et al. (1990), Douglas & Smol (1993), Hamilton et al. (1994b), Fallu et al. (2000), and Cumming et al. (1995). Comparisons of SEM photographs were made with those available in the literature (Henderson & Reimer, 2003). Slides of the 62 lakes in this study are catalogued in the Canadian Museum of Nature herbarium (CANA 76142 – 76204) to allow for specimen comparisons and verification of taxa distributions. All taxa were documented using a Wild MPS 46/52 photoautomat attached to the light microscope. The photograph collection is held at the Laboratory for Paleoclimatology and Climatology, Department of Geography, University of Ottawa, Ottawa, Ontario.

Sediments from over half of the study lakes were examined and diatom valves photographed using a XL30 ESEM Scanning Electron Microscope (SEM) at the Canadian Museum of Nature. Approximately 1 ml of the first dilution of each lake was filtered through a 0.8 $\mu$m membrane filter, which was then adhered onto an SEM stub. Stubs were plated in gold using a Denton Vacuum Desk II gold plater and scanned in the SEM at approximately 2,000 times magnification. Pictures of specimens were taken at magnification between 4,000 to 40,000 times. This work focussed on resolving problematic taxa and differentiating similar looking species otherwise difficult to identify with the LM. For example, one of the characteristics used to differentiate small *Staurosira* spp. from *Staurosirella* spp. is the presence of slits or pores. This can be nearly impossible to distinguish in LM but when viewed in SEM these traits can be seen clearly. Material from lakes dominated by these small forms was scanned in the SEM to see which species was more abundant.

When creating the diatom data tables, species noted as present in each lake but not included in the count were represented as a value of 0.01. In this way, the presence of these species was accounted for yet not given the same weight as those within the transects. Count data were converted to abundance (Appendix E) and total concentration by weight (diatom valves·g$^{-1}$ sediment) or volume (diatom valves·cc$^{-1}$ sediment). Concentration values were calculated according to the following:

$$X = \frac{A \times \left( \frac{B}{E(C \times D)} \right) \times \left( \frac{(F \times G)}{H} \times \frac{Ia - h}{J} \right)}{L}$$

$X$ = diatom concentration (valves·cc$^{-1}$) or (valves·g$^{-1}$)

$A$ = number of diatom valves

$B$ = area of cover slip = 324 mm$^2$

$C$ = transect width = 0.1 mm

$D$ = length of transect = 18 mm

$E$ = number of transects

$F$ = final slurry; volume = 5 ml

$G$ = multiplication factor to account for amount removed from final slurry prior to final plating (i.e. is 1 where none removed or 0.2 where 1 ml was removed)

$H$ = subsample from final slury = 1 ml

$Ia\text{-}h$ = total dilution (amount of DI plus added subsample) (ml)

$J$ = subsample amount between dilutions or deposited on slide = 1 ml

$L$ = subsample of sediment for processing (cc or g)

### *2.4. Numerical Analyses*

#### *Limnology*

The limnological data of 33 sites were included in an exploratory data analysis of 204 lakes and ponds by Hamilton et al. (2001). For this research, these 33 sites have been combined with 29 new sites (labelled JR, KR, and CI) for the analysis of physical and chemical lake characteristics across a north-south transect. Several years of field work were required to obtain samples from a large geographic area. Some problems, such as missing data values due to incomplete analysis and lost samples due to breakage in transport have occurred. In cases where data was missing from a maximum of six lakes the mean value of that parameter was substituted. Measures of soluble reactive phosphorous (SRP) and total filtered phosphorous (TPf) were less than or equal to their respective detection limits in more than 50% of the lakes and therefore were eliminated from the data set prior to analysis. Particulate nitrogen (PN), particulate organic carbon (POC), and all metals were removed due to the large number of missing data values.

The lake water characteristics represent the conditions experienced by the recently fossilized diatoms. I acknowledge that a single point measurement should be used with caution as conditions may vary over the course of the ice-free season. Schindler et al. (1974) and Michelutti et al. (2003b) have shown that the chemical components of arctic lakes exhibit little variation over the summer season maintaining low nutrient levels throughout the year with negligible sediment-water exchange of ions during the winter (Schindler et al., 1974).

Air temperature and water temperature were poorly correlated ($r = -0.12$) and therefore the mean July air temperature data is believed to be the most accurate measure of climate at each site. Single point measurements of water temperature for each site were considered less reliable due to the variation in sampling date from year to year. A low correlation between air and water temperature was also observed by Hamilton et al. (2001). For this reason, water temperature data were not used in analyses.

Limnological variables were first examined using quantile-quantile plots and histograms to check for normal distributions. Variables with skewed distributions, such as mean July air temperature (AT), distance from coast (DFC), and depth (Dep) were square-root transformed. All other variables, except for pH, were log transformed. Correlations among variables were explored using scatterplot and correlation matrices. Several Principal Components Analyses (PCA), based on a correlation matrix, were performed to examine potential relationships among the environmental variables and to summarize major patterns in the data. PCA is a multivariate ordination technique suitable for data with different units of measurement and short ranges. In the PCA biplots, sites were symbolized by their respective subrocktype or geographic region to illustrate potential relationships between these qualitative or geographic characteristics and the limnological characteristics. All analyses were performed using Insightful S-plus v.6 statistical software. Programming commands are given in Appendix D.

### *Diatoms*

Total diatom concentrations (valves$\cdot$cc$^{-1}$), estimated richness, and taxa relative abundances in the 62 lakes were mapped using ArcGIS 8.2. Class limits for the concentration categories were defined by searching for natural breaks in the data and setting the upper limits of each class in a best-fit manner based on the distribution of the data. This was done since the automatic natural breaks computed did not provide a useful classification due to the nature of the data (i.e. many species with single point values). Diagrams depicting the relative abundance of the thirty most dominant taxa and selected genera were created using the program C2 v.1.3 (Juggins, 2003) to show variations in community composition among the lakes.

Taxonomic richness is the number of taxa found in each lake. However, these values are partly dependant on the number of diatoms counted in each lake. In this study, count sums ranged from 610 to 2,814. To better compare diatom richness between lakes, rarefaction richness estimates (Erich; Birks & Line, 1992) were calculated where diatom counts are standardized to a common sum (here the minimum count of 610). Rarefaction estimates were calculated using the program Analytic Rarefaction 1.3 (Steven M. Holland; www.uga.edu/~strata/software/). Calculations are based on the formulation of Raup (1975) and Tipper (1979) based on the estimation equations of Hurlbert (1971).

### *Diatoms and Environment*

Statistical analysis of the diatom data was performed on taxa that were present in at least three lakes with an abundance ≥1% in at least one lake. Of the 326 taxa identified, 145 met these criteria. Detrended Correspondence Analysis (DCA; Hill & Gauch, 1980) was used to see if the diatom distributions follow linear or unimodal patterns. DCA was implemented with detrending by segments on log(x+1) transformed taxa and rare species downweighted. In DCA, gradient lengths measuring the variation in species assemblages are given in standard deviation units. First and second axis gradient lengths were long (4.01 and 2.92 respectively) indicating that beta diversity (species turnover in the samples) in the data set was high and that the unimodal technique, Canonical Correspondence Analysis (CCA), is appropriate to interpret diatom-environment relationships (ter Braak & Šmilauer, 2002). A DCA biplot was created to illustrate the main patterns of floristic variation in the assemblages of the study lakes.

Canonical Correspondence Analysis (CCA) is a constrained ordination technique used to directly relate community compositions to their surrounding environmental characteristics (ter Braak, 1986). Axes are extracted based on linear combinations of the environmental variables, which are represented by arrows in the bipot. Eigenvalues give a measure of the importance of each axis. Species are positioned based on how well the variable explains its distribution. A forward selection process with Monte Carlo permutation tests (199 permutations) was used to determine which variables in the environmental data set were most important in significantly ($p < 0.05$) explaining diatom assemblage variation. Supplementary variables (variables not included in the final analysis but considered potentially important in influencing diatom distributions) maintained in the ordination were selected based on their approximate *t*-scores of the canonical regression coefficients obtained from the initial analysis. A *t*-value above 2.1 indicates that the variable contributes to the fit of the species data (ter Braak & Šmilauer, 2002). Intra-set correlations were also used to see if these variables were significantly correlated with axis 1 or 2. The DCA and CCA analyses were performed using CANOCO version 4.5 (ter Braak & Šmilauer, 2002).

To further examine the influence of environmental variables on diatom abundance and distribution, a series of response surfaces were created using an S-plus program written by Prof. M. Sawada and modified for this study (Appendix D). Response surfaces illustrate the range in diatom abundance as a function of two environmental variables that strongly characterise the lake environment. This technique has been effectively used to show the climate range controlling pollen distributions (Bartlein et al., 1986; Anderson et al., 1991; Gajewski et al., 2002).

# 3. Taxonomy of arctic diatoms

The small size and intricately detailed nature of the diatom frustule makes accurate identification a difficult task. Diatom taxonomy has evolved rapidly since the 1950's with the application of technology, such as Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM), and more recently used techniques of DNA/RNA analysis (Round, 1996). The increasing importance and use of cytoplasmic details (i.e. plastid structure) and methods of sexual reproduction (Mann, 1989) in diatom taxonomy has also refined generic groupings (Round, 1996). These advances have led to detailed descriptions of the structures used to define individual taxa and commonalities shared between taxa of one genus. Genera once encompassing a wide range of taxa, such as *Achnanthes*, have been divided into more natural groupings based on differences in frustule structure/symmetry, shape, and even habitat preference (e.g. Round et al., 1990; Round & Bukhtiyarova, 1996; Bukhtiyarova & Round, 1996).

The current 'state of flux' (Kociolek, 1997) of diatom taxonomy has been an issue often revisited (see Round, 1996; Stoermer, 2001). Part of this debate includes how narrow a species concept should be when considering diatoms. Defining diatom species is complex since reproduction is mostly vegetative (i.e. cell division) and only commences into sexual reproduction when cell size reaches a minimum. Therefore, assessing gene exchange and species compatibility is difficult and the focus of few studies (Mann, 1989).

Most paleoecological work follows the taxonomic scheme of Krammer & Lange-Bertalot (1986-1991) for the purpose of maintaining taxonomic consistency with past studies and other workers. Since acknowledging advances in taxonomy may allow for more accurate definitions of taxa ecological preferences, new generic and species delineations were used, where possible, in the nomenclature of the diatoms encountered in this study. References of the taxonomic literature used in this study are given in Chapter 2.

Among 326 taxa identified from the 62 lakes of this study are numerous complexes, variants, forms, and unknown types denoted 'sp' (Table 3.1). The species "complex" was used to group similar looking taxa difficult to consistently separate using a Light Microscope (LM). Taxa difficult to identify using the light microscope were subsequently examined under the Scanning Electron Microscope (SEM).

Taxa of the genera *Staurosira, Staurosirella*, *Pseudostaurosira*, and *Fragilaria* are good examples of this problem due to their small size and similar characteristics (Figure 3.1, pictures 115-144). Some characteristic features used to separate these taxa are the nature of the pores and properties of the valve margin. Even with a SEM, it is difficult to determine when a pore becomes a slit and whether or not the valve margin is flat or slightly undulate. As another example, *Pseudostaurosira brevistriata* and *Fragilaria oldenburgioides* can be easily confused under the LM. However, the identification is more confident after examining the specimens under SEM. The uniseriate striations with few areolae across the valves of *Pseudostaurosira brevistriata* compared to the smaller, multiple areolated striae of *Fragilaria oldenburgioides* are clearly visible in SEM (Figure 3.1; pictures 129-135). Other studies have focussed on the identification of these forms to determine which traits best differentiate these taxa and to illustrate the importance of using SEM in their identification (Round et al., 1990; Morales et al., 2001; Morales, 2001).

Uncertainties in the identification of other taxa were clarified using SEM micrographs. For example, *Cymbella* sp. aff. *designata* appears to resemble *Cymbella affinis* Kützing often reported from northern regions. SEM micrographs revealed that the specimens in the study lakes lacked the stigmata clearly seen in *C. affinis* micrographs in the literature. Therefore, this specimen was named for its closest resemblance to *C. designata* Krammer. Another example is *Navicula* cf. *trophicatrix* Lange-Bertalot, which showed differences with SEM micrographs of *N. trophicatrix* Lange-Bertalot (Lange-Bertalot, 2001) and similarities with *N.* cf. *cryptotenella* Lange-Bertalot (Cox, 1999). Striae of the specimens in this study are much less radiate than those of *N. densilineolata* Hustedt (Krammer & Lange-Bertalot, 1991). Further investigation is required to confirm its identification. The small *Navicula seminulum* Grunow may be confused with the raphid valve of *Achnanthes* spp. although comparison with SEM micrographs in the literature confirmed its identity (Figure 3.1, pictures 65-68). Also, the small, nondescript valves of *Navicula* cf. *fluens* resembled *N. subminuscula* Manguin in LM although SEM micrographs revealed that the specimens lacked a raised sternum alongside the raphe that is characteristic of *N. subminuscula* (Figure 3.1; pictures 89-92).

The diatom 'raphe' is a slit along the apical axis of a valve. This is found only in pennate diatoms and is used to secrete mucilage for motility over substrates (Round et al., 1990).

Some pennate forms (e.g. *Achnanthes*) lack a raphe on one valve but do have a clear area in the centre of this valve termed a 'pseudoraphe'. Specimens resembling *Achnanthes carissima* Lange-Bertalot were difficult to see in LM due to their small size and structureless appearance. When examined in SEM, only raphid valves of this taxon were found (Figure 3.1; pictures 74-80). Despite this, the taxon was identified as *Achnanthes carissima* until more material is examined. Based on the similarities in valve structure examined using SEM (i.e. parallel striae, far apart central raphe fissures), it is suggested that this taxon may be better fitted into the genus *Diadesmis* (Figure 3.1; pictures 81-86).

The taxa currently called *Navicula(dicta) raederidae* Lange-Bertalot (*Navicula utermoehlii* (syn. *N. subrotundata*)) was dominant in two study lakes (reaching 17.86% in CI12) and found in only five lakes. This taxon is very small and thus difficult to distinguish from other small naviculoids including small forms of *Achanthes* (Figure 3.1; pictures 69-72). Lange-Bertalot & Metzeltin (1994) placed this species in the genus *Naviculadicta* (so-called "Navicula") as it is Navicula-like but distinguishably different. Although this classification has been criticized (see Kociolek, 1996) it was used in this study as SEM photographs matched those available for this taxon in Lange-Bertalot & Moser (1994).

*Stauroneis koeltzii* Metzeltin, Witkowski & Lange-Bertalot occurred in seven lakes of this study (Figure 3.1; picture 205) and is not commonly reported from the Canadian Arctic. Also, it has not been largely documented in the literature. Due to it's wide distribution across the sites in this study it is suspected that this taxa is present elsewhere in the Arctic but may have been called *Achnanthes exigua* Grunow as they appear to have similar raphid valves.

Slides of the 62 lakes in this study are catalogued in the Canadian Museum of Nature herbarium (CANA 76142 – 76204). The available material allows for future specimen comparisons with those from different regions, which is important in the study of diatom biogeography and evolution (Kociolek & Spaulding, 2000; Stoermer, 2001). Light micrographs and scanning electron micrographs of selected taxa identified in this study are provided in Figures 3.1 and 3.2. Originals are kept on file at the Laboratory for Paleolimnology and Climatology, Department of Geography, University of Ottawa, Ottawa, Ontario.

Table 3.1. Diatoms identified in modern sediments of 62 Canadian Arctic lakes. Three hundred and twenty-six taxa were found.

| **Taxon name** | **Taxonomic authority** | **Maximum % abundance** | **# lakes found** |
|---|---|---|---|
| *Achnanthes acares* | Hohn & Hellermann | 0.25 | 2 |
| *Achnanthes broenlundensis* | Foged | 0.64 | 5 |
| *Achnanthes carissima* | Lange-Bertalot | 2.11 | 15 |
| *Achnanthes conspicua* | Mayer | 1.67 | 11 |
| *Achnanthes daui* | Foged | 1.82 | 5 |
| *Achnanthes exigua* | Grunow | 0.13 | 2 |
| *Achnanthes gracillima* | Hustedt | 0.98 | 8 |
| *Achnanthes grana* | Hohn & Hellermann | 3.68 | 7 |
| *Achnanthes impexiformis* | Lange-Bertalot | 1.52 | 10 |
| *Achnanthes ingratiformis* | Lange-Bertalot | 1.99 | 4 |
| *Achnanthes kriegeri* | Krasske | 1.14 | 1 |
| *Achnanthes nitidiformis* | Lange-Bertalot | 1.43 | 2 |
| *Achnanthes nodosa* | Cleve | 0.76 | 1 |
| *Achnanthes rupestris* | Krasske | 3.10 | 4 |
| *Achnanthes* sp. aff. *conspicua* | Mayer | 0.61 | 1 |
| *Achnanthes ziegleri* | Lange-Bertalot | 0.14 | 1 |
| *Achnanthidium exilis* | (Kützing) Round & Bukhtiyarova | 0.79 | 4 |
| *Achnanthidium minutissimum* | (Kützing) Czarnecki | 20.16 | 55 |
| *Adalfia bryophila* | (Petersen) Lange-Bertalot | 6.85 | 18 |
| *Adalfia minuscula* | (Grunow) Lange-Bertalot | 3.35 | 19 |
| *Amphipleura* cf. *kriegeriana* | (Krasske) Hustedt | 0.46 | 1 |
| *Amphipleura pellucida* | (Kützing) Kützing | 0.83 | 5 |
| *Amphora aequalis* | Krammer | 1.90 | 5 |
| *Amphora copulata* | (Kützing) Schoeman & Archibald | 55.11 | 45 |
| *Amphora copulata* morph B | (Kützing) Schoeman & Archibald | 3.17 | 11 |
| *Amphora dusenii* | Brun | 0.38 | 2 |
| *Amphora holsatica* | Kützing | 0.95 | 4 |
| *Amphora inariensis* | Krammer | 47.86 | 41 |
| *Amphora neglecta* | Stoermer & Yang | 8.23 | 6 |
| *Amphora ovalis* | (Kützing) Kützing | 0.31 | 5 |
| *Amphora pediculus* | (Kützing) Grunow | 23.69 | 29 |
| *Amphora thumensis* | (Mayer) Cleve-Euler | 2.94 | 15 |
| *Amphora veneta* | Kützing | 0.54 | 3 |
| *Aneumastus tusculus* | (Ehrenberg) D.G. Mann | 1.86 | 15 |
| *Aulacoseira distans* | (Ehrenberg) Simonsen | 0.16 | 8 |
| *Bacillaria paradoxa* | Gmelin | 0.13 | 1 |
| *Brachysira brebissonii* morph 1 | Ross | 0.12 | 1 |
| *Brachysira neoexilis* | Lange-Bertalot | 2.57 | 11 |
| *Brachysira styriaca* | (Grunow) Ross | 0.13 | 1 |
| *Brachysira zellensis* | (Grunow) Round & Mann | 0.48 | 1 |
| *Caloneis* (?nov) spec. cf. *aemula* var. *ventricosa* | Schulz | 0.31 | 1 |
| *Caloneis bacillum* | (Grunow) Cleve | 2.76 | 12 |
| *Caloneis hendyii* complex | Lange-Bertalot | 7.61 | 32 |
| *Caloneis schumanniana* | (Grunow) Cleve | 0.31 | 2 |
| *Caloneis silicula* | (Ehrenberg) Cleve | 0.30 | 4 |
| *Caloneis silicula* var. *alpina* | Cleve | 2.91 | 6 |
| *Caloneis tenuis* | (Gregory) Krammer | 5.21 | 18 |
| *Caloneis thermalis* | (Grunow) Krammer | 0.11 | 1 |
| *Campylodiscus hibernicus* | Ehrenberg | 0.65 | 14 |
| *Cavinula cocconeiformis* | (Gregory) D.G. Mann & Stickle | 3.02 | 3 |
| *Cavinula jaernefeltii* | (Hustedt) D.G Mann & Stickle | 0.54 | 5 |
| *Cavinula pseudoscutiformis* | (Hustedt) D.G. Mann & Stickle | 0.68 | 12 |
| *Cavinula scutiformis* | (Grunow) D.G. Mann & Stickle | 0.25 | 2 |
| *Chamaepinnularia gandrupii* (? var.) | (Petersen) Lange-Bertalot & Krammer | 0.10 | 1 |
| *Chamaepinnularia krookii* | (Grunow) Lange-Bertalot & Krammer | 19.25 | 1 |
| *Chamaepinnularia soehrensis* | (Krasske) Lange-Bertalot & Krammer | 5.58 | 8 |
| *Chamaepinnularia* sp. 1 |  | 2.82 | 3 |
| *Cocconeis neothumensis* | Krammer | 0.59 | 11 |
| *Cocconeis pediculus* | Ehrenberg | 5.65 | 10 |
| *Cocconeis placentula* var. *euglypta* | Ehrenberg | 6.74 | 22 |
| *Coscinodiscus* sp. |  | 0.32 | 3 |
| *Craticula cuspidata* | (Kützing) D.G. Mann | 0.07 | 2 |
| *Craticula halophilioides* | (Hustedt) Lange-Bertalot | 0.05 | 1 |
| *Cyclotella antiqua* | W.Smith | 0.64 | 11 |
| *Cyclotella bodanica* var. *lemanica/schumannii* complex | (O.Müller ex Schröter) Bachmann | 0.96 | 14 |
| *Cyclotella* cf. *atomus* | Hustedt | 0.93 | 3 |
| *Cyclotella michiganina* | Skvortzow | 1.79 | 1 |
| *Cyclotella ocellata* | Pantocsek | 5.22 | 11 |
| *Cyclotella rossii* | Håkansson | 1.19 | 14 |
| *Cyclotella stelligera* (form 1) | Cleve & Grunow | 0.68 | 9 |
| *Cyclotella stelligera* (form 2) | Cleve & Grunow | 32.10 | 19 |
| *Cymatopleura solea* | (Brébisson) W.Smith | 0.00 | 1 |
| *Cymbella amphicephala* | Näegeli | 1.12 | 16 |
| *Cymbella amphicephala* var. *hercynica* | (A. Schmidt) Cleve | 0.72 | 12 |
| *Cymbella angustata* | (W. Smith) Cleve | 8.29 | 20 |
| *Cymbella arctica* | (Lagerstedt) Schmidt | 0.27 | 1 |
| *Cymbella botellus* | (Lagerstedt) Schmidt | 3.19 | 8 |
| *Cymbella* cf. *ehrenbergii* | Kützing | 0.13 | 1 |
| *Cymbella cleve-eulerae* | Krammer | 0.93 | 12 |
| *Cymbella delicatula* | Kützing | 4.40 | 6 |
| *Cymbella incerta* | (Grunow) Cleve | 1.08 | 3 |
| *Cymbella incerta* var. *crassipunctata* | Krammer | 7.66 | 12 |

| **Taxon name** | **Taxonomic authority** | **Maximum % abundance** | **# lakes found** |
|---|---|---|---|
| *Cymbella incerta* var. *linearis* | Grunow | 0.24 | 1 |
| *Cymbella lanceolata* | (Ehrenberg) Kirchner | 0.00 | 1 |
| *Cymbella neocistula* | Krammer | 0.43 | 3 |
| *Cymbella* sp. aff. *designata* | Krammer | 1.71 | 13 |
| *Cymbella subaequalis* morph B | Grunow | 2.80 | 5 |
| *Cymbella subarctica* | Krammer | 0.31 | 4 |
| *Cymbella subleptoceros* | Krammer | 0.16 | 1 |
| *Cymbopleura cuspidata* | (Kützing) Lange-Bertalot & Genkal? | 0.33 | 5 |
| *Cymbopleura designata* | (Krammer) Lange-Bertalot & Genkal? | 0.48 | 8 |
| *Cymbopleura stauroneiformis* | (Lagerstedt) Lange-Bertalot & Genkal? | 0.96 | 4 |
| *Denticula* (?) *tenuis* var. | Krammer & Lange-Bertalot (1997; Taf.100) | 1.91 | 1 |
| *Denticula elegans* | Kützing | 0.96 | 4 |
| *Denticula kuetzingii* | Grunow | 46.47 | 26 |
| *Denticula tenuis* | Kützing | 1.16 | 15 |
| *Diadesmis* cf. *gallica* | Wm. Smith | 18.34 | 3 |
| *Diadesmis* cf. *gallica* var. ? | Wm. Smith | 0.24 | 1 |
| *Diadesmis contenta* | (Grunow) D.G. Mann | 1.07 | 7 |
| *Diadesmis perpusilla* | (Grunow) D.G. Mann | 1.23 | 8 |
| *Diatoma tenuis* | Kützing | 0.62 | 3 |
| *Diploneis marginestriata* | Hustedt | 0.95 | 5 |
| *Diploneis* nov. spec. Nr. 1 | Julma Ölkky | 1.14 | 8 |
| *Diploneis oblongella* | (Näegeli) Cleve-Euler | 0.95 | 10 |
| *Diploneis occulata* | (Brébisson) Cleve | 4.44 | 26 |
| *Diploneis ovalis* | (Hilse) Cleve | 0.60 | 4 |
| *Diploneis ovalis* cf. ssp. *ovalis* | (Hilse) Cleve | 0.27 | 2 |
| *Diploneis ovalis* ssp. *ovalis* | (Hilse) Cleve | 0.63 | 2 |
| *Diploneis parma* | Cleve | 1.26 | 15 |
| *Encyonema auerswaldii* | Rabenhorst | 0.14 | 1 |
| *Encyonema* cf. *obscurum* var. *alpina* | Krammer | 0.32 | 2 |
| *Encyonema* cf. *subminutum* | Krammer & Lange-Bertalot | 0.30 | 3 |
| *Encyonema elginense* | (Krammer) D.G.Mann | 0.61 | 4 |
| *Encyonema gaeumannii* | (Meister) Krammer | 0.93 | 14 |
| *Encyonema latens* | (Krasske) D.G.Mann | 0.81 | 8 |
| *Encyonema minutum* | (Hilse) D.G. Mann | 0.96 | 17 |
| *Encyonema norvegicum* | (Grunow) Mills | 0.63 | 9 |
| *Encyonema obscurum* | (Krasske) D.G.Mann | 0.27 | 2 |
| *Encyonema obscurum* var. *alpina* | Krammer | 2.01 | 3 |
| *Encyonema silesiacum* | (Bleisch) D.G. Mann | 1.76 | 32 |
| *Encyonema ventricosum* | (Agardh) Grunow | 3.33 | 18 |
| *Encyonopsis behrei* | (Foged) Krammer & Metzeltin | 0.16 | 3 |
| *Encyonopsis cesatiformis* | Krammer | 1.24 | 6 |
| *Encyonopsis cesatii* | (Rabenhorst) Krammer | 3.83 | 3 |
| *Encyonopsis descripta* | (Hustedt) Krammer | 4.87 | 17 |
| *Encyonopsis microcephala* | (Grunow) Krammer | 8.61 | 20 |
| *Encyonopsis subminuta* | Krammer & Reichardt | 6.36 | 9 |
| *Eucocconeis alpestris* | (Brun) Lange-Bertalot | 0.31 | 3 |
| *Eucocconeis flexella* | (Kützing) Cleve | 2.88 | 23 |
| *Eucocconeis laevis* | (Østrup) Lange-Bertalot | 2.95 | 19 |
| *Eucocconeis leptostriata* | Lange-Bertalot | 4.81 | 10 |
| *Eunotia arcus* | Ehrenberg | 7.30 | 13 |
| *Eunotia bilunaris* var. *mucophila* | Lange-Bertalot, Nörpel & Alles | 0.49 | 1 |
| *Eunotia faba* | Ehrenberg | 0.32 | 1 |
| *Eunotia inflata* | (Grunow) Nörpel-Schempp & Lange-Bertalot | 0.49 | 5 |
| *Eunotia praerupta* | Ehrenberg | 2.64 | 2 |
| *Fallacia (Sellaphora?) helensis* | (E.Schulz) D.G. Mann | 2.06 | 7 |
| *Fallacia lenzii* | (Hustedt) D.G. Mann | 5.08 | 19 |
| *Fallacia pygmaea* | (Kützing) Stickle & D.G. Mann | 0.13 | 1 |
| *Fallacia subhamatula* | (Grunow) D.G. Mann | 0.95 | 7 |
| *Fallacia sublucidula* | (Hustedt) D.G. Mann | 1.17 | 6 |
| *Fragilaria capucina* var. *vaucheria* complex | (Kützing) Lange-Bertalot | 22.05 | 12 |
| *Fragilaria cyclopum* | (Brutschy) Lange-Bertalot | 0.00 | 1 |
| *Fragilaria microstriata* | Marciniak | 26.72 | 26 |
| *Fragilaria oldenburgiana* complex | Hustedt | 21.42 | 20 |
| *Fragilaria oldenburgioides/ Pseudostaurosira brevistriata* complex | Lange-Bertalot/(Grunow) D.M. Williams & Round | 19.40 | 30 |
| *Fragilaria tenera* | (W.Smith) Lange-Bertalot | 2.80 | 13 |
| *Frustulia rhomboides* var. *saxonica* | (Rabenhorst) DeToni | 0.16 | 1 |
| *Geissleria cummerowi* | (L.Kalbe) Lange-Bertalot | 0.79 | 3 |
| *Geissleria declivis* | (Hustedt) Lange-Bertalot | 0.32 | 1 |
| *Geissleria schoenfeldii* | (Hustedt) Lange-Bertalot & Metzeltin | 0.81 | 5 |
| *Geissleria similis* | (Krasske) Lange-Bertalot & Metzeltin | 0.27 | 4 |
| *Gomphonema gracile* | Ehrenberg (in Lange-Bertalot 2/1 fig. 26,27) | 2.94 | 6 |
| *Gomphonema "parvulum* var. *undulatum"* | A. Cleve | 0.35 | 1 |
| *Gomphonema acuminatum* | Ehrenberg | 0.62 | 1 |
| *Gomphonema angustatum* | (Kützing) Rabenhorst | 0.07 | 1 |
| *Gomphonema angustum* | Agardh | 2.74 | 5 |
| *Gomphonema* cf. *clavatulum* | Reichardt | 0.53 | 4 |
| *Gomphonema* cf. *leptoproductum* | Lange-Bertalot & Genkal | 0.27 | 1 |
| *Gomphonema* cf. *micropus* | Kützing | 1.57 | 1 |
| *Gomphonema lacus-vulcani* | Reichardt & Lange-Bertalot | 0.23 | 1 |
| *Gomphonema pumilum* var. *elegans* | Reichardt & Lange-Bertalot | 0.34 | 1 |
| *Gomphonema* sp. |  | 0.33 | 2 |
| *Gomphonema* sp. 1 (cf. *cybelloides* ) |  | 0.24 | 1 |
| *Gomphonema* sp. 2 |  | 0.29 | 1 |
| *Gomphonema* sp. 3 |  | 0.08 | 1 |

| **Taxon name** | **Taxonomic authority** | **Maximum % abundance** | **# lakes found** |
|---|---|---|---|
| *Gyrosigma acuminatum* | (Kützing) Rabenhorst | 0.32 | 11 |
| *Hannaea arcus* | (Ehrenberg) Patrick | 0.22 | 2 |
| *Hippodonta costulata* | (Grunow) Lange-Bertalot, Metzeltin & Witkowski | 2.06 | 7 |
| *Hippodonta hungarica* | (Grunow) Lange-Bertalot, Metzeltin & Witkowski | 6.50 | 21 |
| *Hygropetra balfouriana* | (Grunow) Krammer & Lange-Bertalot | 20.78 | 28 |
| *Hygropetra* cf. *balfouriana* | (Grunow) Krammer & Lange-Bertalot | 0.93 | 2 |
| *Karayevia clevei* var. *rostrata* | (Grunow) Kingston | 1.11 | 10 |
| *Karayevia laterostrata* | (Hustedt) Round & Bukhtiyarova | 1.59 | 9 |
| *Kobayasiella jaajii* | (Meister) Lange-Bertalot | 0.36 | 1 |
| *Kolbesia suchlandtii* | (Hustedt) Kingston | 1.16 | 7 |
| *Licmophora* cf. *gracilis* var. *anglica* | (Kützing) Peragallo | 0.13 | 2 |
| *Meridian circulare* | (Greville) Agardh | 0.27 | 1 |
| *Microcostatus krasskei* | (Hustedt) Johansen & Sray | 2.22 | 12 |
| *Navicula (Placoneis?) explanata* | Hustedt | 1.01 | 6 |
| *Navicula absoluta* | Hustedt | 5.68 | 30 |
| *Navicula* aff. *phylepta* | Kützing | 7.64 | 7 |
| *Navicula aurora* (incl. *aurora* var?) | Sovereign | 0.25 | 4 |
| *Navicula* cf. *arvensis* | Hustedt | 0.46 | 3 |
| *Navicula* cf. *fluens* | Hustedt | 2.93 | 17 |
| *Navicula* cf. *trophicatrix* | Lange-Bertalot | 1.10 | 9 |
| *Navicula cincta* | (Ehrenberg) Ralfs | 2.27 | 2 |
| *Navicula concentrica* | Carter | 0.12 | 1 |
| *Navicula cryptocephala/notha/chiarae* complex | Kützing/Hohn & Hellerman/Lange-Bertalot & Genkal | 7.31 | 30 |
| *Navicula cryptotenella* | Lange-Bertalot | 1.44 | 16 |
| *Navicula cryptotenelloides* | Lange-Bertalot | 0.75 | 10 |
| *Navicula dealpina* | Lange-Bertalot | 1.89 | 5 |
| *Navicula difficillima* | Hustedt | 1.27 | 6 |
| *Navicula digituloides* | Lange-Bertalot | 1.12 | 5 |
| *Navicula digitulus* | Hustedt | 2.82 | 13 |
| *Navicula gastrum* var. *signata* | Hustedt | 0.72 | 1 |
| *Navicula interglacialis* | Hustedt | 0.22 | 3 |
| *Navicula libonensis* | Schoeman | 5.37 | 3 |
| *Navicula lucinensis* | Hustedt | 0.31 | 1 |
| *Navicula menisculus* | Schumann | 6.43 | 8 |
| *Navicula modica* | Hustedt | 2.57 | 7 |
| *Navicula muraloides* | Hustedt | 0.22 | 1 |
| *Navicula oblonga* | (Kützing) Kützing | 0.15 | 2 |
| *Navicula pseudosilicula* | Hustedt | 0.35 | 1 |
| *Navicula radiosa* | Kützing | 0.46 | 7 |
| *Navicula reinhardtii* | Grunow | 0.38 | 8 |
| *Navicula rhynchotella* | Lange-Bertalot | 0.10 | 2 |
| *Navicula rhyncocephala* | Kützing | 0.45 | 8 |
| *Navicula schmassmannii (Diadesmis* sp.aff. *contenta?)* | Hustedt | 1.74 | 8 |
| *Navicula seminulum* | Grunow | 18.63 | 2 |
| *Navicula* sp. |  | 0.22 | 2 |
| *Navicula vitiosa* | Schimanski | 2.20 | 3 |
| *Navicula vulpina* | Kützing | 5.07 | 13 |
| *Navicula(dicta)* cf. *raedieriae* | Lange-Bertalot | 0.24 | 2 |
| *Navicula(dicta) raederiae* | Lange-Bertalot | 17.86 | 3 |
| *Neidiopsis wulffii* | (Petersen) Lange-Bertalot | 0.40 | 1 |
| *Neidium affine* var. *longiceps* | (Gregory) Cleve | 0.49 | 1 |
| *Neidium ampliatum* | (Ehrenberg) Krammer | 5.93 | 14 |
| *Neidium bergii* | (Cleve-Euler) Krammer | 3.01 | 5 |
| *Neidium bisulcatum* | (Lagerstedt) Cleve | 0.31 | 5 |
| *Neidium distinctepunctatum* | Hustedt | 1.60 | 6 |
| *Neidium dubium* | (Ehrenberg) Cleve | 0.27 | 6 |
| *Neidium dubium* fo. *constrictum* | (Hustedt) Hustedt | 0.00 | 1 |
| *Neidium kozlowii* var. *ellipticum* | Mereschkowsky | 0.32 | 2 |
| *Neidium ladogensis* | (Cleve) Foged | 0.65 | 2 |
| *Neidium* sp. aff. *alpinum* | Hustedt | 0.32 | 1 |
| *Neidium* sp. nov. |  | 2.38 | 1 |
| *Neidium* sp. nov. *Lange-Bertalot* | Lange-Bertalot | 0.48 | 1 |
| *Nitzschia* aff. *draveillensis* | Costé & Ricard | 0.94 | 2 |
| *Nitzschia amphibia* f. *frauenfeldii* | Grunow | 0.32 | 2 |
| *Nitzschia amphibia* f. *rostrata* | Hustedt | 0.26 | 1 |
| *Nitzschia angustata* | (W.Smith) Grunow | 0.32 | 3 |
| *Nitzschia angustiforaminata* | Lange-Bertalot | 0.54 | 3 |
| *Nitzschia bryophila* | (Hustedt) Hustedt | 0.63 | 1 |
| *Nitzschia* cf. *amphibia* | Grunow | 1.43 | 9 |
| *Nitzschia commutata* | Grunow | 0.80 | 2 |
| *Nitzschia debilis* | (Arnott) Grunow | 0.13 | 1 |
| *Nitzschia dissipata* | (Kützing) Grunow | 2.06 | 28 |
| *Nitzschia dissipata* var. *media* | (Hantzsch) Grunow | 0.57 | 3 |
| *Nitzschia fonticola* | Grunow | 6.30 | 19 |
| *Nitzschia frustulum* | (Kützing) Grunow | 22.56 | 21 |
| *Nitzschia frustulum* var. *inconspicua* | Grunow | 2.12 | 3 |
| *Nitzschia gracilis* | Hantzsch | 0.80 | 10 |
| *Nitzschia palea* | (Kützing) W. Smith | 12.87 | 12 |
| *Nitzschia palea* var. *tenuirostris* | Grunow | 0.94 | 5 |
| *Nitzschia perminuta* | (Grunow) Peragallo | 8.08 | 27 |
| *Nitzschia pura* | Hustedt | 1.74 | 3 |
| *Nitzschia recta* | Hantzsch | 0.62 | 3 |
| *Nitzschia sinuata* var. 1 |  | 0.92 | 1 |
| *Nitzschia sinuata* var. *delognei* | (Grunow) Lange-Bertalot | 0.16 | 1 |

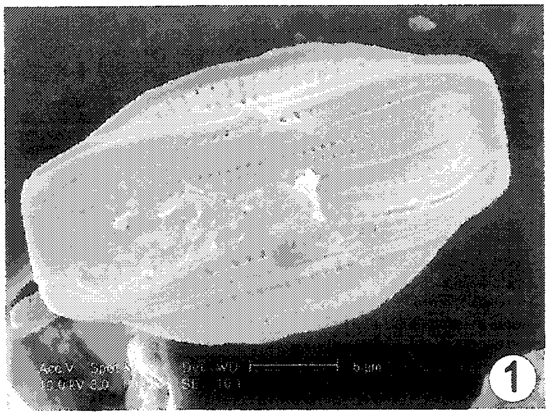
| **Taxon name** | **Taxonomic authority** | **Maximum % abundance** | **# lakes found** |
|---|---|---|---|
| *Nitzschia sinuata* var. *sinuata* | (Thwaites) Grunow | 0.32 | 1 |
| *Nitzschia sinuata* var. *tabellaria* | (Grunow) Grunow | 0.48 | 2 |
| *Nitzschia* sp. |  | 0.25 | 1 |
| *Nitzschia* sp. 3 aff. *dealpina* | Lange-Bertalot | 4.45 | 9 |
| *Nitzschia* sp. 4 |  | 4.29 | 1 |
| *Nitzschia* sp. 1 cf. *fonticola* | Grunow | 5.53 | 19 |
| *Nitzschia* sp. 2 cf. *dealpina* | Lange-Bertalot | 11.97 | 11 |
| *Nitzscia inconspicua* | Grunow | 10.10 | 14 |
| *Pinnularia biceps* | Gregory | 0.63 | 5 |
| *Pinnularia birnirkiana* | Patrick & Freese | 2.54 | 6 |
| *Pinnularia borealis* var. *lanceolata* | Hustedt | 0.00 | 1 |
| *Pinnularia brebissonii* | (Kützing) Rabenhorst | 0.40 | 9 |
| *Pinnularia* cf. *brebissonii* | (Kützing) Rabenhorst | 0.16 | 1 |
| *Pinnularia nodosa* morph 1 | (Ehrenberg) Smith | 6.95 | 1 |
| *Pinnularia nodosiformis* | Krammer | 0.18 | 1 |
| *Pinnularia rhombarea* | Krammer | 1.54 | 9 |
| *Pinnularia* sp. |  | 0.32 | 2 |
| *Pinnularia* sp. 1 |  | 0.27 | 1 |
| *Placoneis elginensis* | (Gregory) Cox | 0.47 | 5 |
| *Placoneis placentula* | (Ehrenberg) Heinzerling | 0.32 | 2 |
| *Placoneis pseudanglica* | (Lange-Bertalot) Cox | 0.45 | 8 |
| *Planothidium calcar* | (Cleve) Round & Bukhtiyarova | 0.27 | 3 |
| *Planothidium frequentissimum* | (Lange-Bertalot) Round & Bukhtiyarova | 2.06 | 9 |
| *Planothidium lanceolatum (* ssp.oder aff.ssp. *lanceolatoides?)* | (Brébisson) Round & Bukhtiyarova | 0.49 | 2 |
| *Planothidium oestrupii* | (Cleve-Euler) Round & Bukhtiyarova | 1.72 | 8 |
| *Planothidium peragallii* | (Brun & Héribaud) Round & Bukhtiyarova | 2.67 | 5 |
| *Planothidium rostatum* | (Östrup) Round & Bukhtiyarova | 0.40 | 2 |
| *Psammothidium abundans* f. *rosenstockii* | (Lange-Bertalot) Bukhtiyarova | 16.50 | 19 |
| *Psammothidium bioretii* | (Germain) Bukhtiyarova & Round | 1.35 | 16 |
| *Psammothidium didymum* | (Hustedt) Bukhtiyarova & Round | 0.75 | 2 |
| *Psammothidium grischunum* f. *daonensis* | (Lange-Bertalot) Bukhtiyarova & Round | 42.16 | 15 |
| *Psammothidium helveticum* | (Hustedt) Bukhtiyarova & Round | 2.38 | 19 |
| *Psammothidium levanderi* | (Hustedt) Czarn | 3.40 | 15 |
| *Psammothidium marginulatum* | (Grunow) Bukhtiyarova & Round | 33.17 | 9 |
| *Psammothidium sacculum* | (Carter) Bukhtiyarova | 1.84 | 14 |
| *Psammothidium subatomoides* | (Hustedt) Bukhtiyarova & Round | 0.64 | 6 |
| *Psammothidium ventralis* | (Krasske) Bukhtiyarova & Round | 3.59 | 8 |
| *Pseudostaurosira brevistriata* (form 1) | (Grunow) D.M. Williams & Round | 7.23 | 4 |
| *Pseudostaurosira brevistriata* var. *inflata* | (Pantocsek) Edlund | 51.65 | 35 |
| *Pseudostaurosira pseudoconstruens* | (Marciniak) D.M. Williams & Round | 49.84 | 50 |
| *Reimeria sinuata* | (Gregory) Kociolek & Stoermer | 0.69 | 3 |
| *Rhopalodia* aff. *gibba* | (Ehrenberg) O. Müller | 0.29 | 1 |
| *Rossithidium petersenii* | (Hustedt) Round & Bukhtiyarova | 4.15 | 10 |
| *Rossithidium pusillum* | (Grunow) Round & Bukhtiyarova | 6.85 | 19 |
| *Sellaphora bacillum* | (Ehrenberg) D.G. Mann | 0.44 | 12 |
| *Sellaphora laevissima* | (Kützing) D.G. Mann | 1.96 | 3 |
| *Sellaphora mutata* | (Krasske) Lange-Bertalot | 2.06 | 16 |
| *Sellaphora pupula* morph 4 | (Kützing) Mereschkowski Morphotyp Nr. 4 | 19.87 | 7 |
| *Sellaphora pupula* var. *pupula* | (Ehrenberg) Mereschkowsky | 1.76 | 23 |
| *Sellaphora verecundiae* | Lange-Bertalot | 0.32 | 5 |
| *Simonsenia delognei* | (Grunow) Lange-Bertalot | 0.46 | 1 |
| *Stauroneis* (?nov) spec. cf. *amphicephala* | Kützing | 0.04 | 1 |
| *Stauroneis anceps* | Ehrenberg | 2.06 | 14 |
| *Stauroneis* cf. *gracilima* | Hustedt | 0.13 | 1 |
| *Stauroneis* cf. *undata* | Hustedt | 0.16 | 1 |
| *Stauroneis koeltzii* | Metzeltin, Witkowski & Lange-Bertalot | 7.37 | 10 |
| *Stauroneis neohyalina* | Lange-Bertalot & Krammer | 1.16 | 3 |
| *Stauroneis phoenicentron* | (Nitzsch) Ehrenberg | 1.16 | 7 |
| *Stauroneis smithii* | Grunow | 1.74 | 11 |
| *Stauroneis smithii* var. *borgei* | (Manguin) Hustedt | 1.95 | 10 |
| *Stauroneis* sp. 1 |  | 0.35 | 1 |
| *Stauroneis* sp. 2 |  | 0.15 | 1 |
| *Staurosira construens* var. *subsalina* | (Hustedt) Bukhtiyarova | 11.21 | 17 |
| *Staurosira construens.* f. *exigua* | (W. Smith) Bukhtiyarova? | 0.33 | 1 |
| *Staurosira venter* | (Ehrenberg) Cleve & Möller | 58.02 | 51 |
| *Staurosirella pinnata* | (Ehrenberg) D.M. Williams & Round | 69.39 | 55 |
| *Staurosirella pinnata* (long form) | (Ehrenberg) D.M. Williams & Round | 25.39 | 55 |
| *Staurosirella pinnata* var. *lancettula/acuminatum* | (Ehrenberg) D.M. Williams & Round | 25.03 | 37 |
| *Stephanodiscus medius* | Håkansson | 0.16 | 5 |
| *Surirella bifrons* | Ehrenberg | 0.94 | 4 |
| *Surirella brebissonii* | Krammer & Lange-Bertalot | 1.12 | 7 |
| *Surirella linearis* | W. Smith | 0.58 | 1 |
| *Surirella linearis* var. *constricta* | Grunow | 0.15 | 2 |
| *Surirella minuta* | Brébisson | 0.32 | 5 |
| *Surirella turgida* | W. Smith | 0.63 | 5 |
| *Tabellaria flocculosa* | (Roth) Kützing | 3.76 | 9 |

Figure 3.1. Scanning electron micrographs of selected diatoms from the surface sediments of 62 arctic lakes.

| Picture # | Taxon |
|---|---|
| 1 | *Amphora holsatica* Kützing |
| 2 | *Amphora neglecta* Stoermer & Yang |
| 3, 4 | *Amphora inariensis* Krammer |
| 5, 6 | *Amphora pediculus* (Kützing) Grunow |
| 7 | *Amphora thumensis* (Mayer) Cleve-Euler |
| 8 | *Amphora aequalis* Krammer |
| 9 | *Amphora copulata* morph B (Kützing) Schoeman & Archibald |
| 10-12 | *Amphora copulata* (Kützing) Schoeman & Archibald |
| 13, 14 | *Amphora ovalis* (Kützing) Kützing |
| 15, 16 | *Eunotia arcus* Ehrenberg |
| 17, 18 | *Caloneis hendyii* complex Lange-Bertalot |
| 19, 20 | *Campylodiscus hibernicus* Ehrenberg |
| 21-23 | *Cocconeis pediculus* Ehrenberg |
| 24 | *Cocconeis placentula* var. *euglypta* Ehrenberg |
| 25 | *Encyonema obscurum* var. *alpina* Krammer |
| 26 | *Encyomema* cf. *ventricosum* (Agardh) Grunow |
| 27 | *Encyonema silesiacum* (Bleisch) D.G. Mann |
| 28 | *Encyonema gaeumannii* (Meister) Krammer |
| 29 | *Encyonopsis microcephala* (Grunow) Krammer |
| 30 | *Encyonopsis descripta* (Hustedt) Krammer |
| 31, 32 | *Cymbella* sp. aff. *designata* Krammer |
| 33 | *Cymbella incerta* var. *crassipunctata* Krammer |
| 34 | *Cymbella subaequalis* morph B Grunow |
| 35 | *Cymbella delicatula* Kützing |
| 36 | *Cymbella angustata* (W. Smith) Cleve |
| 37 | *Reimeria sinuata* (Gregory) Kociolek & Stoermer |
| 38 | *Amphipleura pellucida* (Kützing) Kützing |
| 39, 40 | *Denticula tenuis* Kützing |
| 41 | *Diploneis ovalis* (Hilse) Cleve |
| 42 | *Diploneis parma* Cleve |
| 43, 44 | *Diploneis ovalis* ssp. *ovalis* (Hilse) Cleve |
| 45 | *Diploneis* cf. *dimorpha* Hustedt |
| 46-48 | *Diploneis occulata* (Brébisson) Cleve |
| 49 | *Achnanthes conspicua* Mayer |
| 50 | *Planothidium oestrupii* (Cleve-Euler) Round & Bukhtiyarova |
| 51 | *Psammothidium levanderi* (Hustedt) Czarn |
| 52 | *Psammothidium* c.f. *sacculum* (Carter) Bukhtiyarova |
| 53, 54 | *Psammothidium grischunum* f. *daonensis* (Lange-Bertalot) Bukhtiyarova & Round |
| 55 | *Achnanthes nitidiformis* Lange-Bertalot |
| 56 | *Rossithidium pusillum* (Grunow) Round & Bukhtiyarova |
| 57 | *Achnanthidium minutissimum* (Kützing) Czarnecki |
| 58 | *Achnanthidium* cf. *exilis* (Kützing) Round & Bukhtiyarova |
| 59 | *Planothidium calcar* (Cleve) Round & Bukhtiyarova |
| 60 | *Planothidium peragallii* (Brun & Héribaud) Round & Bukhtiyarova |

| **Picture #** | **Taxon** |
|---|---|
| 61 | *Planothidium frequentissimum* (Lange-Bertalot) Round & Bukhtiyarova |
| 62 | *Karayevia clevei* var. *rostrata* (Grunow) Kingston |
| 63 | *Achnanthes gracillima* Hustedt |
| 64 | *Psammothidium abundans* f. *rosenstockii* (Lange-Bertalot) Bukhtiyarova |
| 65-68 | *Navicula seminulum* Grunow |
| 69-72 | *Navicula(dicta) raederiae* Lange-Bertalot |
| 73 | *Navicula schmassmannii (Diadesmis* sp.aff. *contenta?)* Hustedt |
| 74-80 | *Achnanthes carissima* Lange-Bertalot |
| 81-83 | *Diadesmis* cf. *contenta* (Grunow) D.G. Mann |
| 84 | *Diadesmis contenta* (Grunow) D.G. Mann |
| 85, 86 | *Diadesmis perpusilla* (Grunow) D.G. Mann |
| 87, 88 | *Diadesmis* cf. *gallica* Wm. Smith |
| 89-92 | *Navicula* cf. *fluens* Hustedt |
| 93, 94 | *Adalfia minuscula* (Grunow) Lange-Bertalot |
| 95 | *Navicula digitulus* Hustedt |
| 96 | *Navicula digituloides* Lange-Bertalot |
| 97 | *Cavinula cocconeiformis* (Gregory) D.G. Mann & Stickle |
| 98 | *Fallacia lenzii* (Hustedt) D.G. Mann |
| 99-102 | *Fallacia (Sellaphora?) helensis* (E.Schulz) D.G. Mann |
| 103 | *Microcostatus krasskei* (Hustedt) Johansen & Sray |
| 104 | *Hippodonta hungarica* (Grunow) Lange-Bertalot, Metzeltin & Witkowski |
| 105 | *Chamaepinnularia* sp.1 |
| 106 | *Chamaepinnularia krookii* (Grunow) Lange-Bertalot & Krammer |
| 107, 108 | *Pinnularia* cf. *nodosiformis* Krammer |
| 109 | *Pinnularia* cf. *birnirkiana* Patrick & Freese |
| 110 | *Pinnularia brebissonii* (Kützing) Rabenhorst |
| 111 | *Chamaepinnularia soehrensis* (Krasske) Lange-Bertalot & Krammer |
| 112-114 | *Hygropetra balfouriana* (Grunow) Krammer & Lange-Bertalot |
| 115-119 | *Staurosirella pinnata* (Ehrenberg) D.M. Williams & Round |
| 120 | *Staurosirella pinnata* (long form) (Ehrenberg) D.M. Williams & Round |
| 121, 122 | *Staurosirella* cf. *pinnata* (Ehrenberg) D.M. Williams & Round |
| 123 | *Staurosira cf. venter* (Ehrenberg) Cleve & Möller |
| 124-126 | *Staurosira venter* (Ehrenberg) Cleve & Möller |
| 127, 128 | *Staurosira construens* var. *subsalina* (Hustedt) Bukhtiyarova |
| 129-133 | *Pseudostaurosira brevistriata* (Grunow) D.M. Williams & Round |
| 134, 135 | *Fragilaria oldenburgioides* Lange-Bertalot |
| 136 | *Fragilaria microstriata* Marciniak |
| 137-139 | *Pseudostaurosira pseudoconstruens* (Marciniak) D.M. Williams & Round |
| 140 | *Fragilaria capucina* var. *vaucheria* complex (Kützing) Lange-Bertalot |
| 141-144 | *Fragilaria* aff. *oldenburgiana* Hustedt |
| 145-148 | *Gomphonema angustum* Agardh |
| 149 | *Gomphonema "parvulum* var. *undulatum"* A. Cleve |
| 150 | *Geissleria schoenfeldii* (Hustedt) Lange-Bertalot & Metzeltin |
| 151 | *Aneumastus tusculus* (Ehrenberg) D.G. Mann |
| 152 | *Surirella turgida* W. Smith |

| Picture # | Taxon |
|---|---|
| 153 | *Navicula rhynchotella* Lange-Bertalot |
| 154 | *Navicula reinhardtii* Grunow |
| 155 | *Navicula* aff. *phylepta* Kützing |
| 156 | *Navicula libonensis* Schoeman |
| 157, 158 | *Navicula* cf. *cryptocephala* Kützing |
| 159, 160 | *Navicula* cf. *chiarae* Lange-Bertalot & Genkal |
| 161-163 | *Navicula menisculus* Schumann |
| 164 | *Navicula absoluta* Hustedt |
| 165 | *Navicula (Placoneis?) gastrum* var. *signata* Hustedt |
| 166 | *Placoneis elginensis* (Gregory) Cox |
| 167, 168 | *Rhopalodia* aff. *gibba* (Ehrenberg) O. Müller |
| 169, 170 | *Nitzschia frustulum* var. *inconspicua* Grunow |
| 171 | *Nitzschia frustulum* (Kützing) Grunow |
| 172 | *Nitzschia fonticola* Grunow |
| 173 | *Nitzschia* sp.1 cf. *fonticola* Grunow |
| 174 | *Nitzschia* sp. 3 aff. *dealpina* Lange-Bertalot |
| 175 | *Nitzschia* sp.2 cf. *dealpina* Lange-Bertalot |
| 176 | *Nitzschia* sp. 4 |
| 177-180 | *Nitzschia perminuta* (Grunow) Peragallo |
| 181 | *Nitzschia palea* (Kützing) W. Smith |
| 182 | *Nitzschia angustata* (W.Smith) Grunow |
| 183 | *Nitzschia recta* Hantzsch |
| 184 | *Nitzschia dissipata* (Kützing) Grunow |
| 185 | *Neidium dubium* (Ehrenberg) Cleve |
| 186 | *Neidium distinctepunctatum* Hustedt |
| 187, 188 | *Neidium* sp. nov. |
| 189 | *Neidium bergii* (Cleve-Euler) Krammer |
| 190 | *Neidium* cf. *bergii* (Cleve-Euler) Krammer |
| 191 | *Brachysira neoexilis* Lange-Bertalot |
| 192 | *Navicula interglacialis* Hustedt |
| 193-195 | *Navicula* cf. *trophicatrix* Lange-Bertalot |
| 196 | *Cyclotella tripartita* Håkansson |
| 197, 198 | *Cyclotella ocellata* Pantocsek |
| 199, 200 | *Cyclotella stelligera (*form 2) Cleve & Grunow |
| 201 | *Sellaphora pupula* var. *pupula* (Ehrenberg) Mereschkowsky |
| 202 | *Sellaphora bacillum* (Ehrenberg) D.G. Mann |
| 203 | *Sellaphora mutata* (Krasske) Lange-Bertalot |
| 204 | *Sellaphora pupula* morph 4 (Kützing) Mereschkowski |
| 205 | *Stauroneis koeltzii* Metzeltin, Witkowski & Lange-Bertalot |
| 206 | *Stauroneis neohyalina* Lange-Bertalot & Krammer |
| 207 | *Stauroneis smithii* Grunow |
| 208 | *Stauroneis smithii* var. *borgei* (Manguin) Hustedt |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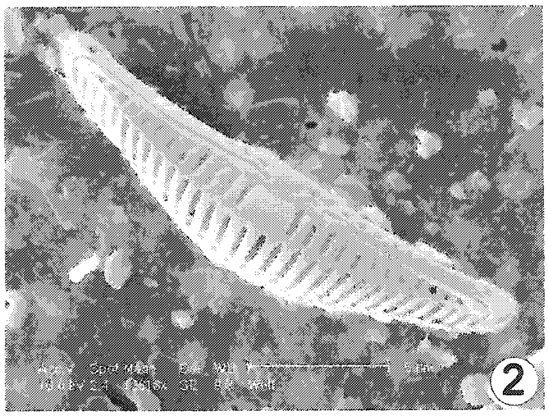
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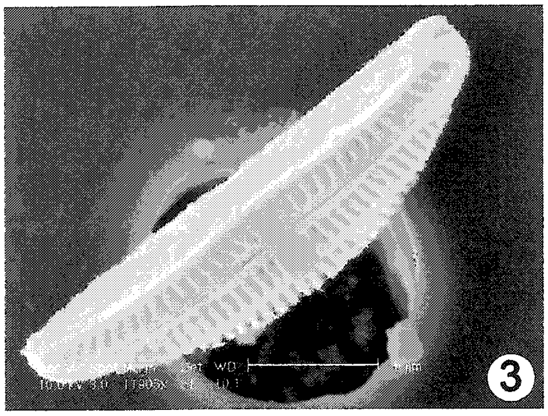
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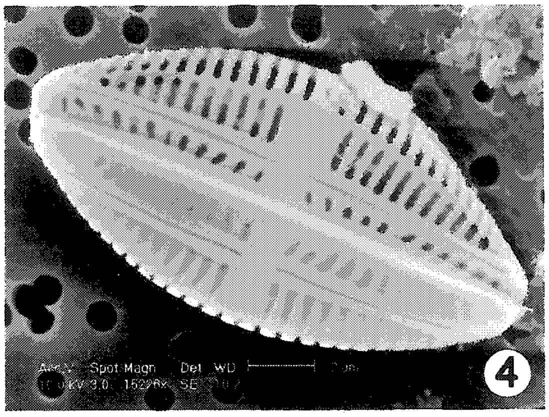
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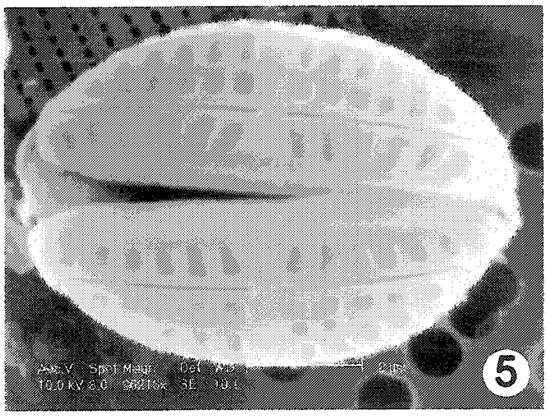
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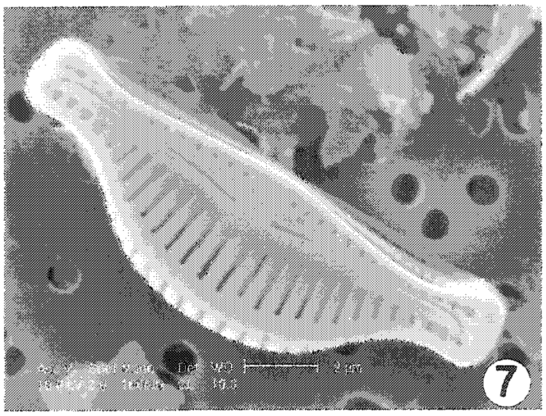
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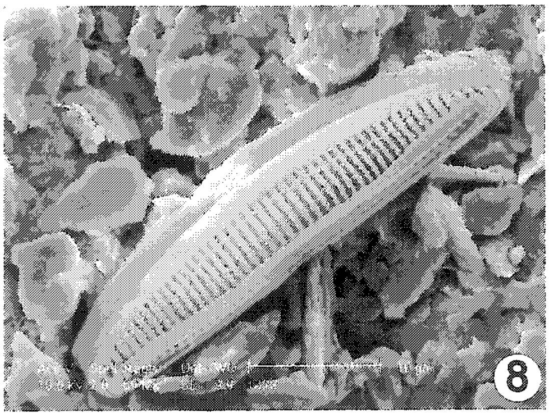
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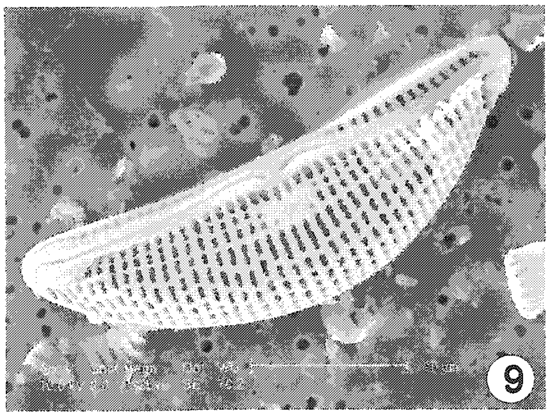
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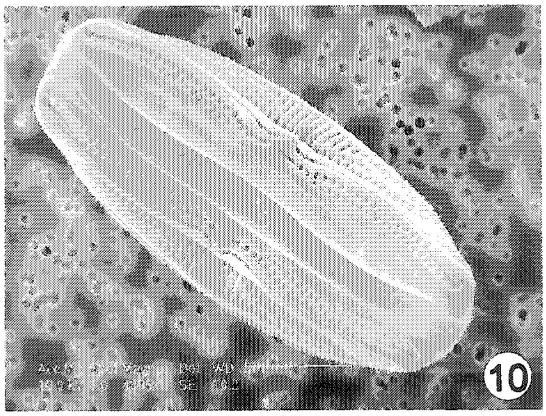
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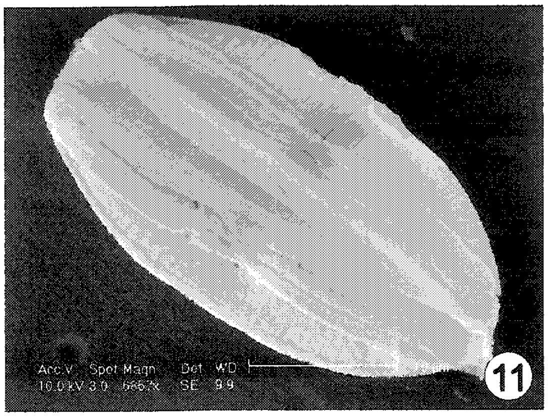
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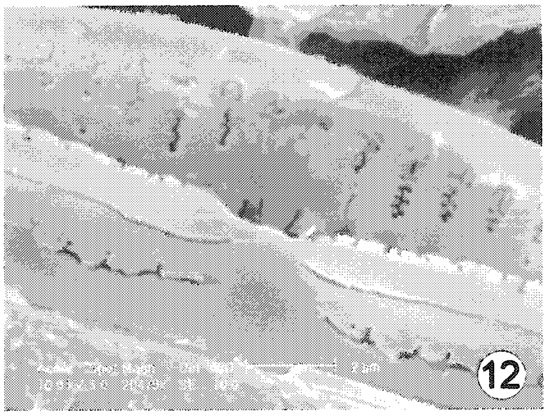
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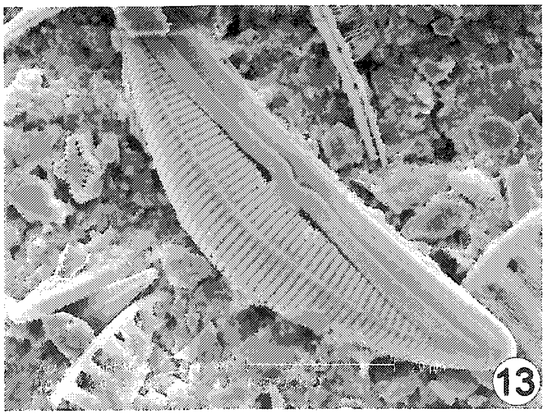
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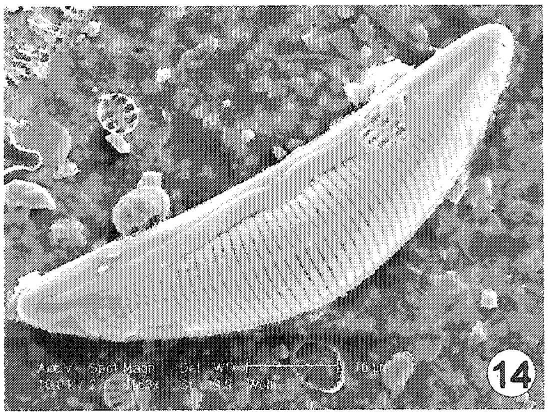
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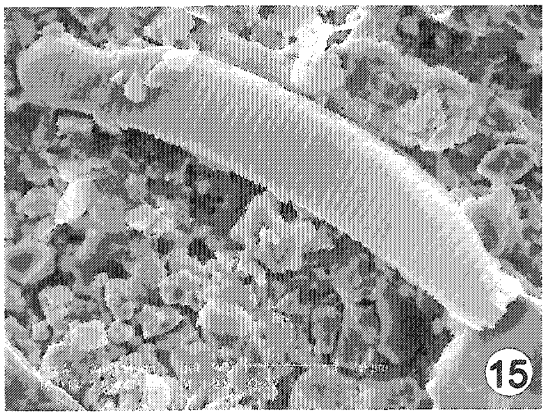
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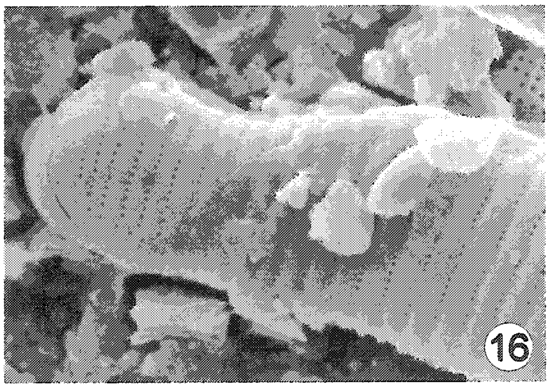
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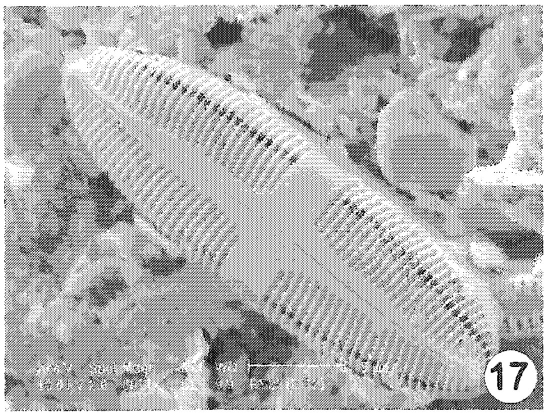
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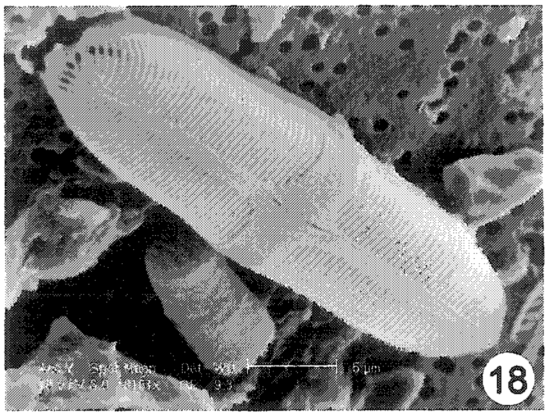
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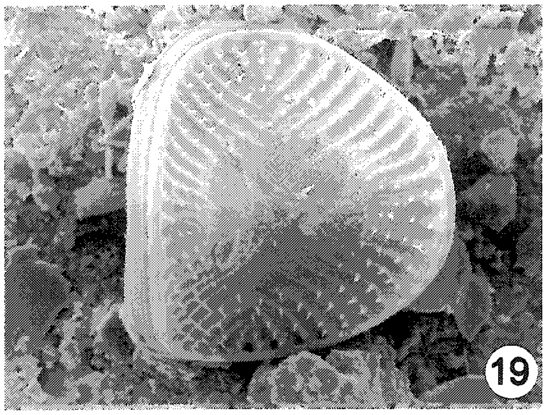
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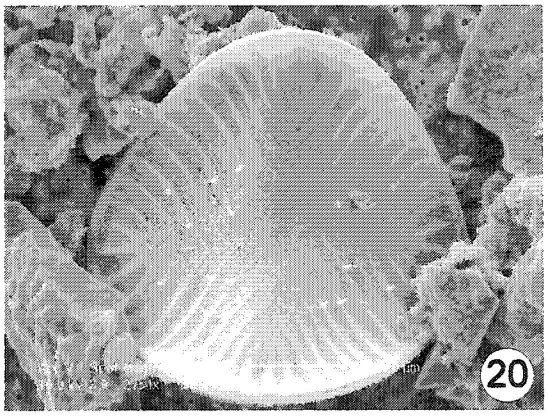
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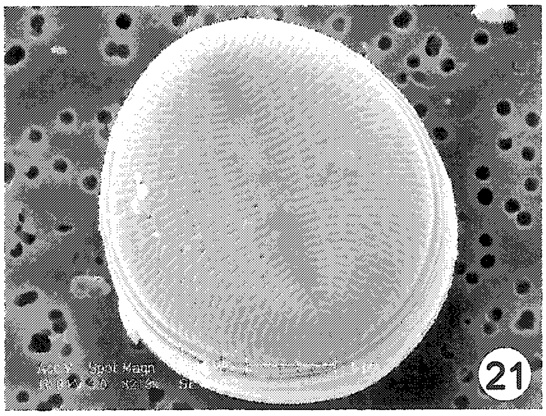
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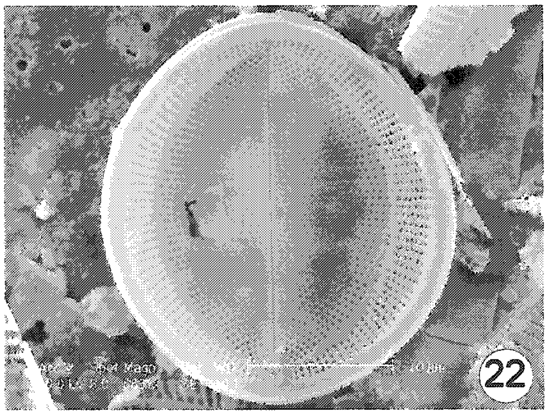
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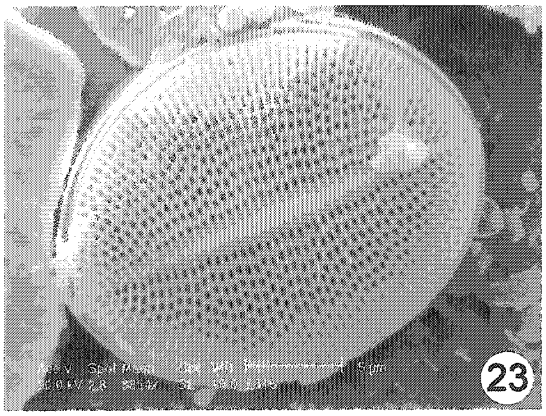
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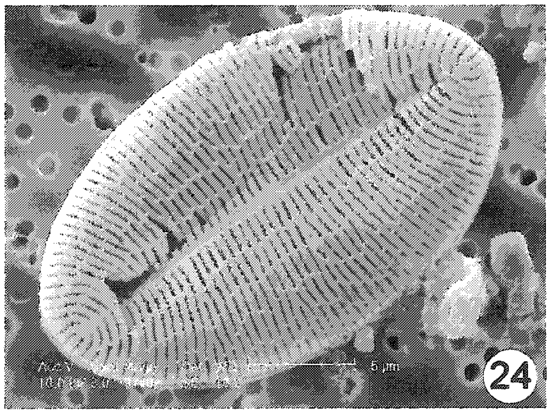
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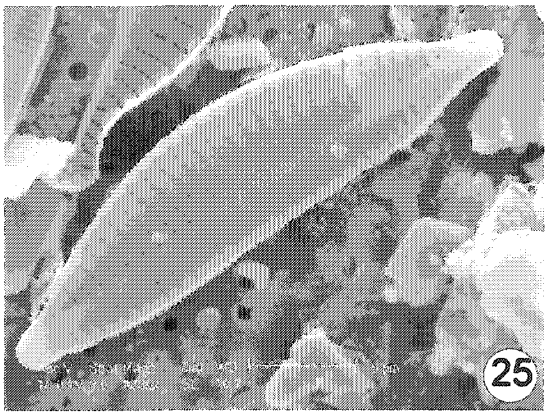
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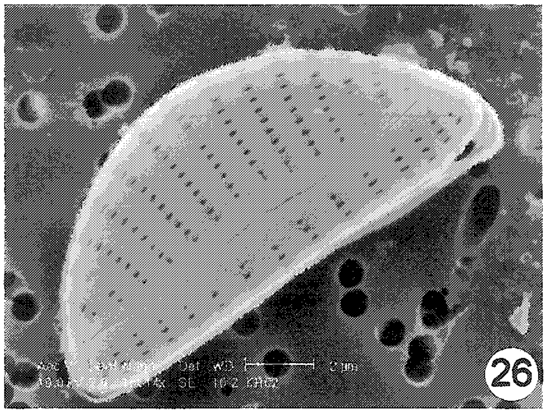

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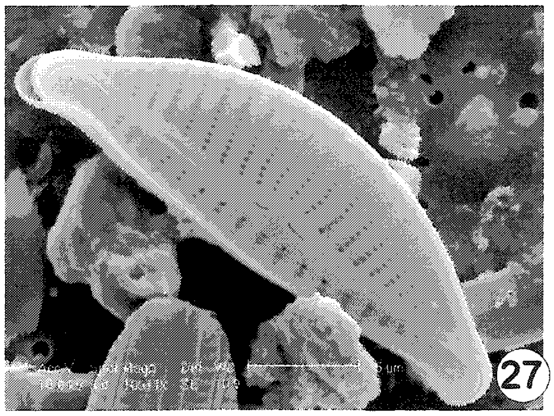
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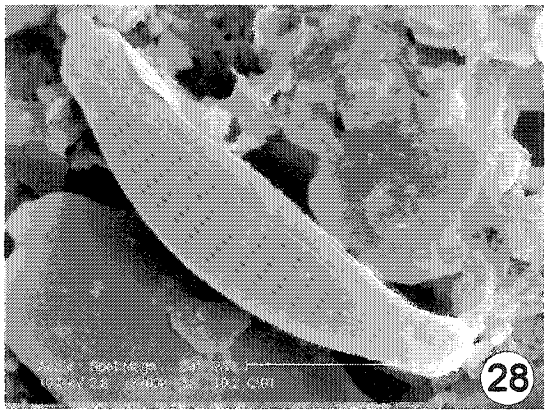
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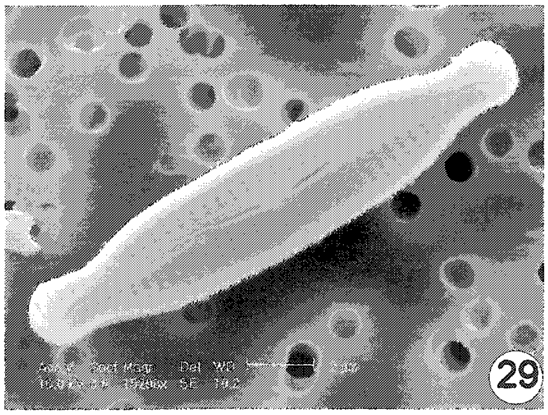
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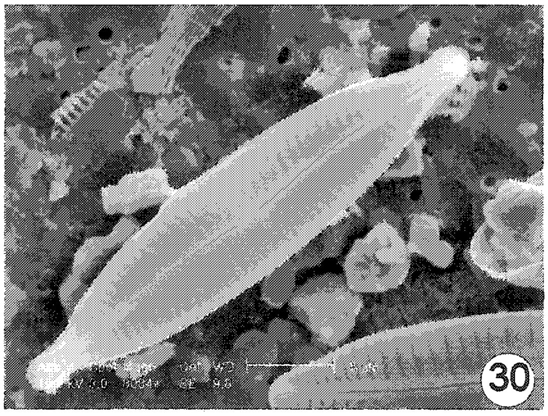
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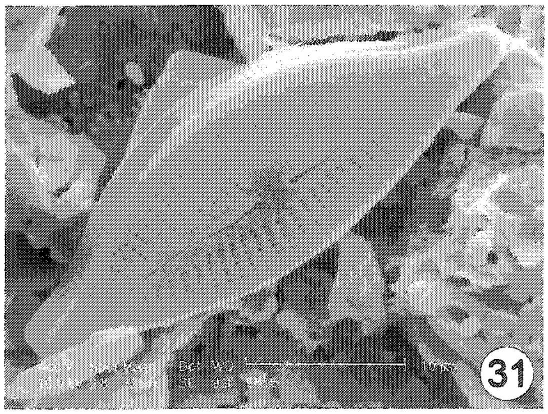

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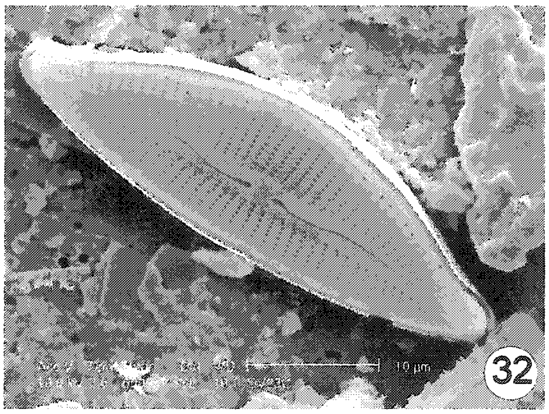

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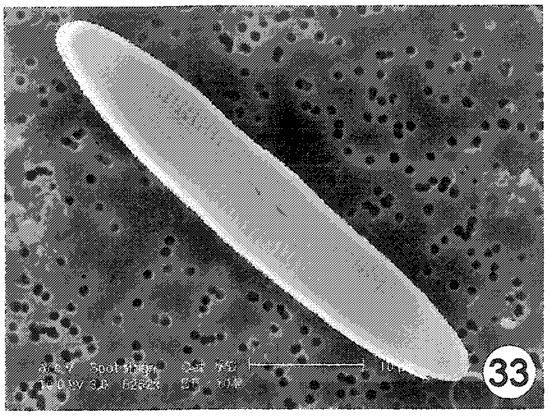
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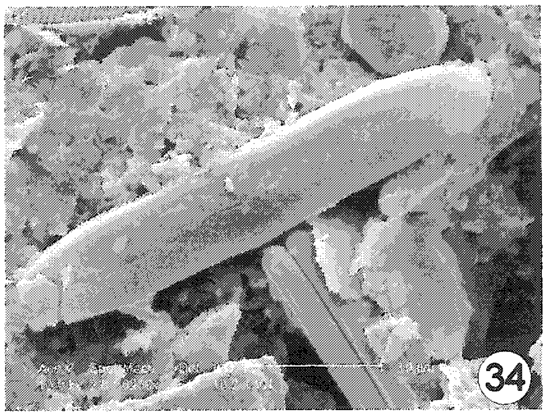
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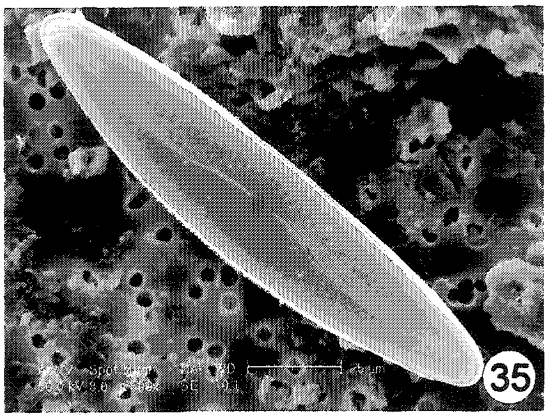
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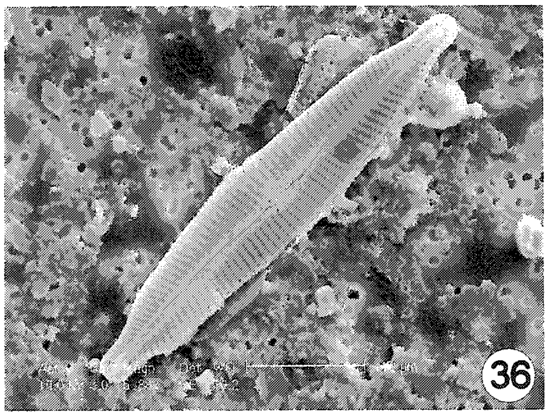
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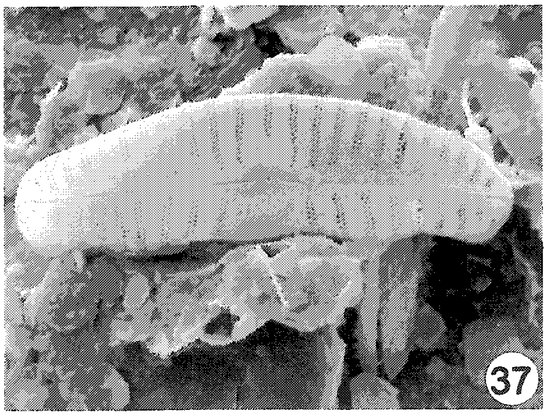
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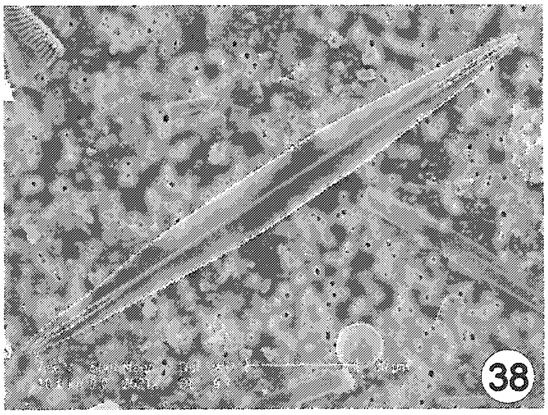
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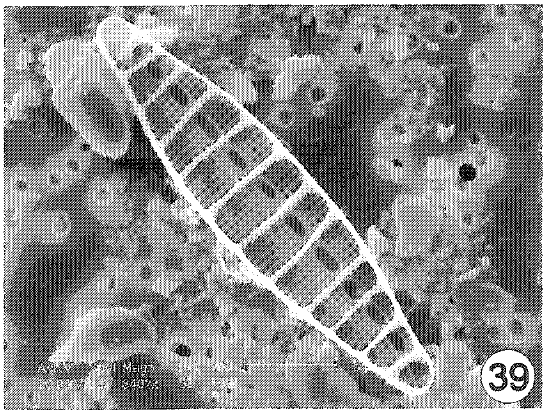
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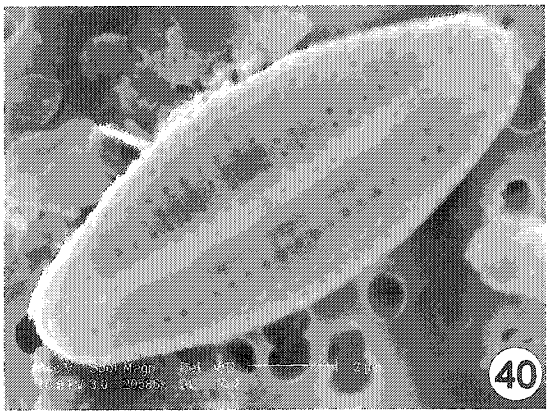
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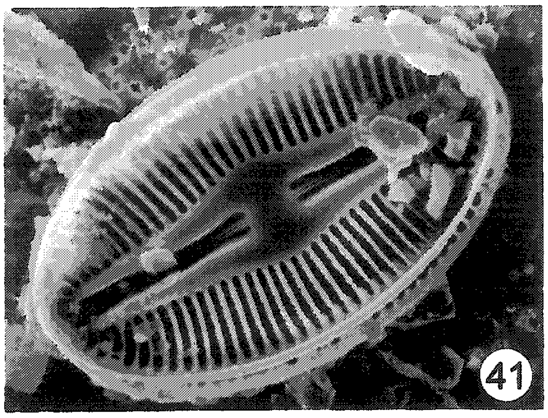
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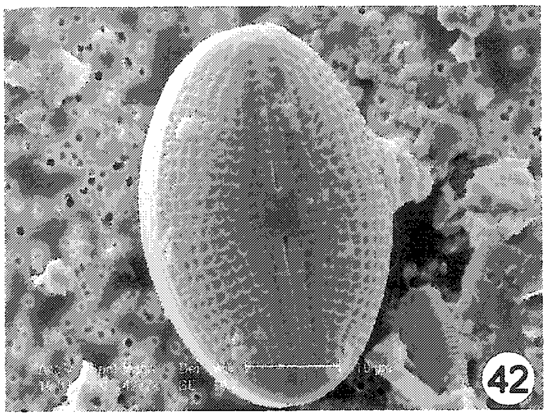
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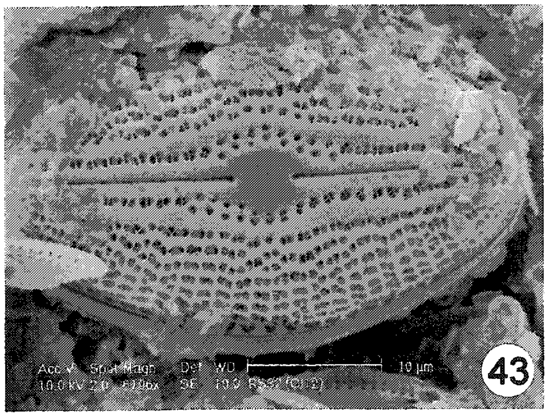

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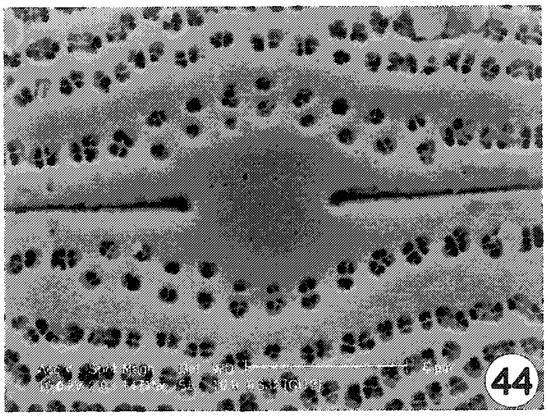
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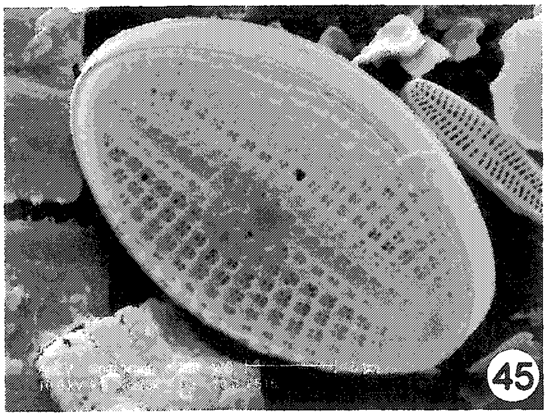
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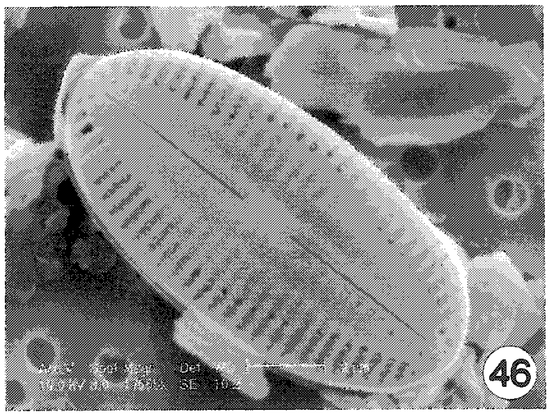
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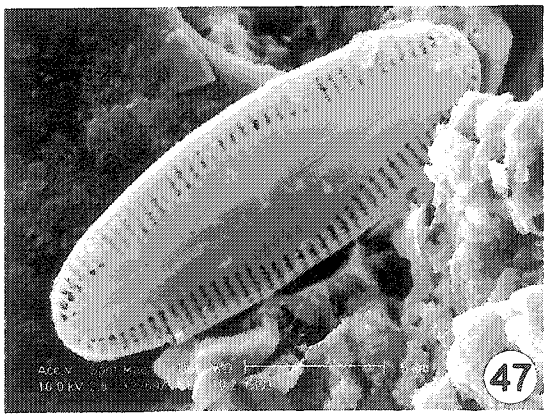

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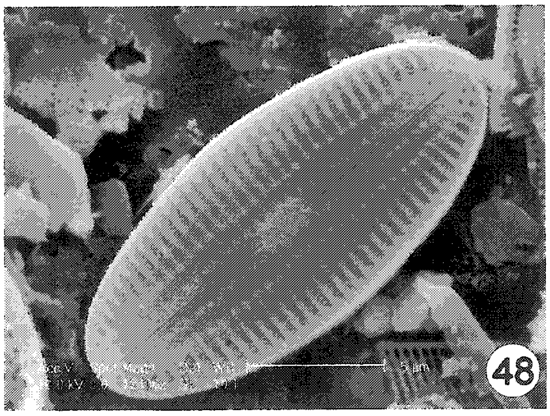

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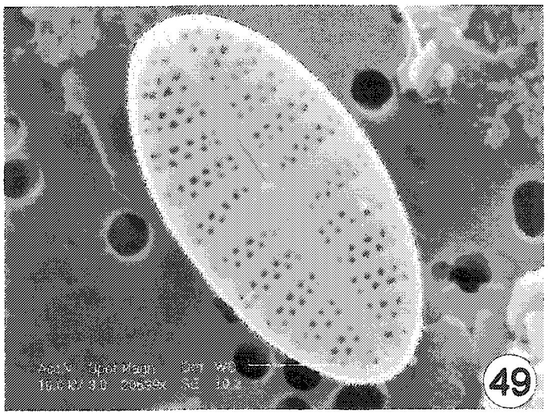
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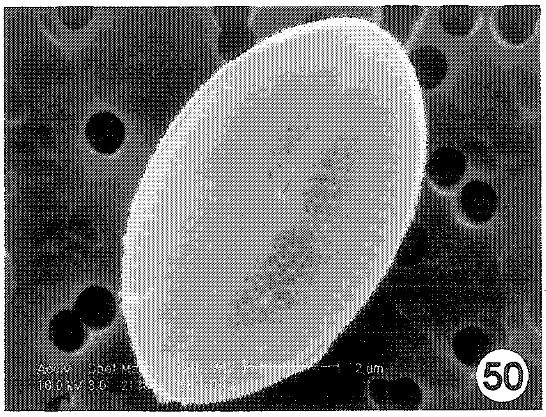

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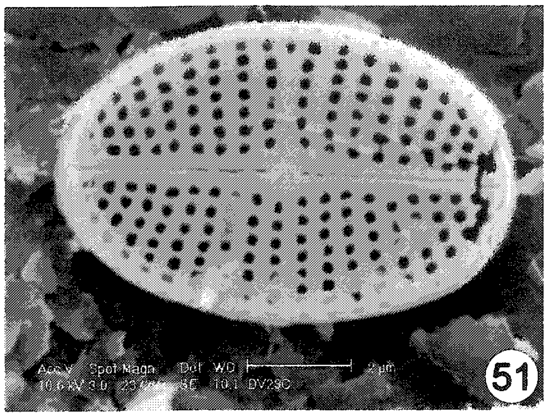

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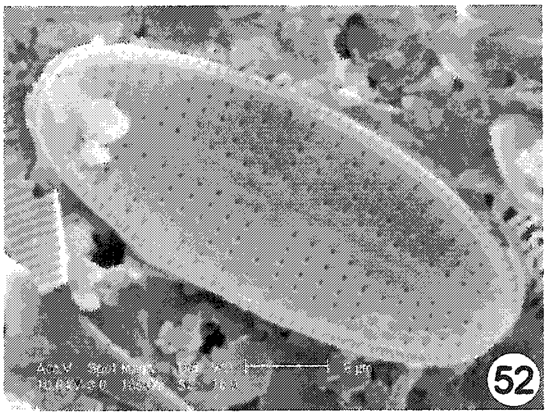

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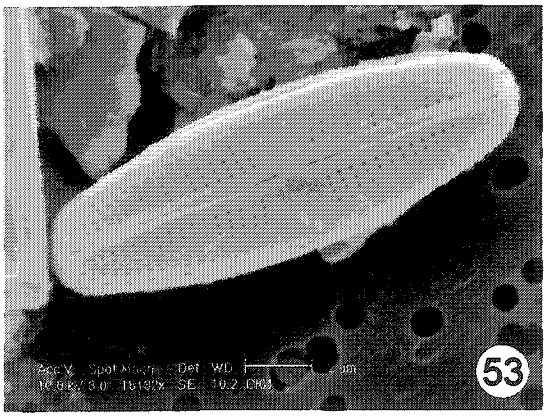
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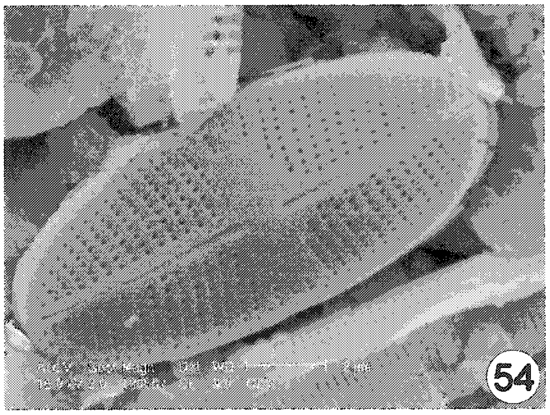

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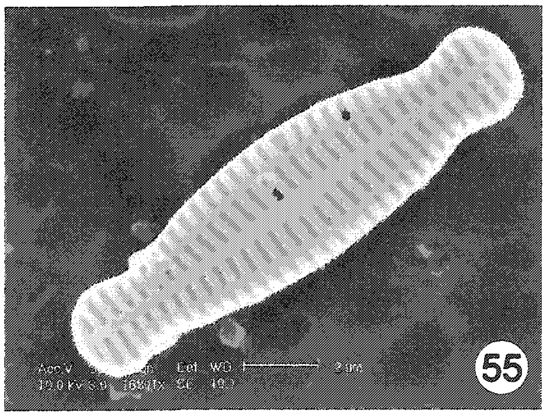

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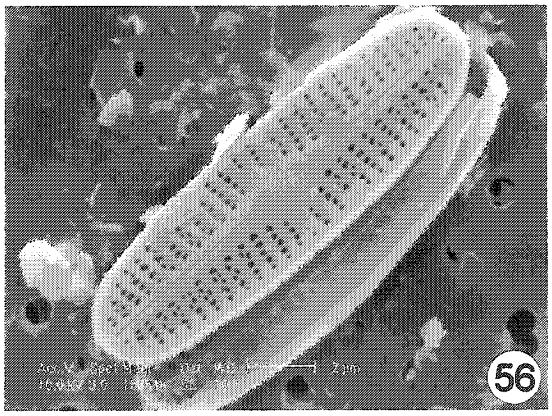

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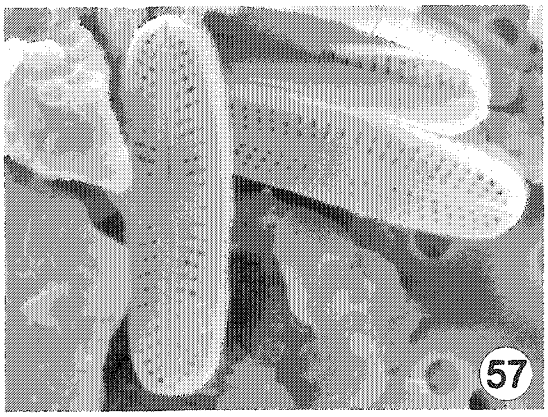
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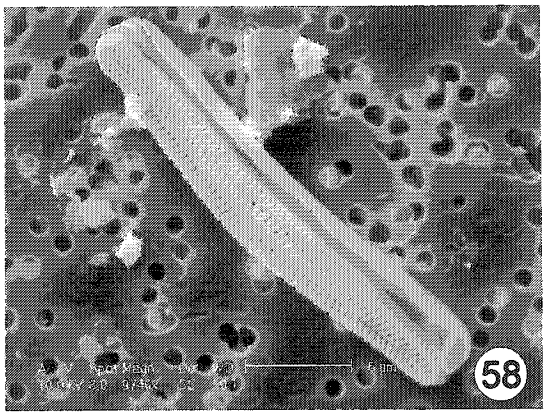
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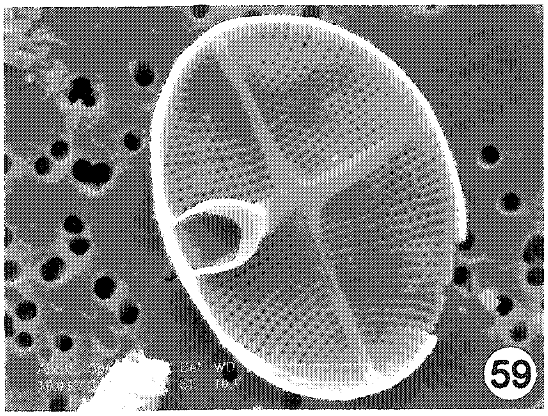
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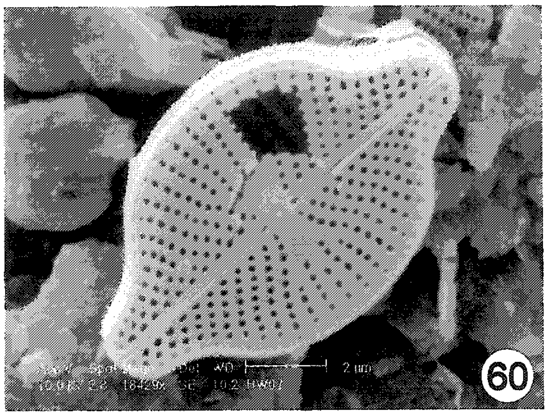
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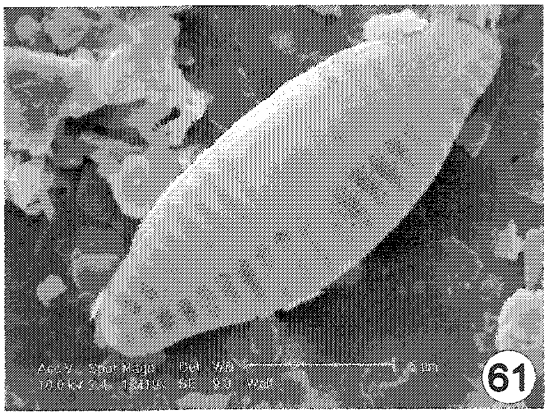
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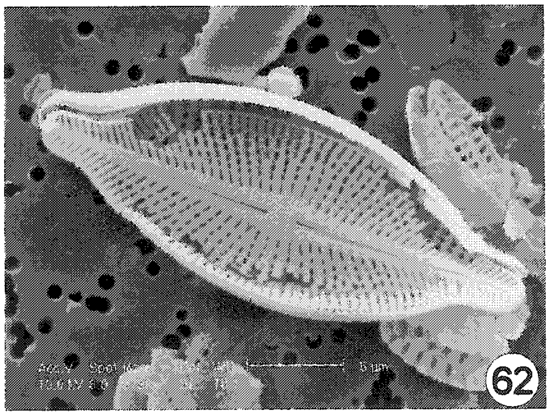
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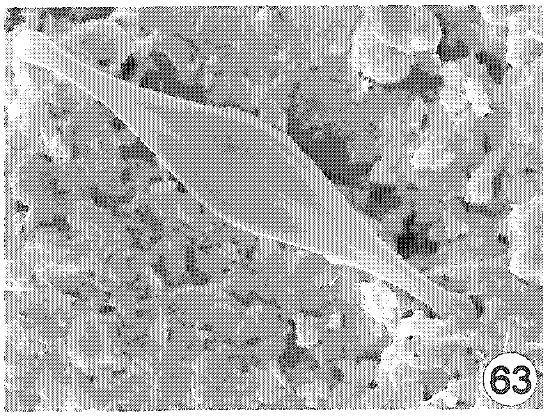
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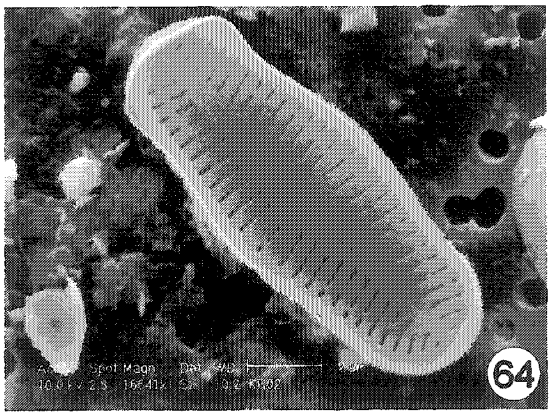
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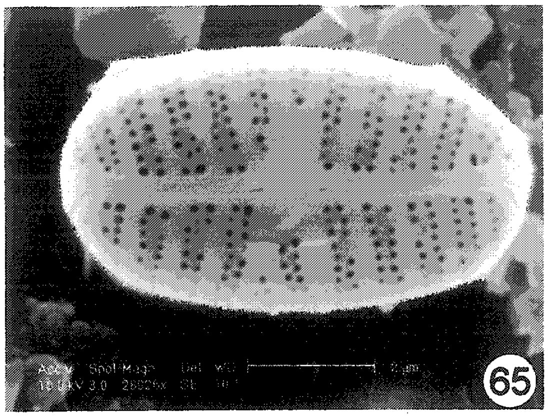
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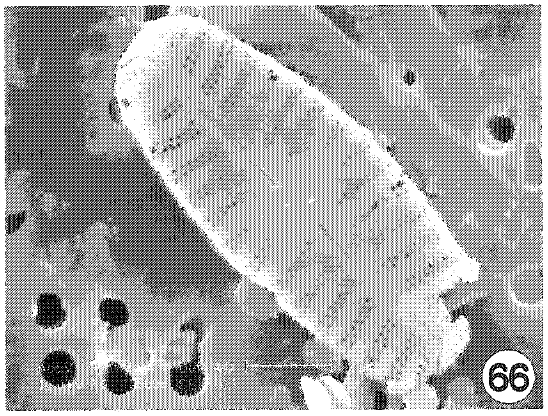
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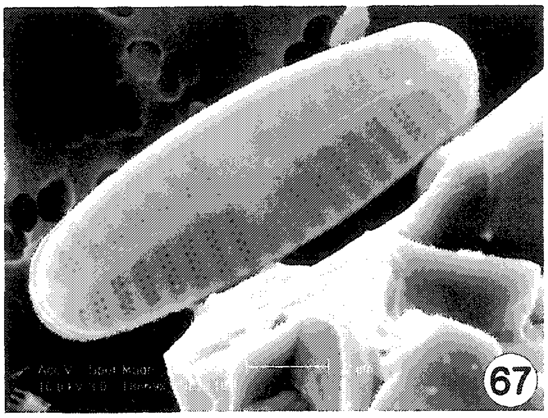
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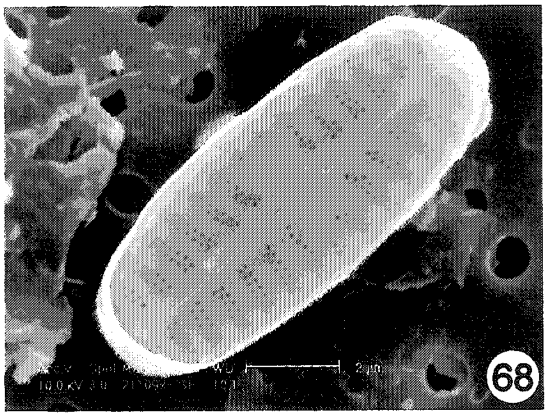
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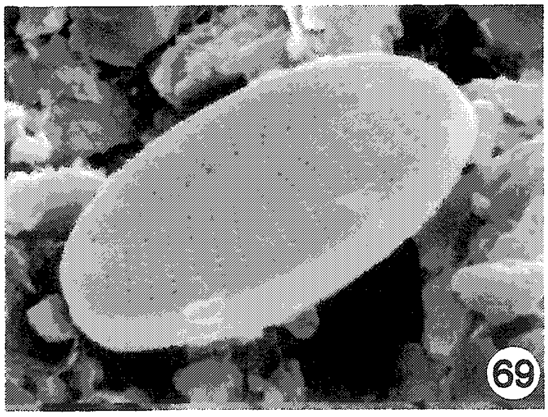
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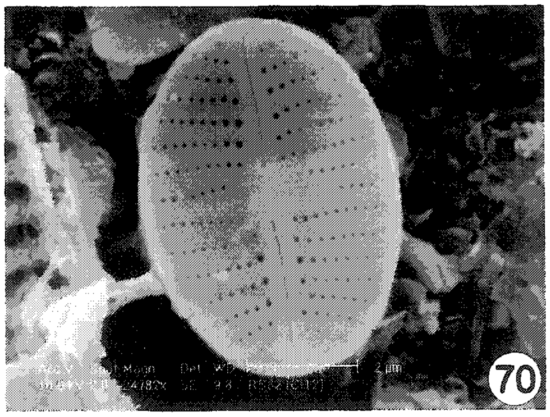
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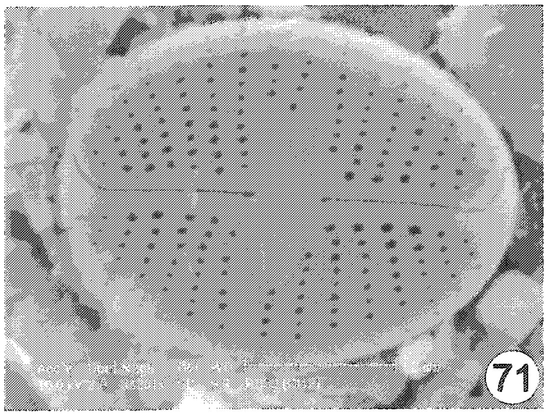
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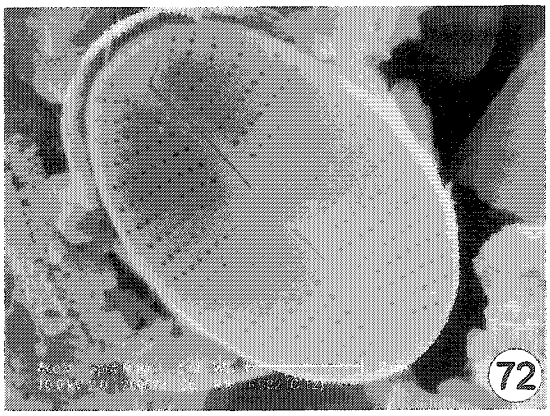
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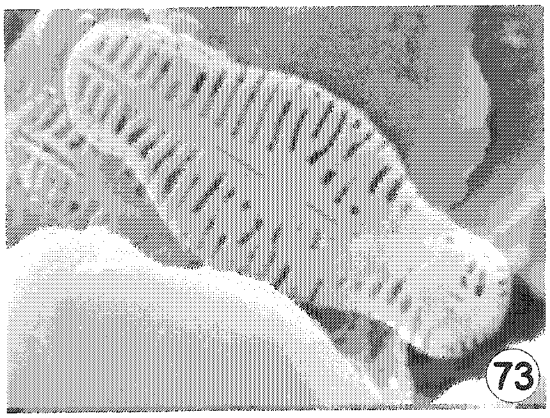
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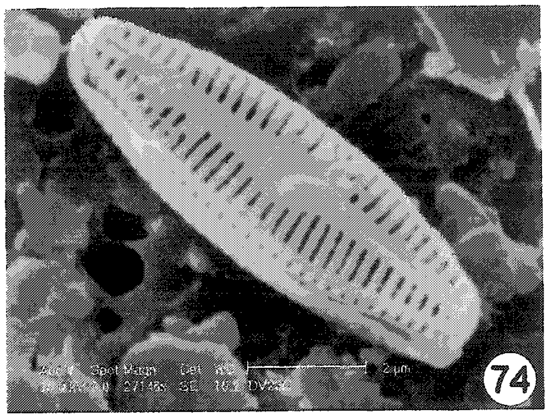

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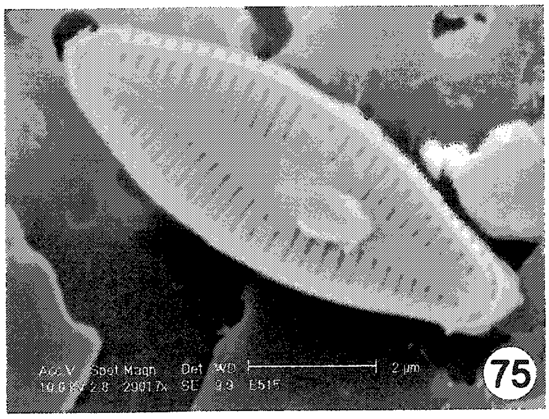

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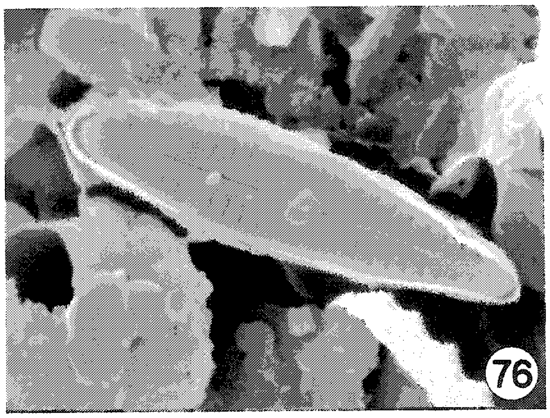
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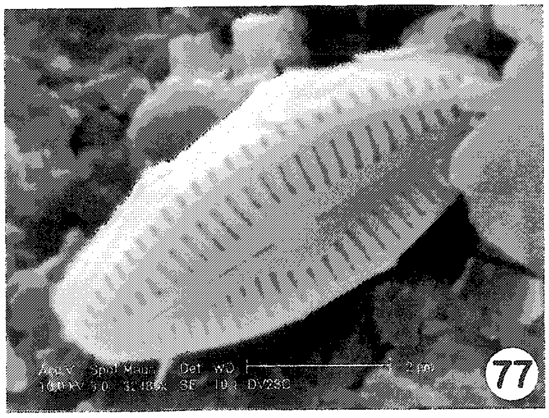

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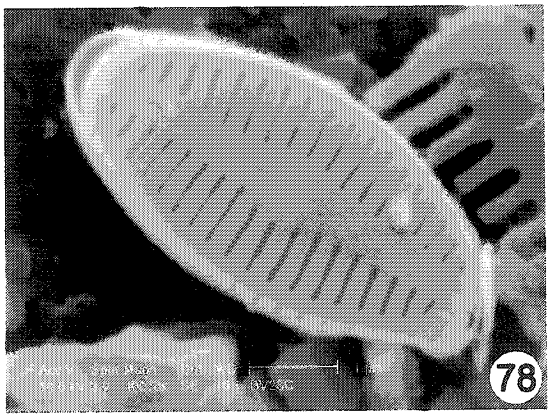

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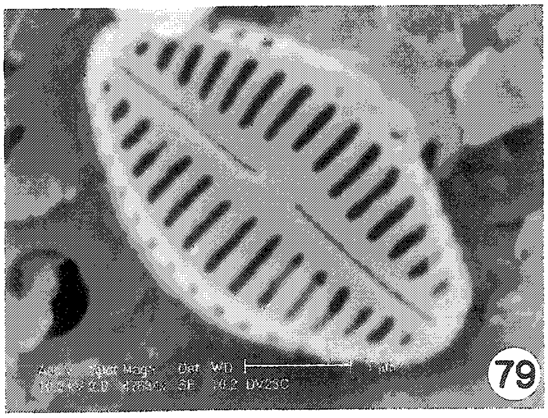
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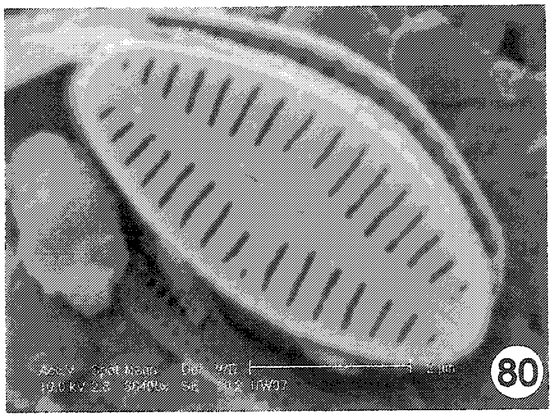

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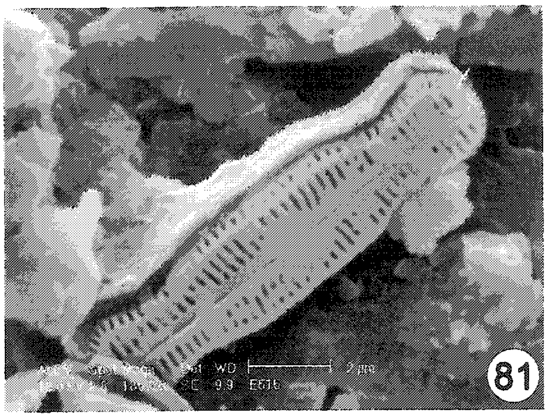

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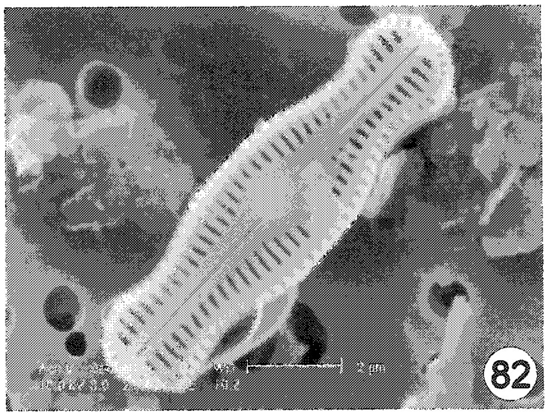

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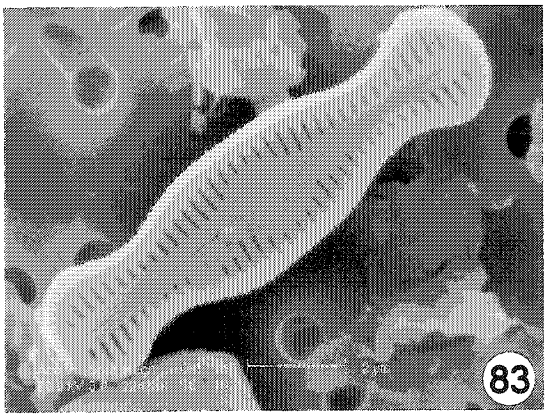

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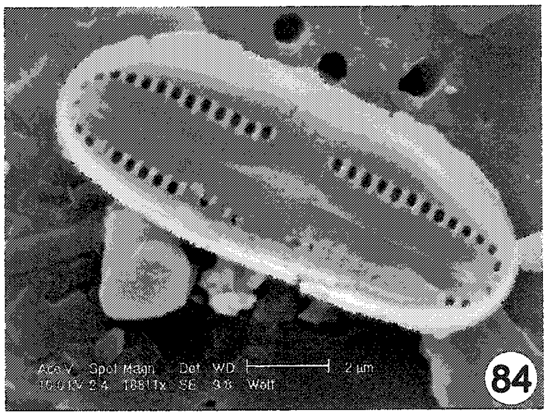

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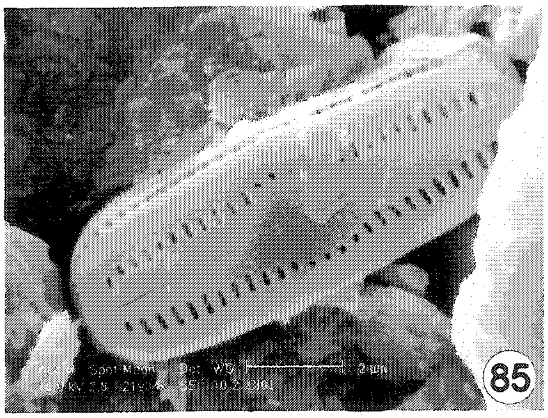

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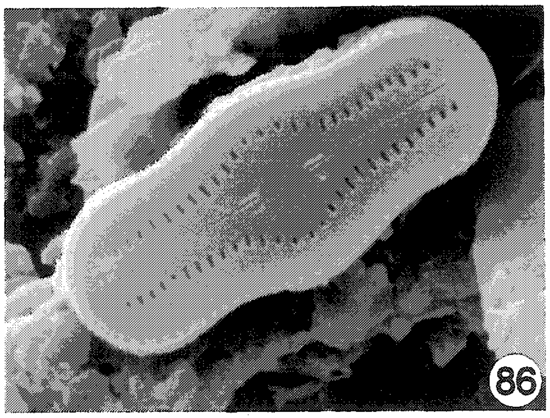

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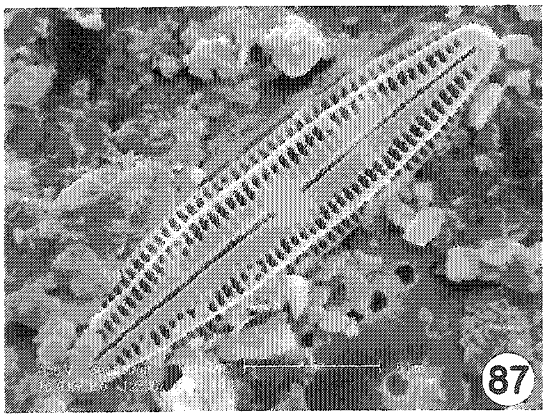

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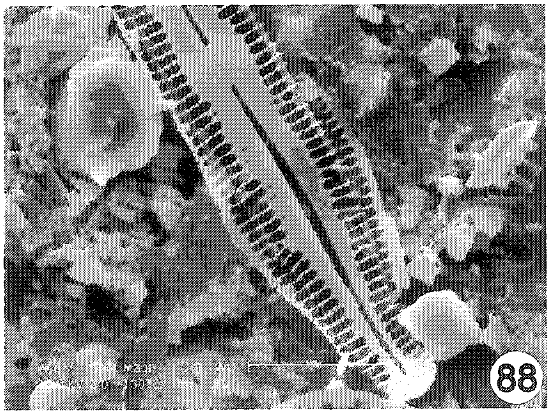

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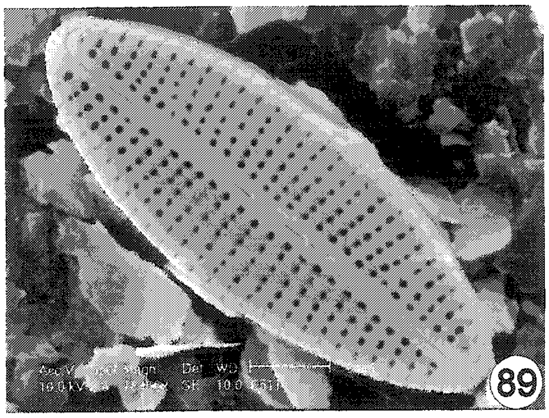
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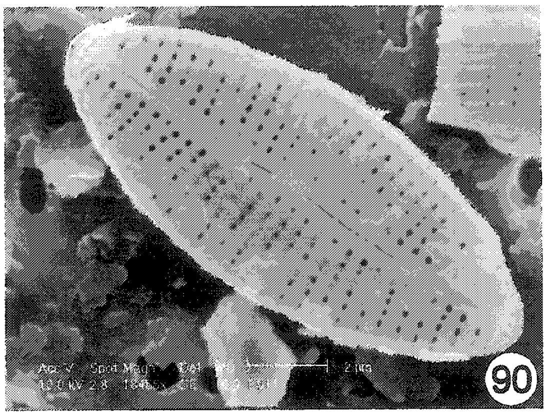
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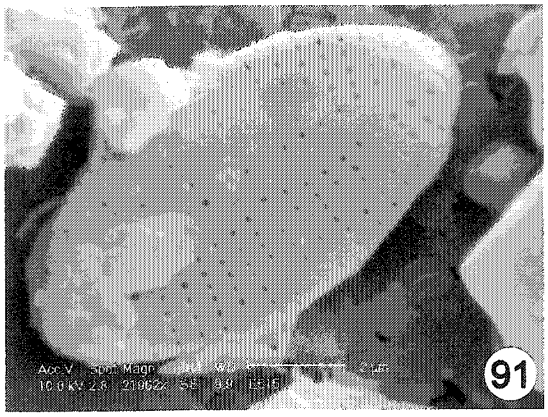
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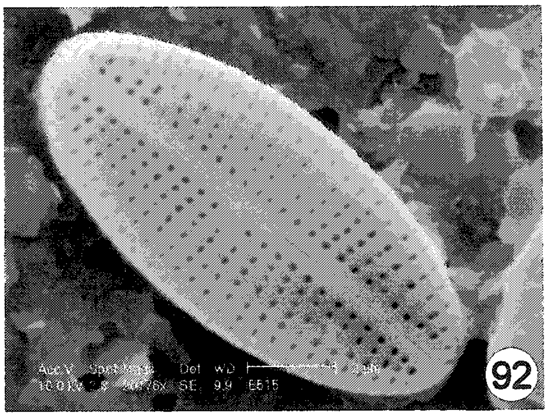
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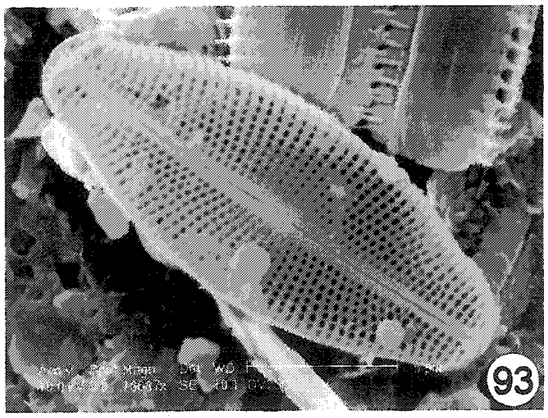
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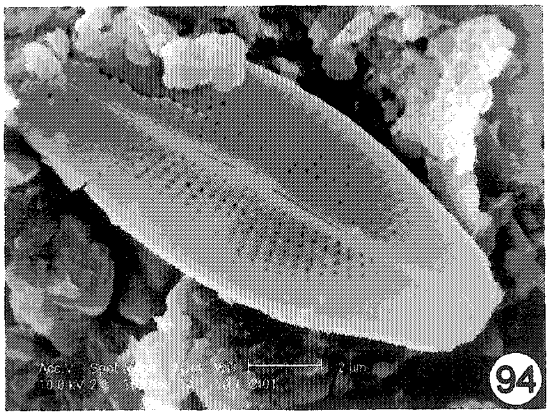
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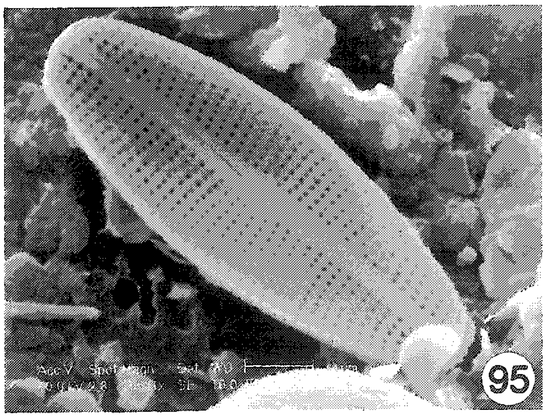
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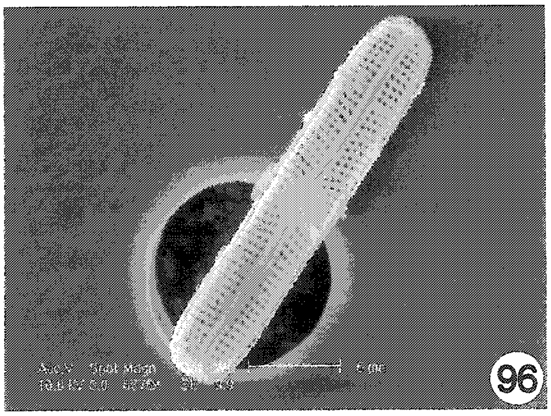
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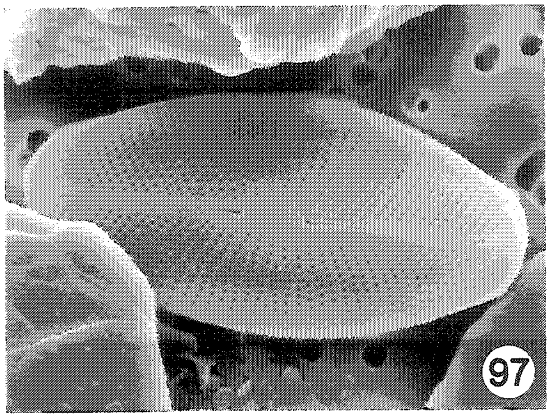
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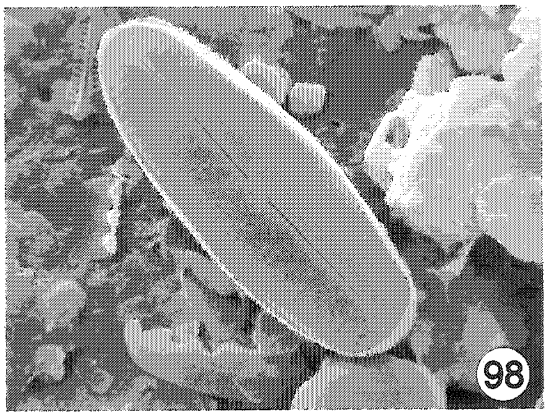
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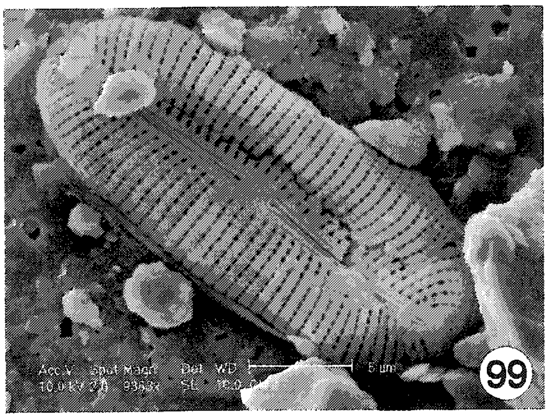
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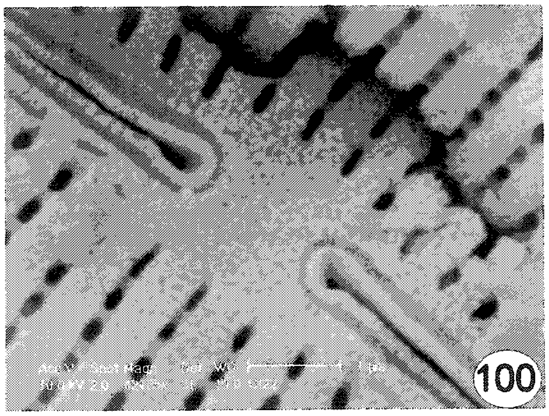
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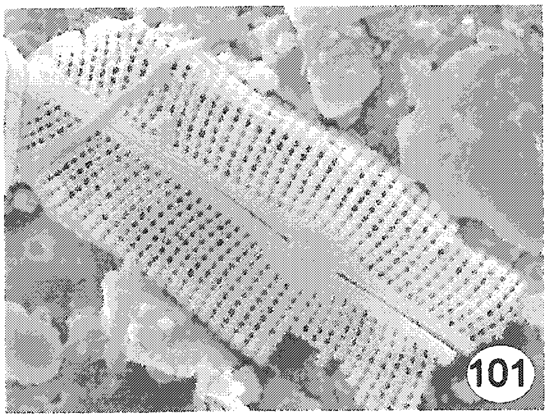
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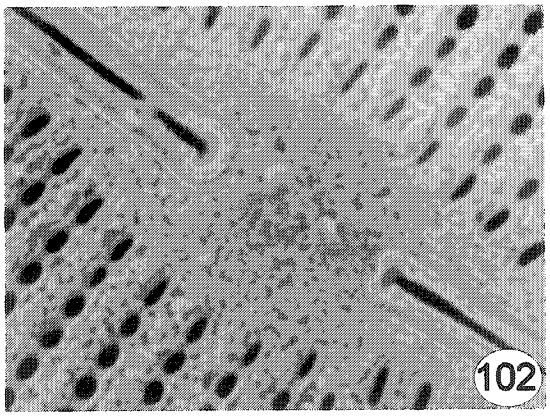
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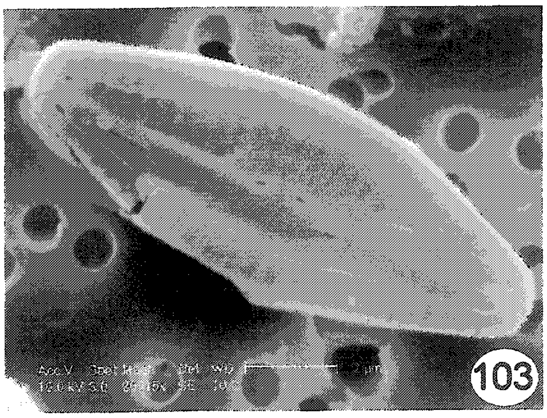
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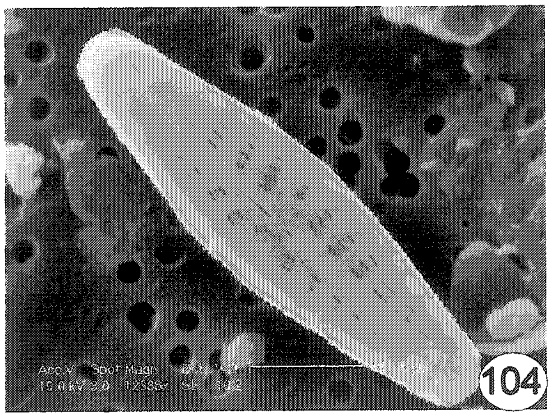
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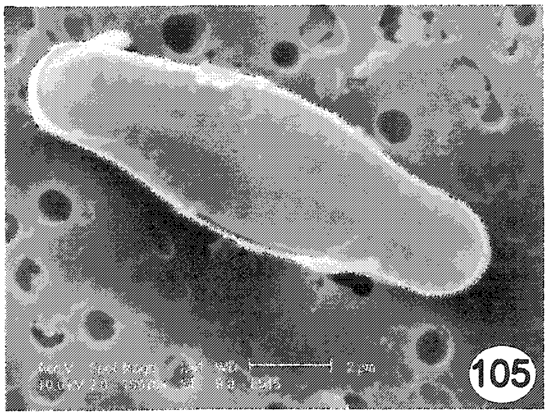

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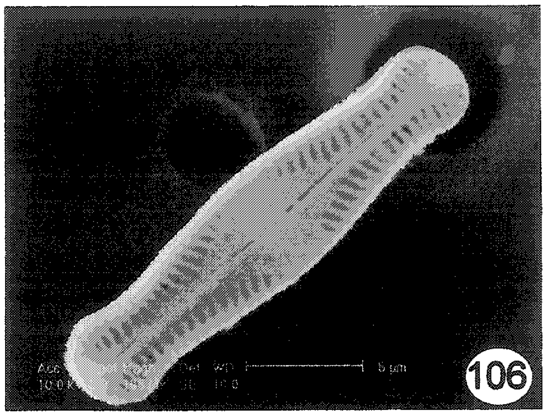

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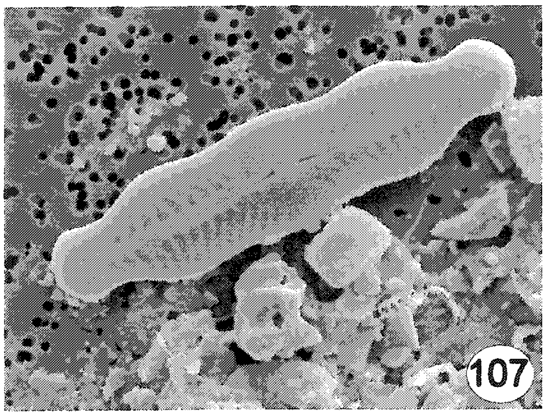

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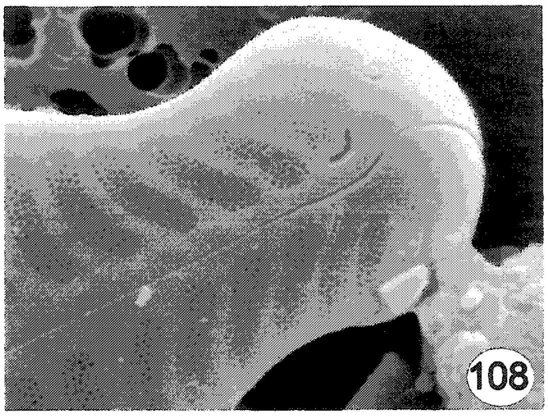

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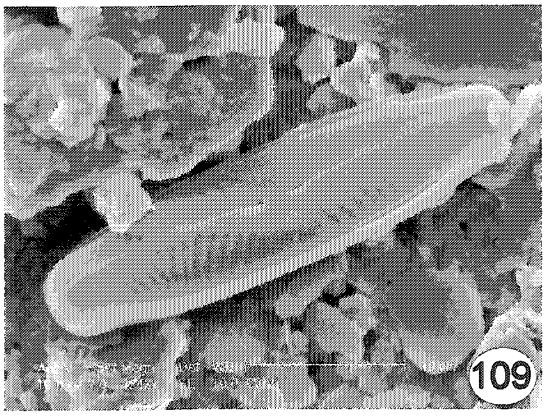

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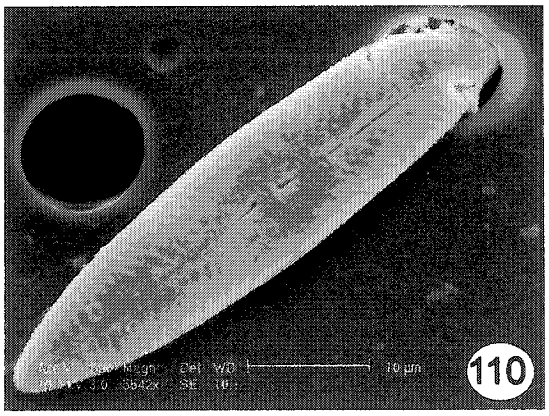

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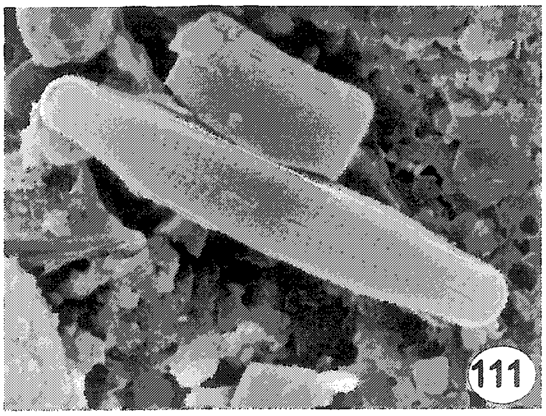

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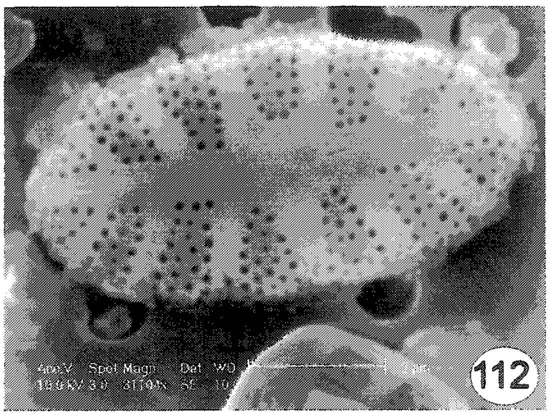

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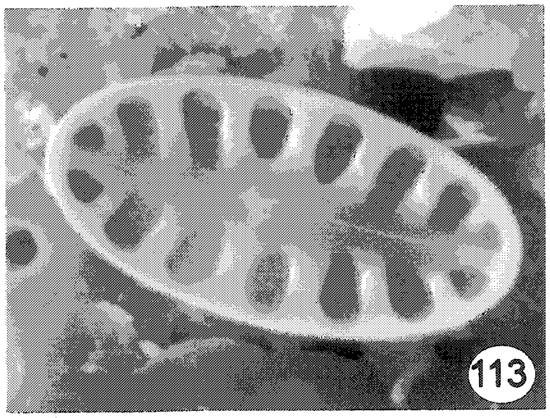
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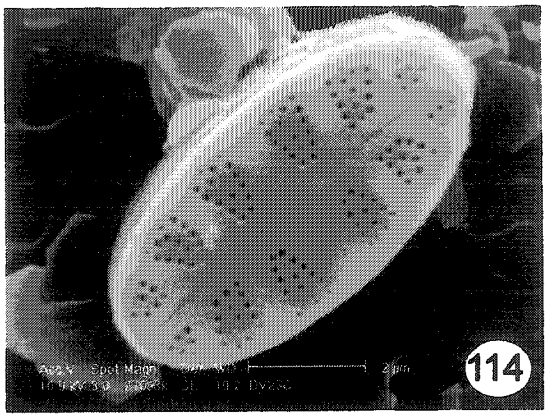
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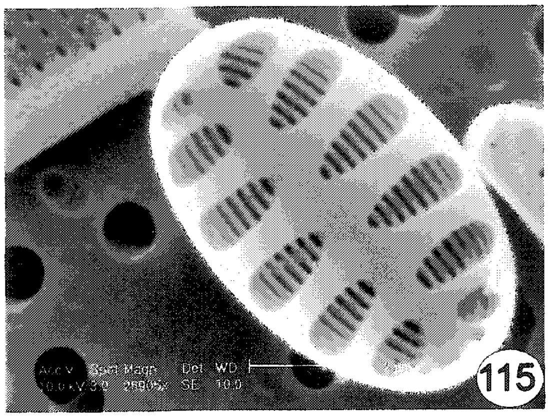
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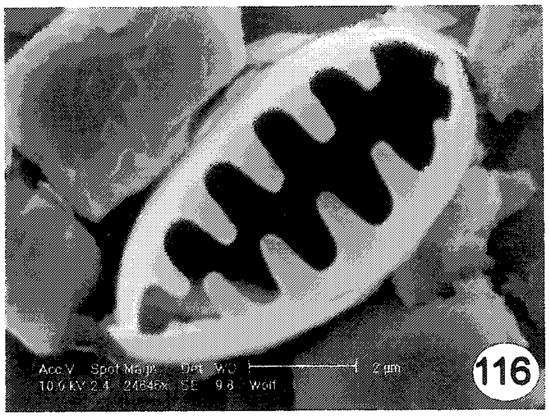
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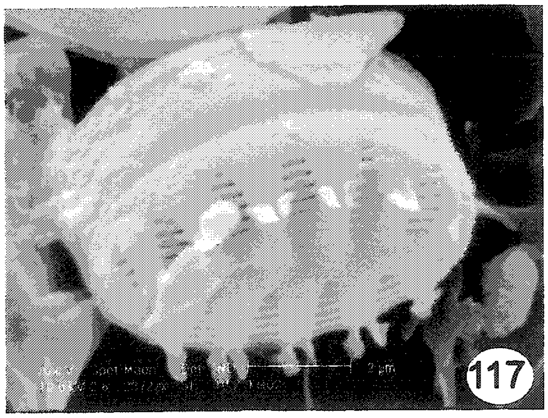
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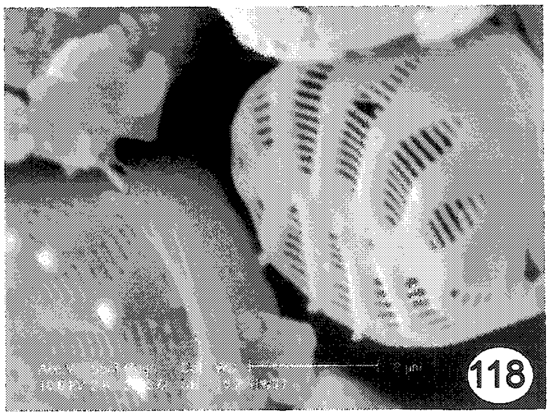
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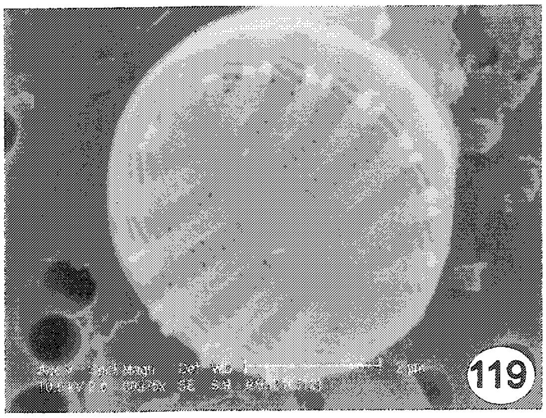
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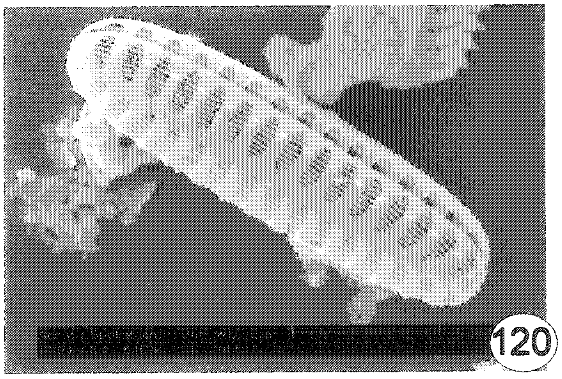
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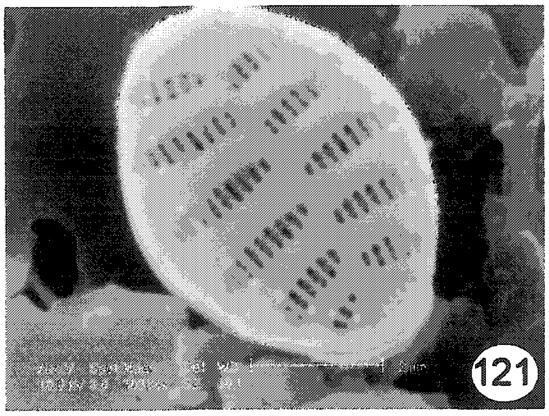
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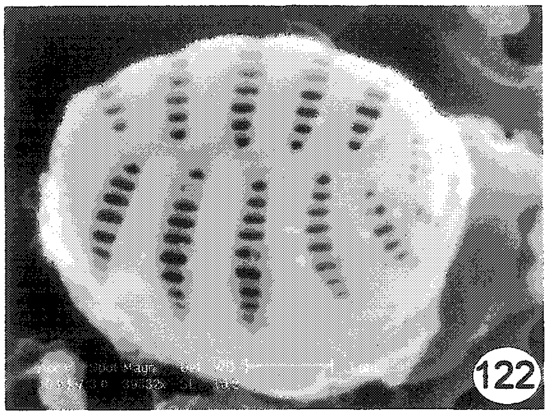
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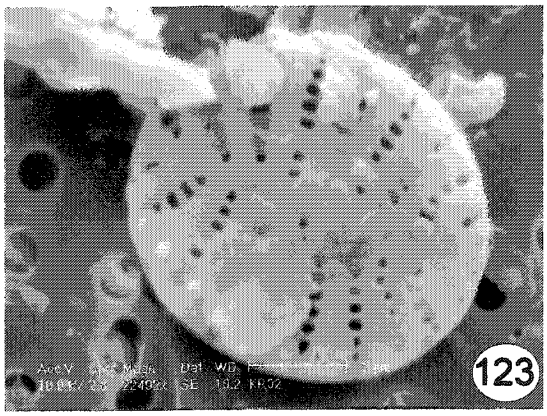
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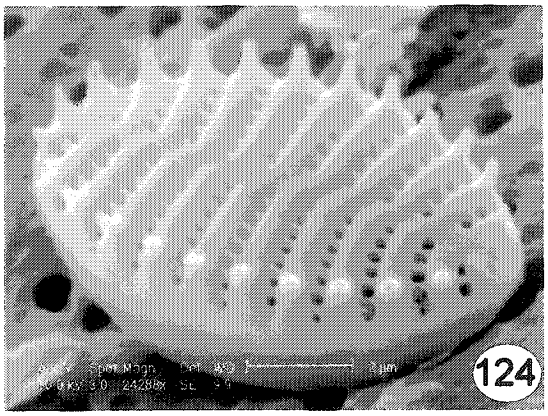
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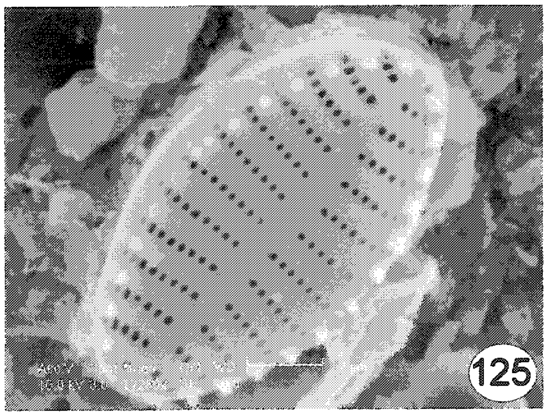
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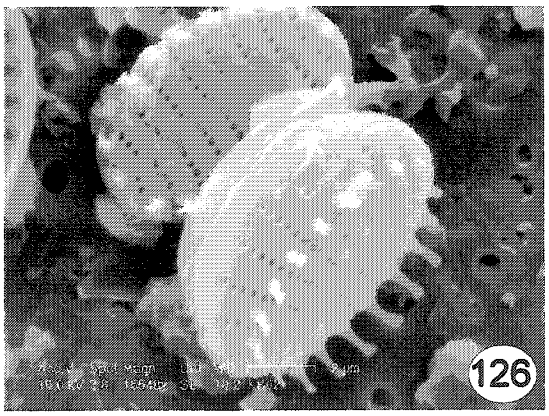
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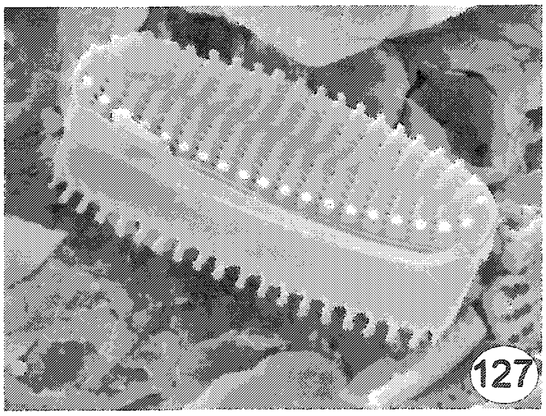
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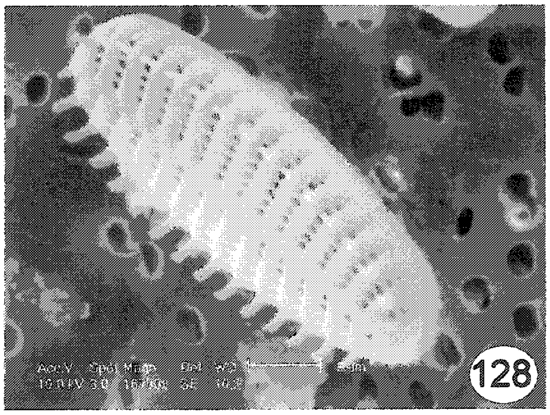
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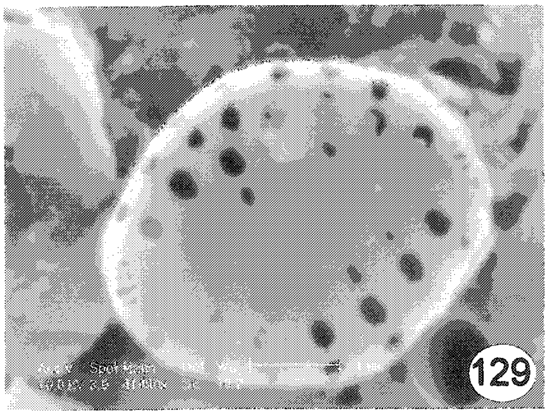
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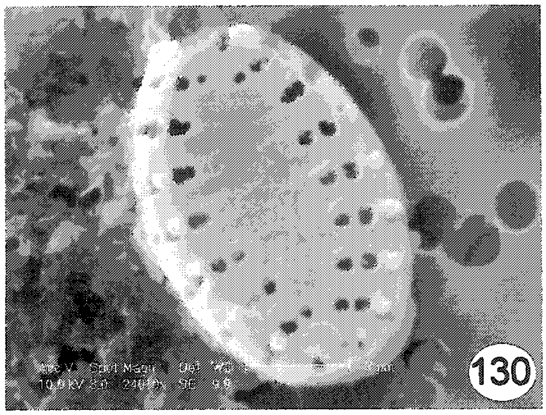
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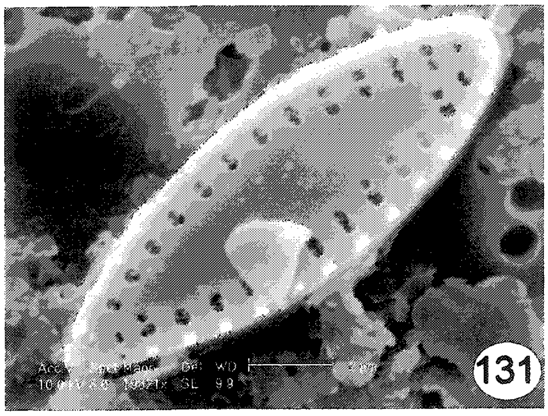
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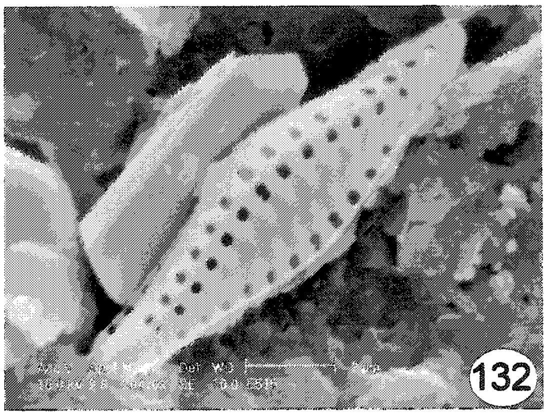
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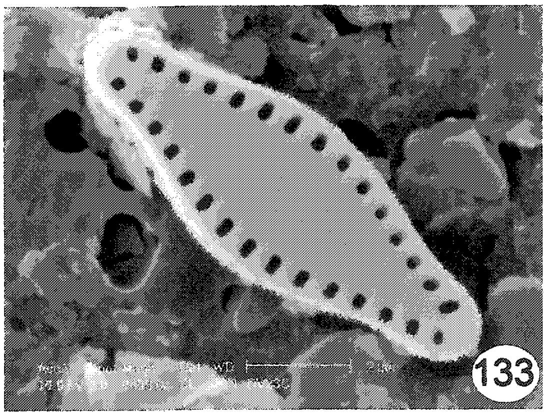
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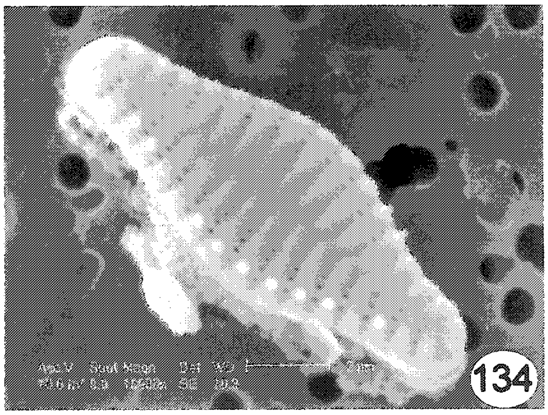
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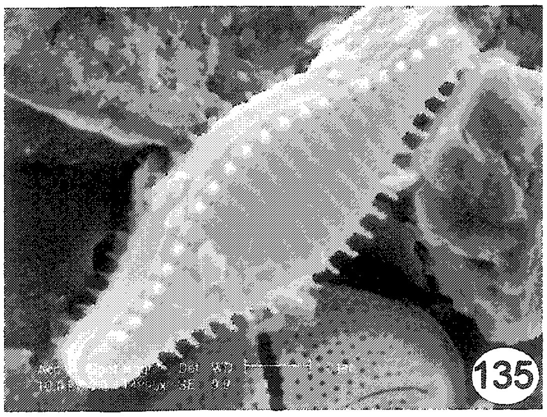
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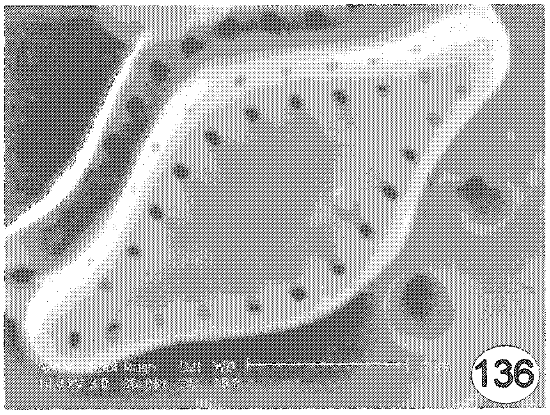
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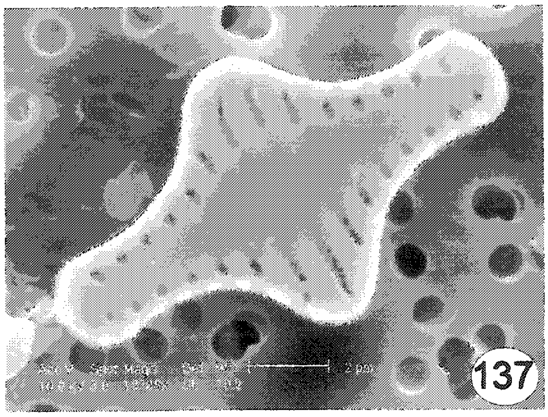
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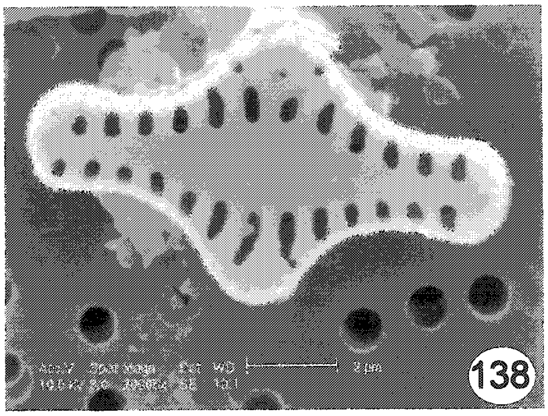
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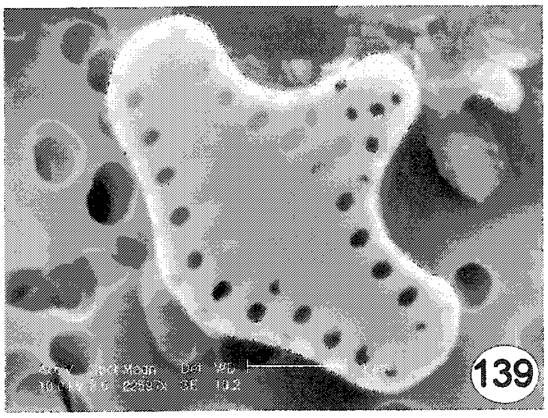
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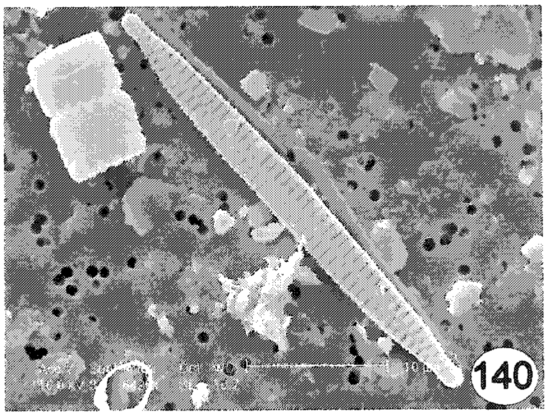
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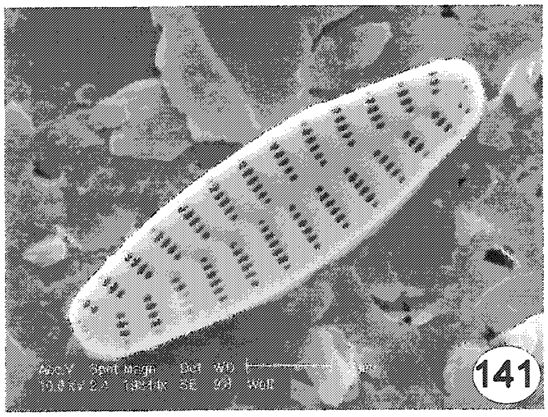
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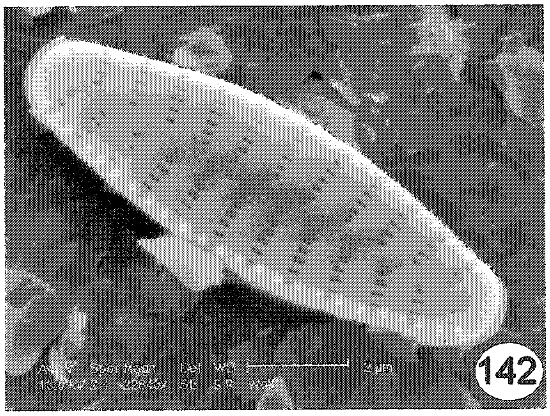
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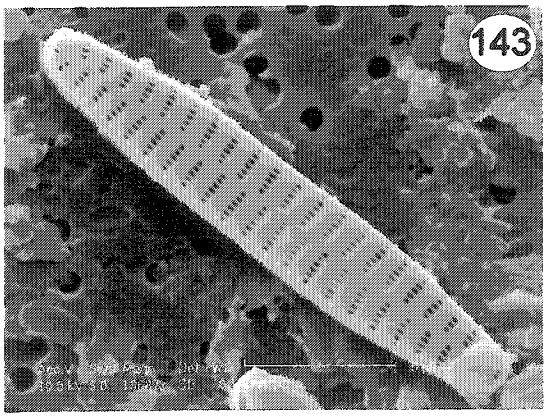
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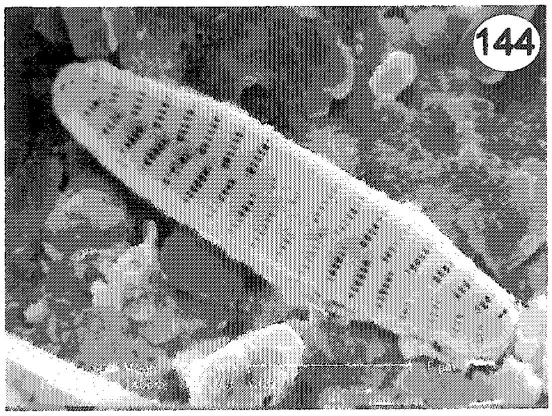
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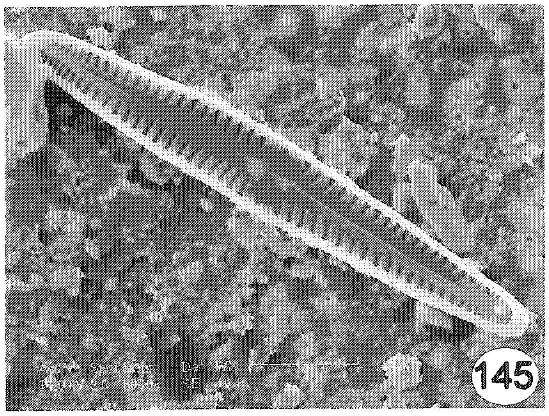
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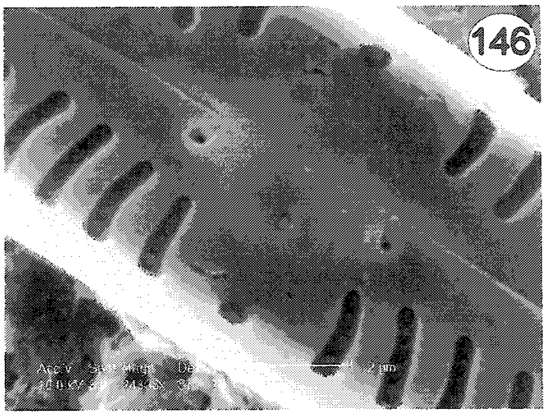
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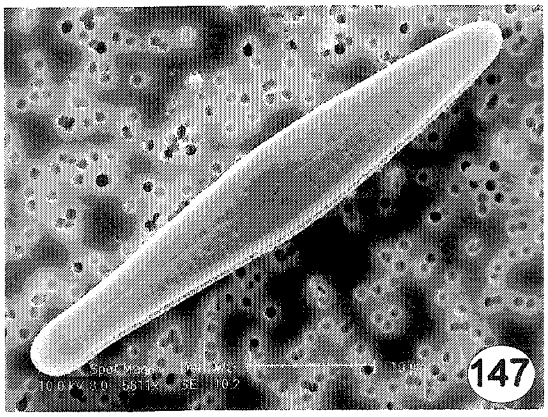
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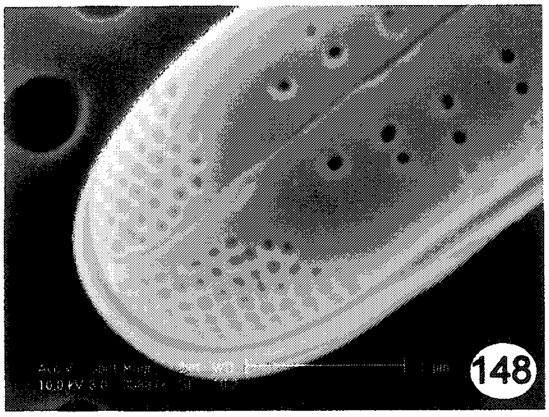
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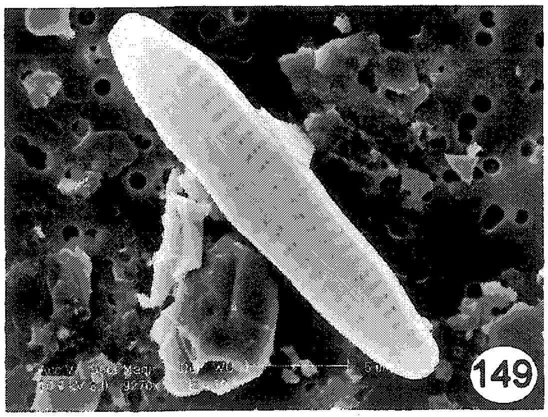
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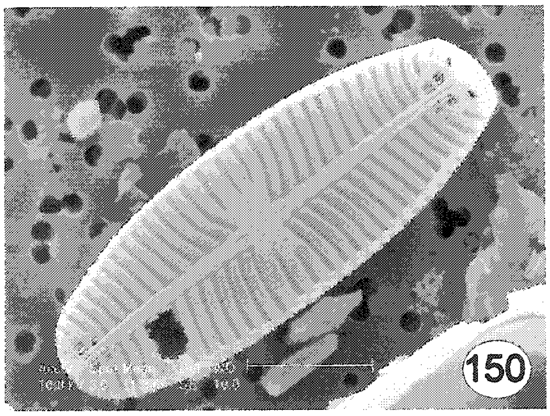
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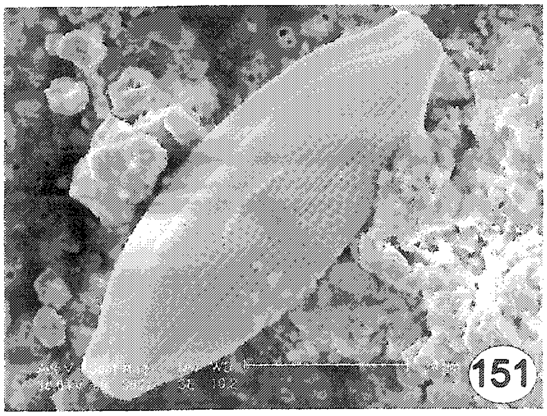
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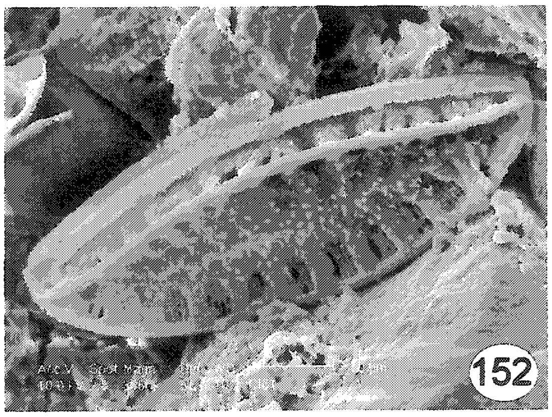
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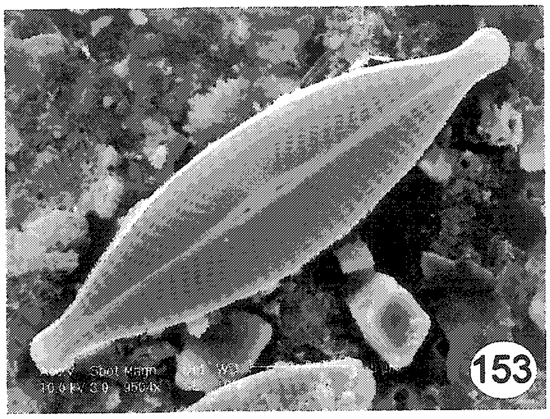
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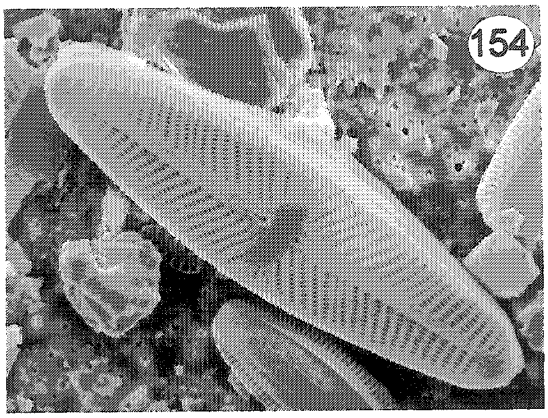
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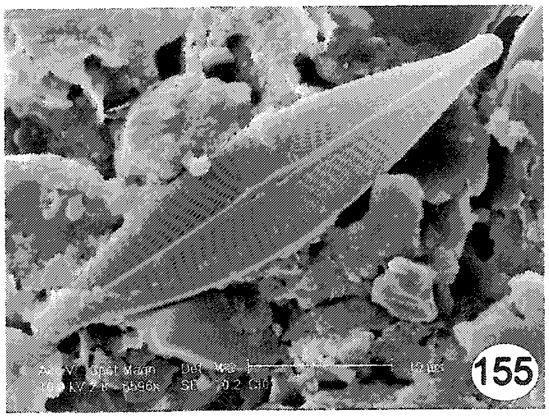
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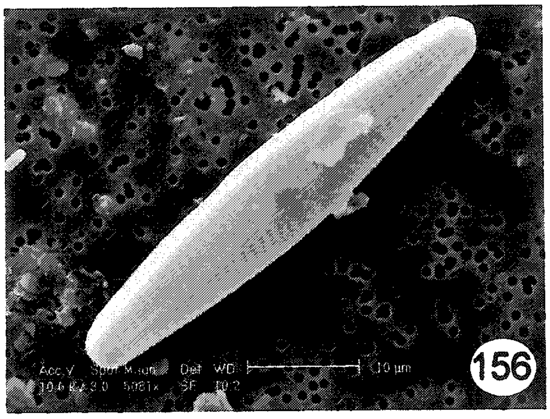
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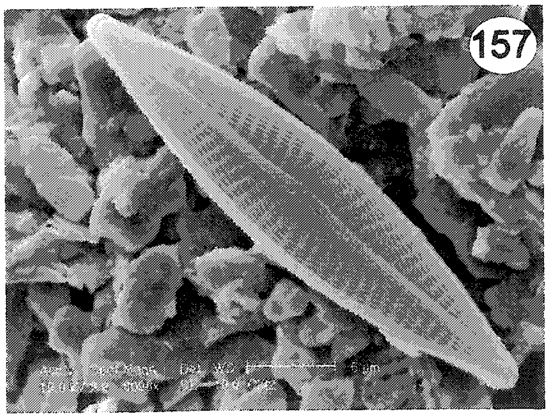
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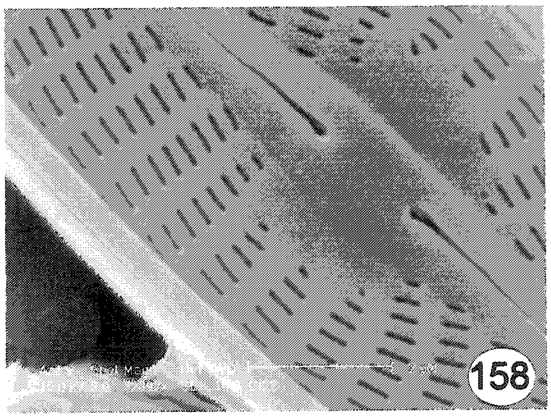
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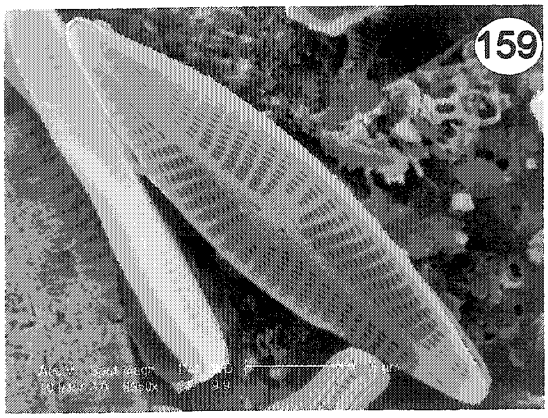
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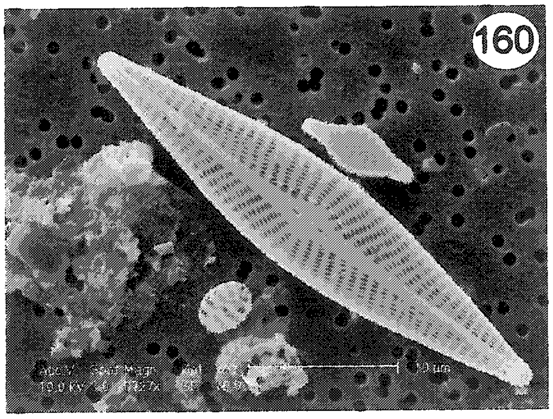
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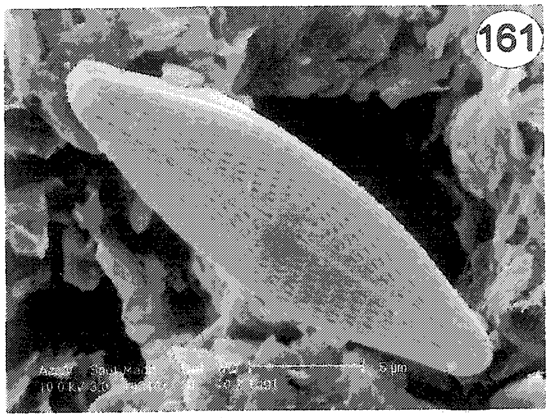

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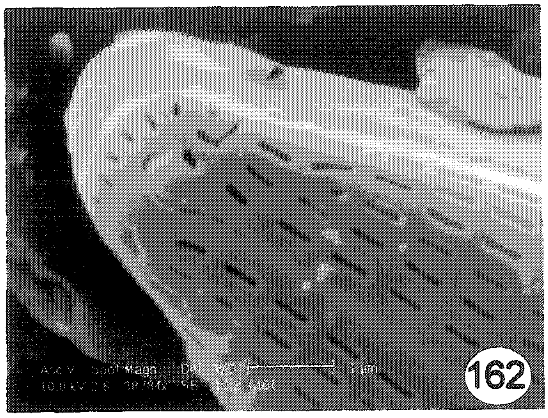

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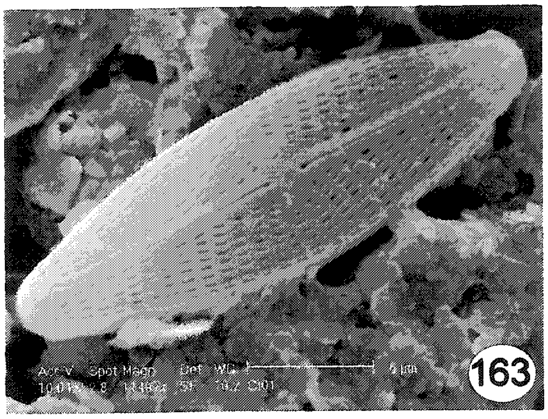

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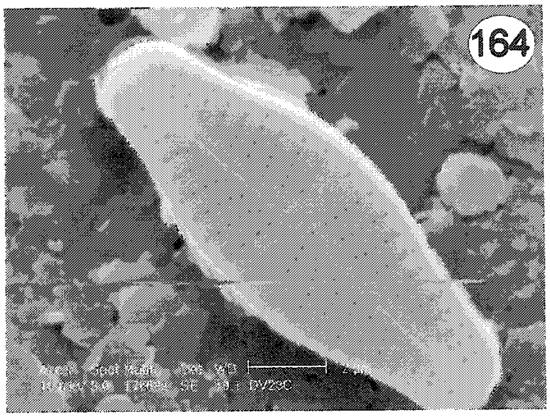

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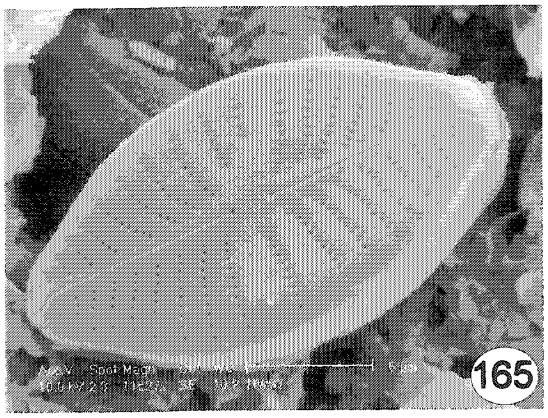

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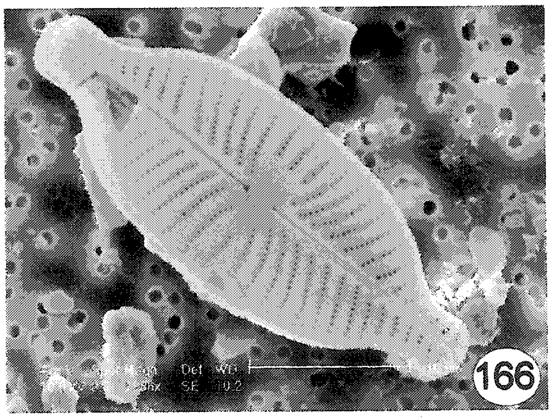

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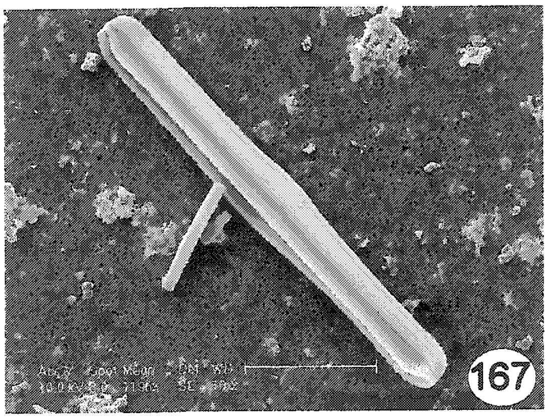

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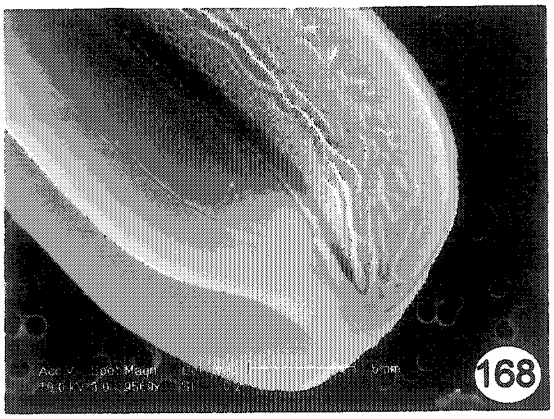

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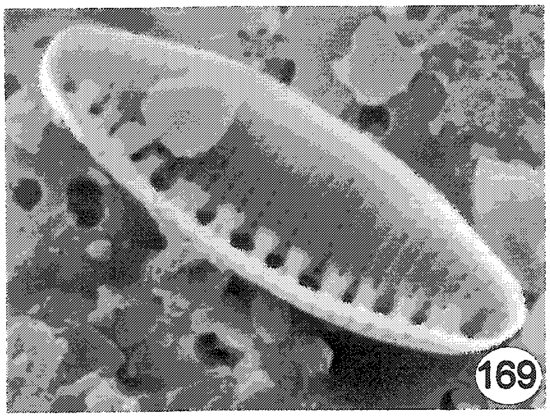
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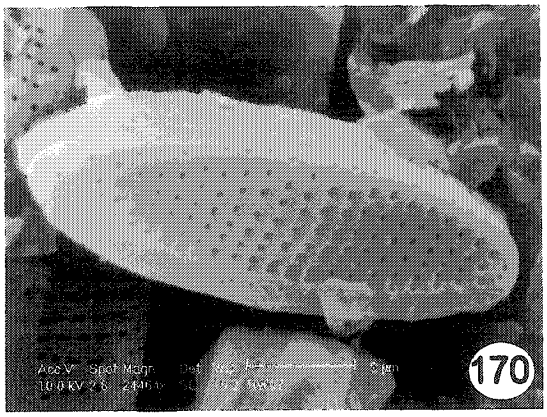
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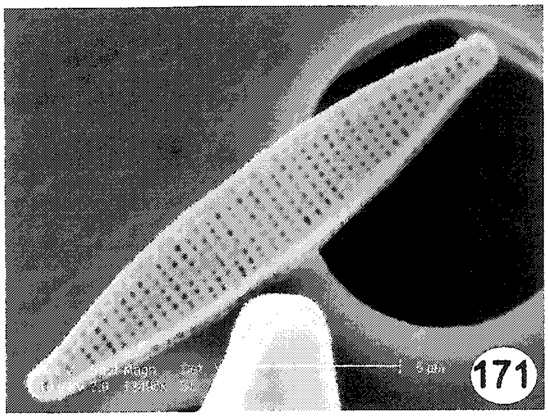
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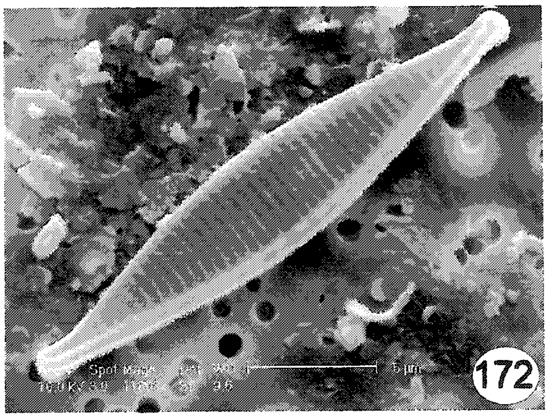
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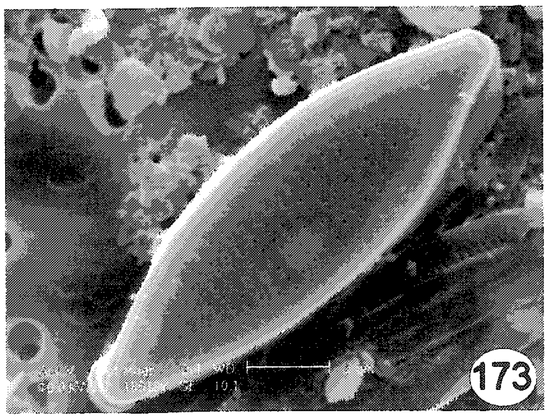
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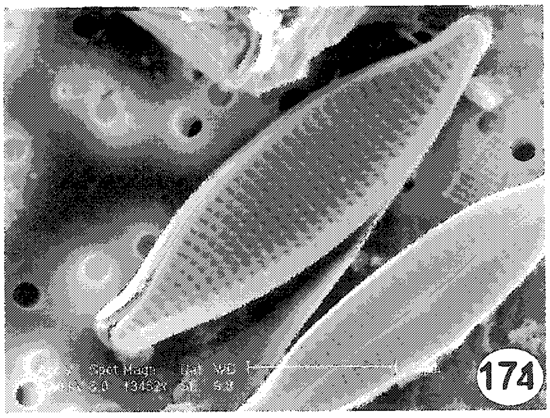
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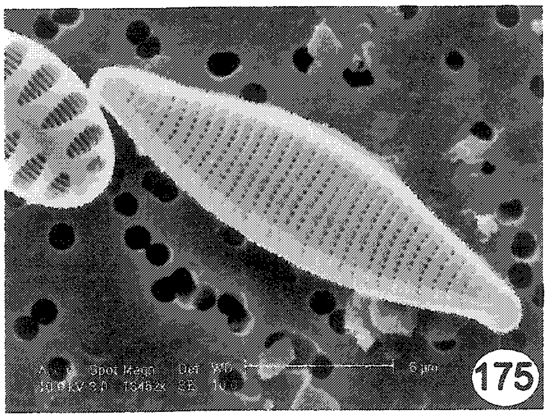
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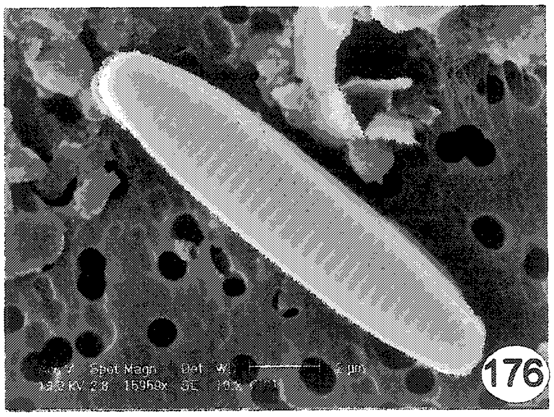
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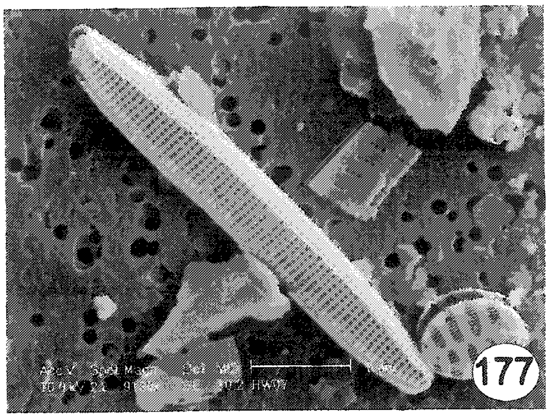
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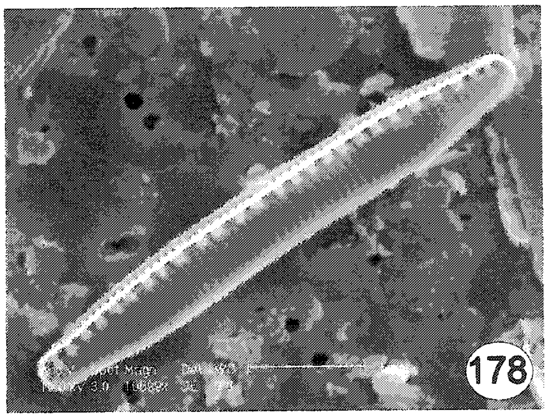
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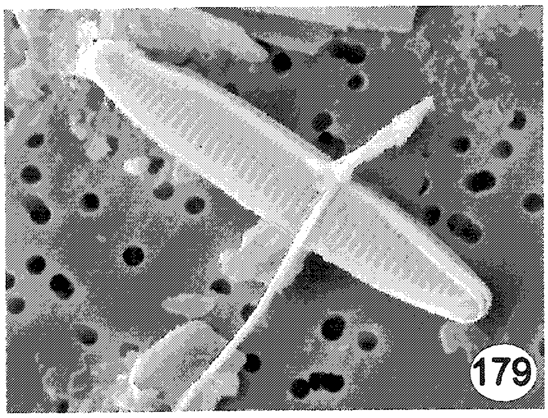
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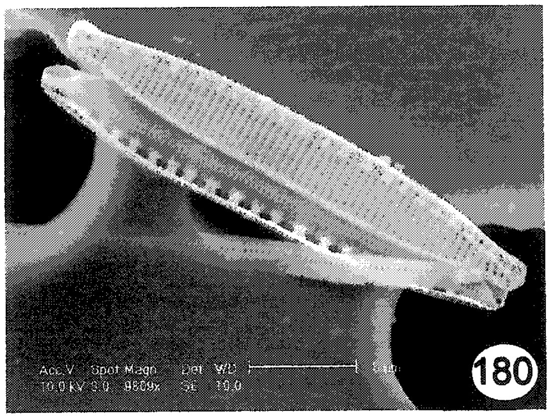
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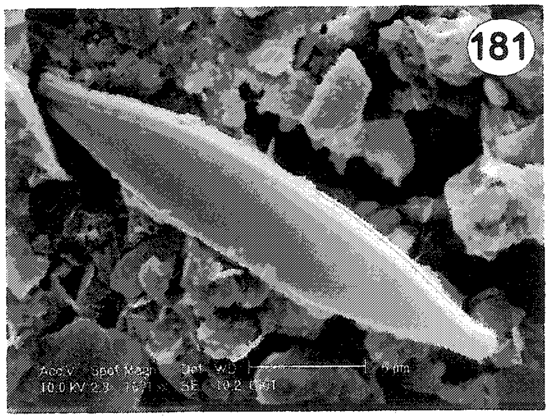
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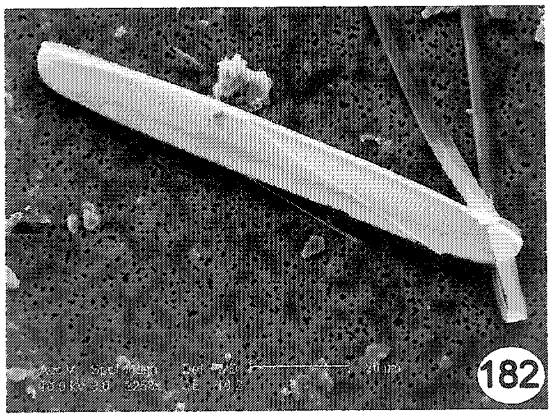
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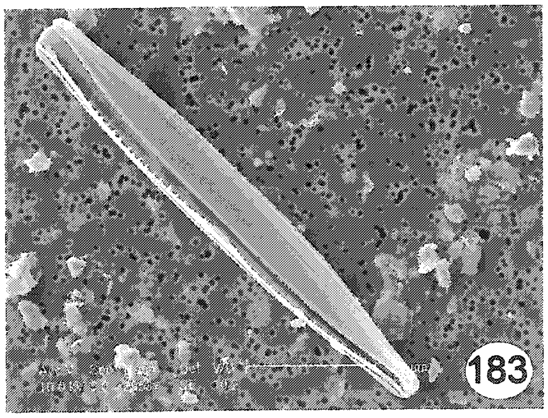
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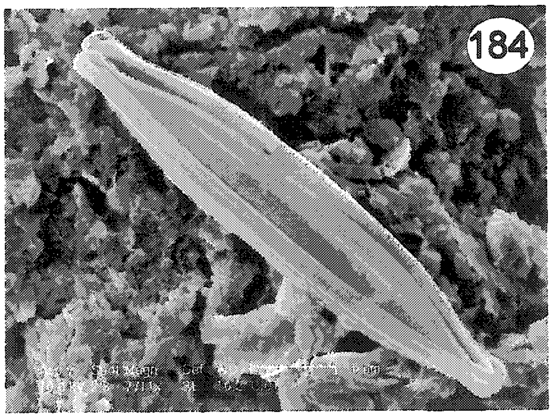
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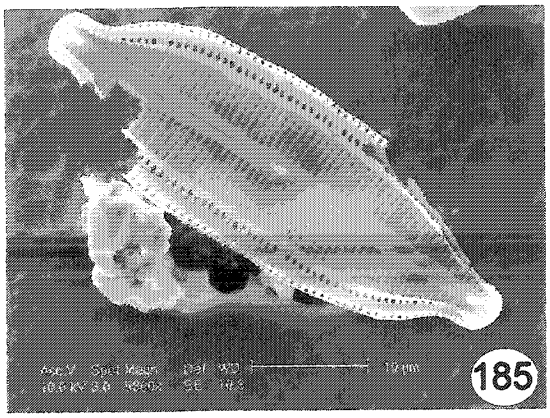

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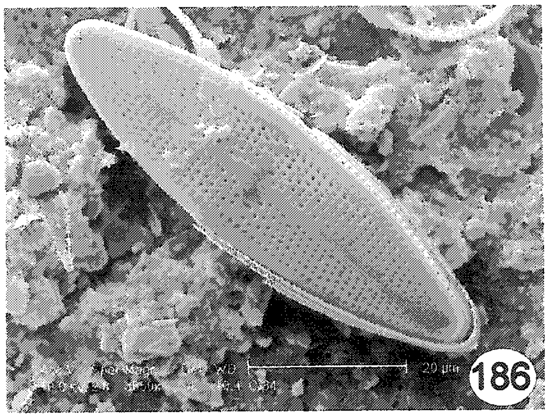

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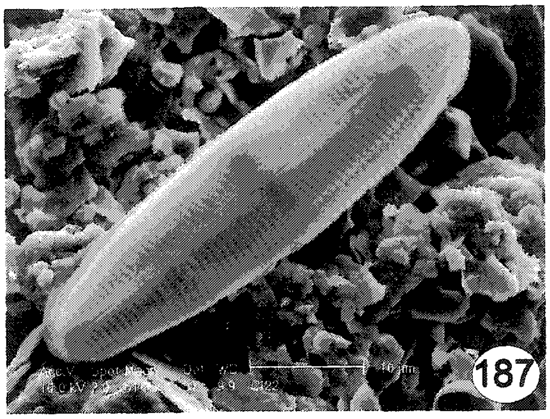

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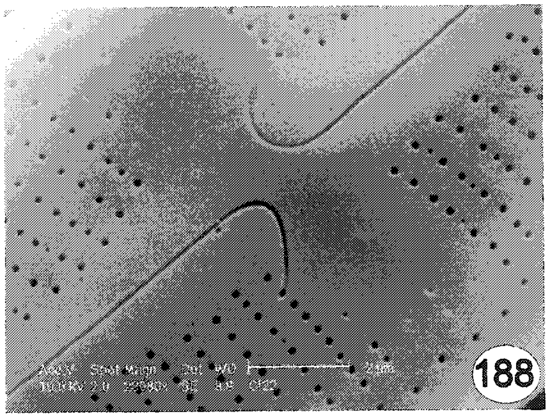

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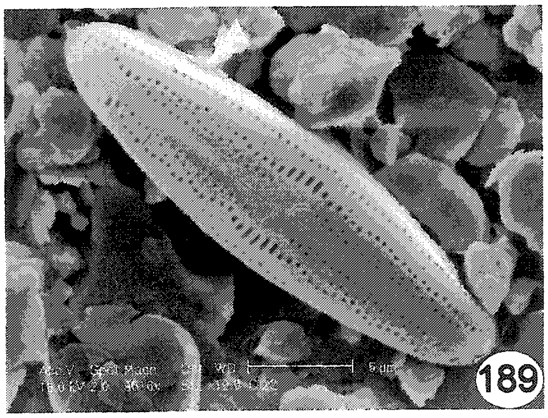

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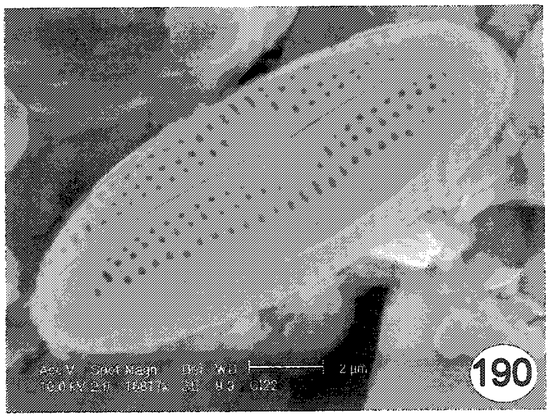

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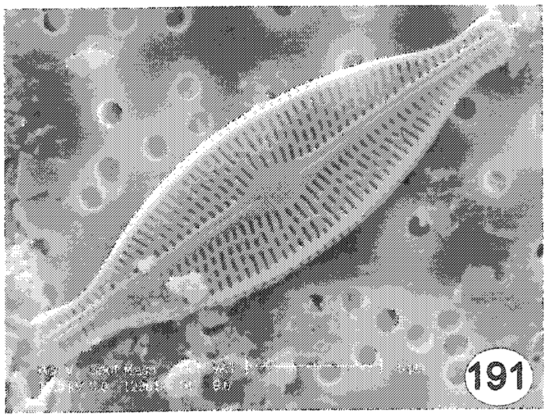

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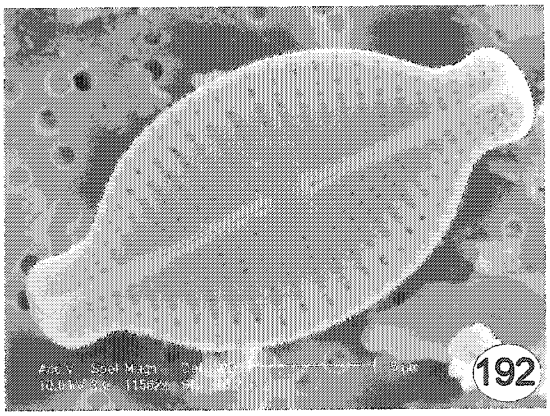

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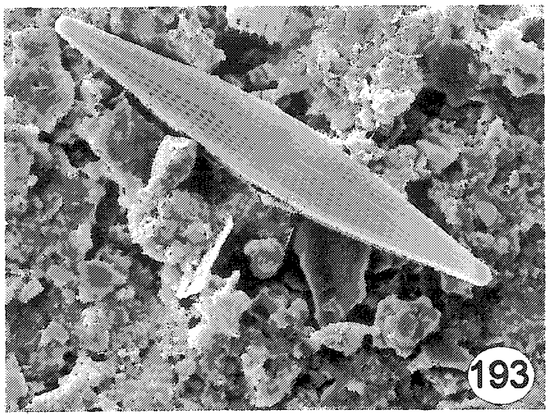
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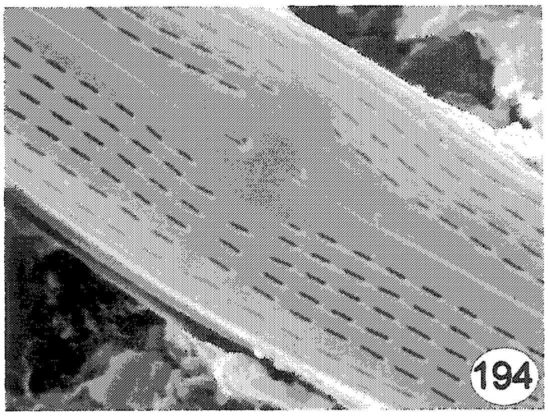
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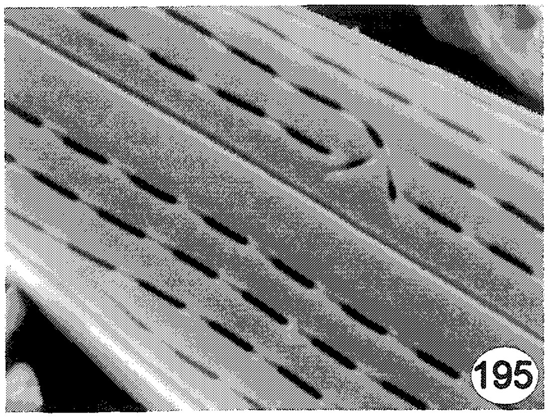
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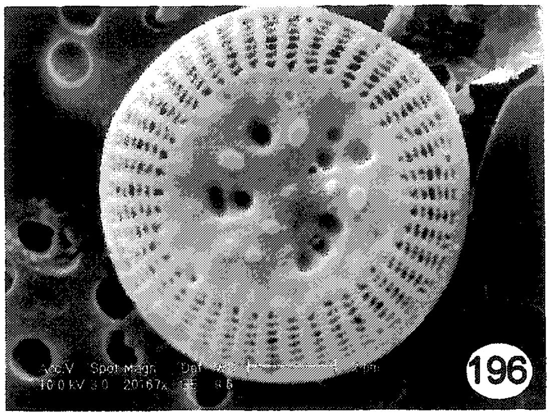
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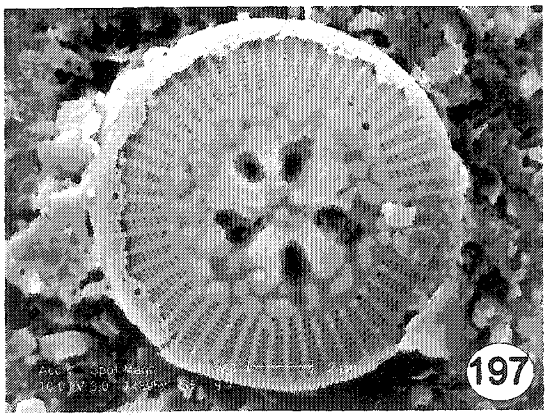
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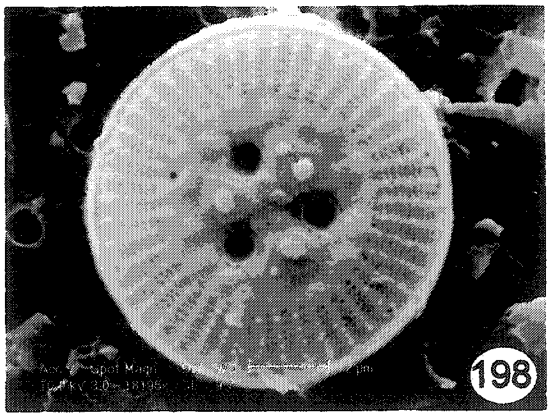
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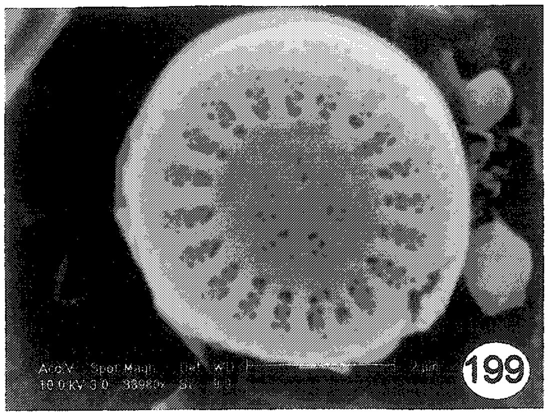
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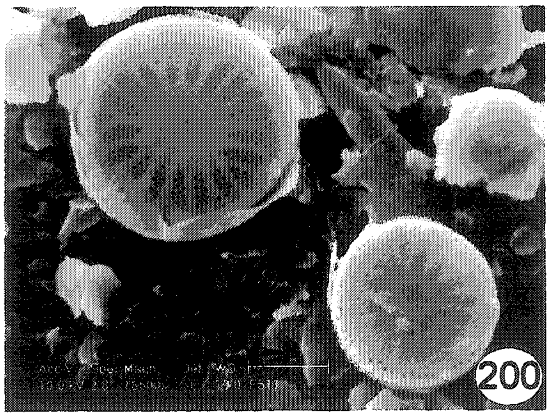
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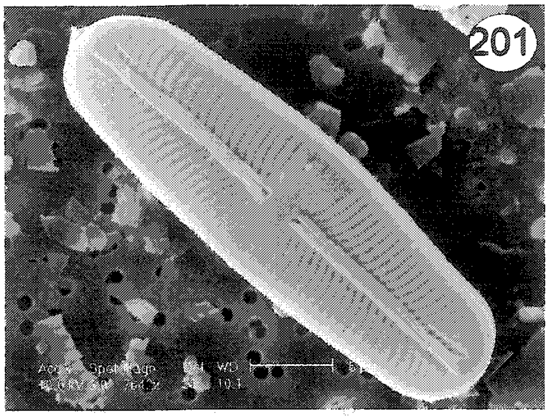
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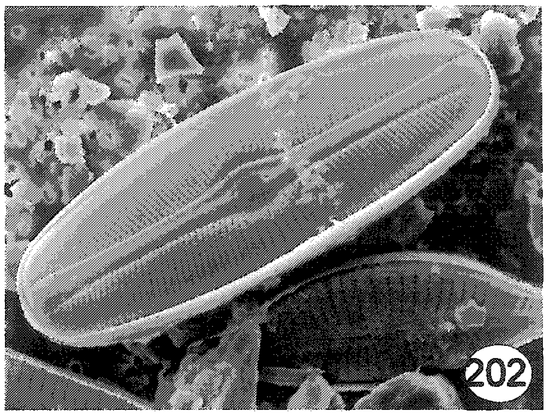
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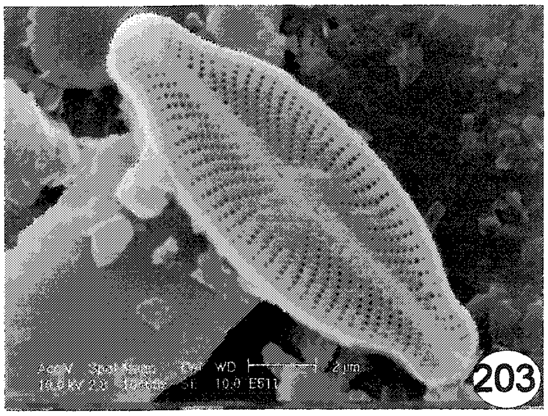

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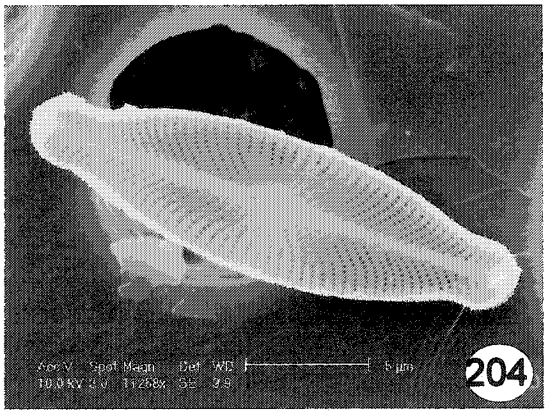

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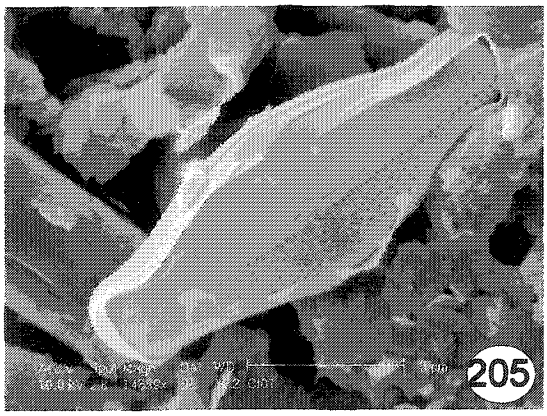
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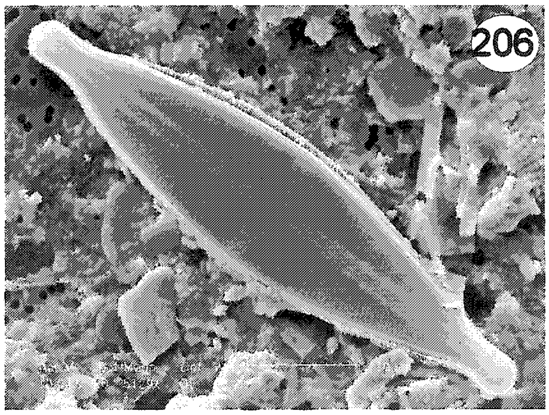
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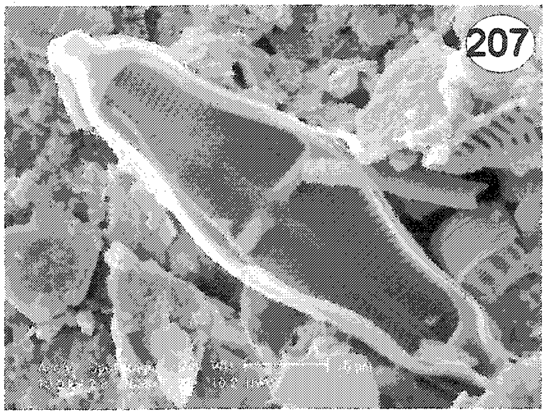
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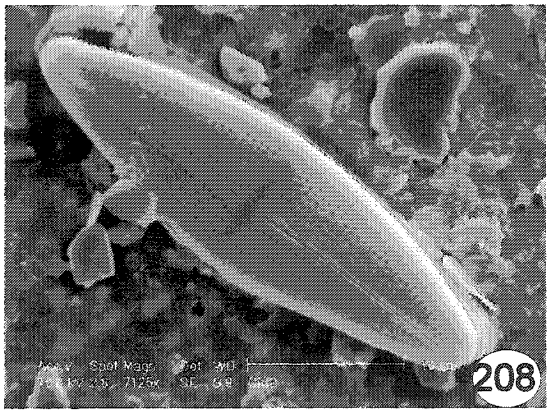

208

Figure 3.2. Light micrographs of selected diatoms from the surface sediments of 62 arctic lakes.

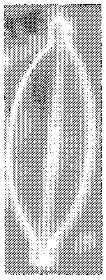
| **Picture #** | **Taxon** |
|---|---|
| 1 | *Achnanthes ingratiformis* Lange-Bertalot |
| 2 | *Achnanthes nitidiformis* Lange-Bertalot |
| 3 | *Achnanthes gracillima* Hustedt |
| 4 | *Achnanthes impexiformis* Lange-Bertalot |
| 5 | *Achnanthes rupestris* Krasske |
| 6 | *Achnanthes nodosa* Cleve |
| 7 | *Achnanthes kriegeri* Krasske |
| 8 | *Achnanthes ziegleri* Lange-Bertalot |
| 9 | *Achnanthes daui* Foged |
| 10 | *Achnanthes grana* Hohn & Hellermann |
| 11 | *Achnanthes conspicua* Mayer |
| 12 | *Eucocconeis alpestris* (Brun) Lange-Bertalot |
| 13 | *Eucocconeis leptostriata* Lange-Bertalot |
| 14 | *Eucocconeis flexella* (Kützing) Cleve |
| 15 | *Eucocconeis laevis* (Østrup) Lange-Bertalot |
| 16 | *Achnanthidium minutissimum* (Kützing) Czarnecki |
| 17 | *Planothidium frequentissimum* (Lange-Bertalot) Round & Bukhtiyarova |
| 18 | *Planothidium calcar* (Cleve) Round & Bukhtiyarova |
| 19 | *Planothidium oestrupii* (Cleve-Euler) Round & Bukhtiyarova |
| 20 | *Planothidium lanceolatum (*ssp.oder aff.ssp. *lanceolatoides?)* (Brébisson) Round & Bukhtiyarova |
| 21 | *Rossithidium petersenii* (Hustedt) Round & Bukhtiyarova |
| 22 | *Rossithidium pusillum* (Grunow) Round & Bukhtiyarova |
| 23 | *Psammothidium sacculum* (Carter) Bukhtiyarova |
| 24 | *Psammothidium ventralis* (Krasske) Bukhtiyarova & Round |
| 25 | *Psammothidium marginulatum* (Grunow) Bukhtiyarova & Round |
| 26, 27 | *Psammothidium levanderi* (Hustedt) Czarn |
| 28 | *Psammothidium subatomoides* (Hustedt) Bukhtiyarova & Round |
| 29 | *Psammothidium bioretii* (Germain) Bukhtiyarova & Round |
| 30 | *Psammothidium grischunum* f. *daonensis* (Lange-Bertalot) Bukhtiyarova & Round |
| 31 | *Psammothidium helveticum* (Hustedt) Bukhtiyarova & Round |
| 32, 33 | *Karayevia laterostrata* (Hustedt) Round & Bukhtiyarova |
| 34 | *Karayevia clevei* var. *rostrata* (Grunow) Kingston |
| 35 | *Kolbesia suchlandtii* (Hustedt) Kingston |
| 36 | *Amphipleura pellucida* (Kützing) Kützing |
| 37 | *Amphora holsatica* Kützing |
| 38 | *Amphora dusenii* Brun |
| 39 | *Amphora veneta* Kützing |
| 40 | *Amphora aequalis* Krammer |
| 41 | *Amphora thumensis* (Mayer) Cleve-Euler |
| 42 | *Amphora pediculus* (Kützing) Grunow |
| 43 | *Amphora copulata* morph B (Kützing) Schoeman & Archibald |
| 44 | *Amphora copulata* (Kützing) Schoeman & Archibald |
| 45, 46 | *Amphora neglecta* Stoermer & Yang |
| 47 | *Amphora inariensis* Krammer |
| 48 | *Brachysira zellensis* (Grunow) Round & Mann |
| 49 | *Brachysira brebissonii* morph 1 Ross |
| 50 | *Brachysira neoexilis* Lange-Bertalot |
| 51 | *Brachysira styriaca* (Grunow) Ross |
| 52 | *Meridian circulare* (Greville) Agardh |

| Picture # | Taxon |
|---|---|
| 53 | *Cocconeis pediculus* Ehrenberg |
| 54 | *Cocconeis placentula* var. *euglypta* Ehrenberg |
| 55 | *Cocconeis neothumensis* Krammer |
| 56 | *Frustulia rhomboides* var. *saxonica* (Rabenhorst) DeToni |
| 57 | *Aneumastus tusculus* (Ehrenberg) D.G. Mann |
| 58 | *Caloneis silicula* (Ehrenberg) Cleve |
| 59 | *Caloneis silicula* var. *alpina* Cleve |
| 60 | *Caloneis thermalis* (Grunow) Krammer |
| 61 | *Caloneis schumanniana* (Grunow) Cleve |
| 62 | *Caloneis bacillum* (Grunow) Cleve |
| 63, 64 | *Caloneis hendyii* complex Lange-Bertalot |
| 65 | *Caloneis tenuis* (Gregory) Krammer |
| 66 | *Cymbella* sp. aff. *designata* Krammer |
| 67 | *Cymbella subarctica* Krammer |
| 68 | *Cymbella cleve-eulerae* Krammer |
| 69, 70 | *Cymbella botellus* (Lagerstedt) Schmidt |
| 71 | *Cymbella amphicephala* var. *hercynica* (A. Schmidt) Cleve |
| 72 | *Cymbella amphicephala* Näegeli |
| 73 | *Cymbella incerta* var. *linearis* Grunow |
| 74 | *Cymbella incerta* var. *crassipunctata* Krammer |
| 75 | *Cymbella subaequalis* morph B Grunow |
| 76 | *Cymbella angustata* (W. Smith) Cleve |
| 77 | *Cymbella delicatula* Kützing |
| 78 | *Cymbella neocistula* Krammer |
| 79 | *Encyonema elginense* (Krammer) D.G.Mann |
| 80 | *Encyonema norvegicum* (Grunow) Mills |
| 81 | *Encyonema* cf. *silesiacum* (Bleisch) D.G. Mann |
| 82 | *Encyonema ventricosum* (Agardh) Grunow |
| 83 | *Encyonema minutum* (Hilse) D.G. Mann |
| 84 | *Encyonema latens* (Krasske) D.G.Mann |
| 85 | *Encyonema gaeumannii* (Meister) Krammer |
| 86 | *Encyonema obscurum* var. *alpina* Krammer |
| 87 | *Encyonema obscurum* (Krasske) D.G.Mann |
| 88 | *Cymbopleura designata* (Krammer) Lange-Bertalot & Genkal? |
| 89 | *Cymbopleura stauroneiformis* (Lagerstedt) Lange-Bertalot & Genkal? |
| 90 | *Cymbopleura cuspidata* (Kützing) Lange-Bertalot & Genkal? |
| 91 | *Encyonopsis behrei* (Foged) Krammer & Metzeltin |
| 92 | *Reimeria sinuata* (Gregory) Kociolek & Stoermer |
| 93 | *Encyonopsis cesatii* (Rabenhorst) Krammer |
| 94 | *Encyonopsis cesatiformis* Krammer |
| 95 | *Encyonopsis descripta* (Hustedt) Krammer |
| 96 | *Encyonopsis microcephala* (Grunow) Krammer |
| 97 | *Denticula* (?) *tenuis* var. Krammer & Lange-Bertalot (1997; Taf.100) |
| 98 | *Denticula tenuis* Kützing |
| 99 | *Denticula kuetzingii*Grunow |
| 100 | *Cyclotella bodanica* var. *lemanica* complex (O.Müller) Bachmann |
| 101 | *Stephanodiscus medius* Håkansson |
| 102 | *Cyclotella antiqua* W.Smith |

| Picture # | Taxon |
|---|---|
| 103 | *Cyclotella michiganina* Skvortzow |
| 104 | *Cyclotella stelligera* (form 1) Cleve & Grunow |
| 105 | *Cyclotella stelligera (*form 2) Cleve & Grunow |
| 106, 107 | *Cyclotella ocellata* Pantocsek |
| 108 | *Gomphonema* cf. *leptoproductum* Lange-Bertalot & Genkal |
| 109 | *Gomphonema pumilum* var. *elegans* Reichardt & Lange-Bertalot |
| 110 | *Gomphonema* sp. 3 |
| 111 | *Gomphonema* cf. *micropus* Kützing |
| 112 | *Gomphonema "parvulum* var. *undulatum"* A. Cleve |
| 113 | *Gomphonema* sp. 2 |
| 114 | *Gomphonema* sp. 1 (cf. *cybelloides*) |
| 115 | *Gomphonema angustum* Agardh |
| 116 | *Geissleria cummerowi* (L.Kalbe) Lange-Bertalot |
| 117 | *Geissleria similis* (Krasske) Lange-Bertalot & Metzeltin |
| 118 | *Geissleria schoenfeldii* (Hustedt) Lange-Bertalot & Metzeltin |
| 119 | *Navicula schmassmannii (Diadesmis* sp.aff. *contenta?)* Hustedt |
| 120 | *Diadesmis perpusilla* (Grunow) D.G. Mann |
| 121 | *Diadesmis contenta* (Grunow) D.G. Mann |
| 122 | *Diadesmis* cf. *gallica* Wm. Smith |
| 123, 124 | *Achnanthes carissima* Lange-Bertalot |
| 125 | *Staurosirella pinnata* (long form) (Ehrenberg) D.M. Williams & Round |
| 126 | *Fragilaria* aff. *oldenburgiana* Hustedt |
| 127 | *Staurosirella pinnata* var. *lancettula/acuminatum* (Ehrenberg) D.M. Williams & Round |
| 128 | *Staurosirella pinnata* (Ehrenberg) D.M. Williams & Round |
| 129-130 | *Staurosira venter* (Ehrenberg) Cleve & Möller |
| 131-132 | *Pseudostaurosira pseudoconstruens* (Marciniak) D.M. Williams & Round |
| 133-134 | *Pseudostaurosira brevistriata* (Grunow) D.M. Williams & Round |
| 135 | *Hannaea arcus* (Ehrenberg) Patrick |
| 136 | *Diploneis oblongella* (Näegeli) Cleve-Euler |
| 137 | *Diploneis parma* Cleve |
| 138 | *Diploneis ovalis* ssp. *ovalis* (Hilse) Cleve |
| 139 | *Diploneis occulata* (Brébisson) Cleve |
| 140 | *Diploneis* nov. spec. Nr. 1 Julma Ölkky |
| 141 | *Eunotia arcus* Ehrenberg |
| 142 | *Eunotia praerupta* Ehrenberg |
| 143 | *Microcostatus krasskei* (Hustedt) Johansen & Sray |
| 144 | *Navicula seminulum* Grunow |
| 145 | *Navicula(dicta) raederiae* Lange-Bertalot |
| 146 | *Navicula absoluta* Hustedt |
| 147 | *Navicula* cf. *fluens* Hustedt |
| 148 | *Adalfia minuscula* (Grunow) Lange-Bertalot |
| 149 | *Cavinula cocconeiformis* (Gregory) D.G. Mann & Stickle |
| 150 | *Cavinula jaernefeltii* (Hustedt) D.G Mann & Stickle |
| 151 | *Cavinula scutiformis* (Grunow) D.G. Mann & Stickle |
| 152 | *Kobayasiella jaajii* (Meister) Lange-Bertalot |
| 153 | *Hippodonta hungarica* (Grunow) Lange-Bertalot, Metzeltin & Witkowski |
| 154 | *Navicula cincta* (Ehrenberg) Ralfs |
| 155 | *Navicula digitulus* Hustedt |
| 156 | *Navicula digituloides* Lange-Bertalot |
| 157 | *Fallacia sublucidula* (Hustedt) D.G. Mann |
| 158 | *Fallacia lenzii* (Hustedt) D.G. Mann |
| 159 | *Fallacia subhamatula* (Grunow) D.G. Mann |

| Picture # | Taxon |
|---|---|
| 160 | *Navicula muraloides* Hustedt |
| 161 | *Navicula lucinensis* Hustedt |
| 162 | *Navicula libonensis* Schoeman |
| 163 | *Navicula cryptotenelloides* Lange-Bertalot |
| 164 | *Navicula* aff. *phylepta* Kützing |
| 165 | *Navicula* cf. *chiarae* Lange-Bertalot & Genkal |
| 166 | *Navicula* cf. *notha* Hohn & Hellerman |
| 167 | *Navicula* cf. *cryptocephala* Kützing |
| 168 | *Navicula cryptotenella* Lange-Bertalot |
| 169 | *Navicula rhyncocephala* Kützing |
| 170 | *Navicula rhynchotella* Lange-Bertalot |
| 171 | *Navicula* cf. *trophicatrix* Lange-Bertalot |
| 172 | *Navicula dealpina* Lange-Bertalot |
| 173 | *Navicula interglacialis* Hustedt |
| 174 | *Navicula menisculus* Schumann |
| 175 | *Navicula* (*Placoneis*?) *gastrum* var. *signata* Hustedt |
| 176 | *Placoneis pseudanglica* (Lange-Bertalot) Cox |
| 177 | *Placoneis elginensis* (Gregory) Cox |
| 178 | *Navicula (Placoneis?) explanata* Hustedt |
| 179 | *Placoneis placentula* (Ehrenberg) Heinzerling |
| 180 | *Navicula vulpina* Kützing |
| 181 | *Neidiopsis wulffii* (Petersen) Lange-Bertalot |
| 182 | *Neidium dubium* (Ehrenberg) Cleve |
| 183 | *Neidium ladogensis* (Cleve) Foged |
| 184 | *Neidium affine* var. *longiceps* (Gregory) Cleve |
| 185 | *Neidium bergii* (Cleve-Euler) Krammer |
| 186 | *Neidium* sp. aff. *alpinum* Hustedt |
| 187 | *Sellaphora verecundiae* Lange-Bertalot |
| 188 | *Sellaphora mutata* (Krasske) Lange-Bertalot |
| 189 | *Sellaphora pupula* morph 4 (Kützing) Mereschkowski |
| 190 | *Sellaphora bacillum* (Ehrenberg) D.G. Mann |
| 191 | *Sellaphora laevissima* (Kützing) D.G. Mann |
| 192 | *Sellaphora pupula* var. *pupula* (Ehrenberg) Mereschkowsky |
| 193 | *Fallacia* (*Sellaphora*?) *helensis* (E.Schulz) D.G. Mann |
| 194 | *Stauroneis* sp.1 |
| 195 | *Stauroneis* sp.2 |
| 196 | *Stauroneis neohyalina* Lange-Bertalot & Krammer |
| 197 | *Stauroneis smithii* Grunow |
| 198 | *Stauroneis smithii* var. *borgei* (Manguin) Hustedt |
| 199 | *Stauroneis* cf. *undata* Hustedt |
| 200 | *Stauroneis koeltzii* Metzeltin, Witkowski & Lange-Bertalot |
| 201 | *Tabellaria flocculosa* (Roth) Kützing |
| 202 | *Surirella minuta* Brébisson |
| 203 | *Surirella turgida* W. Smith |
| 204 | *Pinnularia biceps* Gregory |
| 205 | *Pinnularia brebissonii* (Kützing) Rabenhorst |
| 206 | *Pinnularia nodosa* morph 1 (Ehrenberg) Smith |
| 207 | *Pinnularia borealis* var. *lanceolata* Hustedt |
| 208 | *Pinnularia* cf. *birnirkiana* Patrick & Freese |
| 209 | *Pinnularia* sp. 1 |

| **Picture #** | **Taxon** |
|---|---|
| 210 | *Chamaepinnularia krookii* (Grunow) Lange-Bertalot & Krammer |
| 211 | *Chamaepinnularia gandrupii* (? var.) (Petersen) Lange-Bertalot & Krammer |
| 212 | *Chamaepinnularia soehrensis* (Krasske) Lange-Bertalot & Krammer |
| 213 | *Hygropetra* cf. *balfouriana* (Grunow) Krammer & Lange-Bertalot |
| 214 | *Hygropetra balfouriana* (Grunow) Krammer & Lange-Bertalot |
| 215 | *Nitzschia sinuata* var. 1 |
| 216 | *Nitzschia sinuata* var. *tabellaria* (Grunow) Grunow |
| 217 | *Nitzschia sinuata* (Thwaites) Grunow |
| 218 | *Nitzschia perminuta* (Grunow) Peragallo |
| 219 | *Nitzschia frustulum* (Kützing) Grunow |
| 220 | *Nitzschia fonticola* Grunow |
| 221 | *Nitzschia* sp. 1 cf. *fonticola* Grunow |
| 222 | *Nitzschia* sp. 2 cf. *dealpina* Lange-Bertalot |
| 223 | *Nitzschia* sp. 3 aff. *dealpina* Lange-Bertalot |
| 224 | *Nitzschia* sp. 4 |
| 225 | *Nitzschia debilis* (Arnott) Grunow |
| 226 | *Nitzschia amphibia* f. *frauenfeldii* Grunow |
| 227 | *Nitzschia* cf. *amphibia* Grunow |
| 228 | *Nitzschia angustiforaminata* Lange-Bertalot |
| 229 | *Nitzschia dissipata* (Kützing) Grunow |
| 230 | *Nitzschia palea* (Kützing) W. Smith |
| 231 | *Nitzschia palea* var. *tenuirostris* Grunow |
| 232 | *Nitzschia* aff. *draveillensis* Costé & Ricard |
| 233 | *Nitzschia pura* Hustedt |
| 234 | *Nitzschia gracilis* Hantzsch |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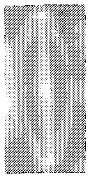
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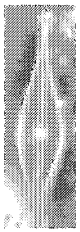
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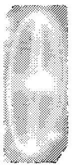
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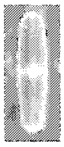
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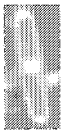
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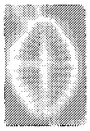
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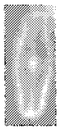
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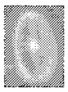
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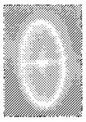
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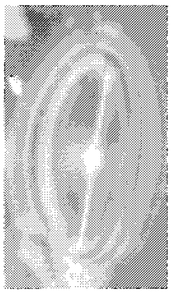
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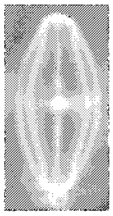
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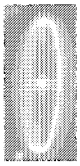
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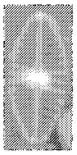
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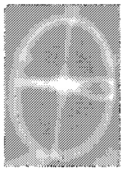
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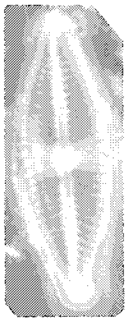
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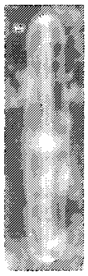
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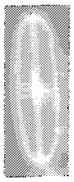
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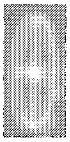
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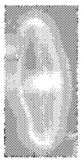
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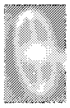
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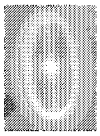
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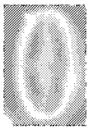
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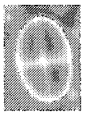
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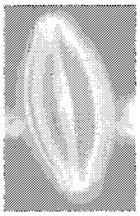
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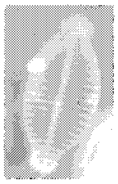
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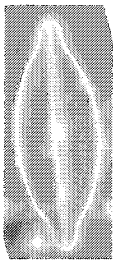
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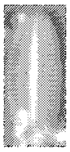
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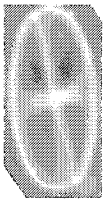
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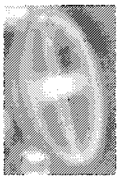
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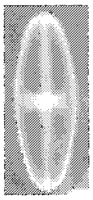
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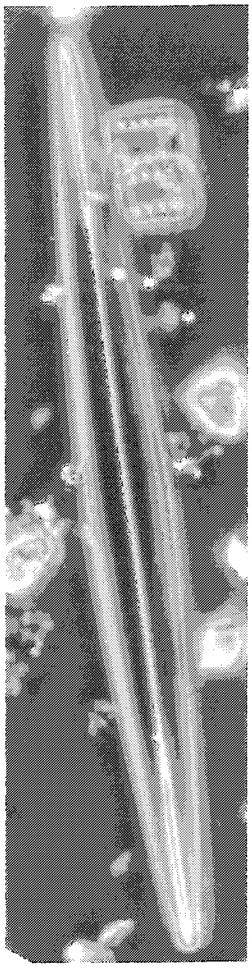

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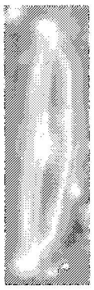

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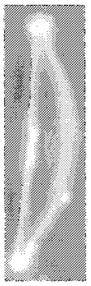

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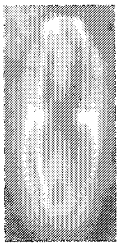

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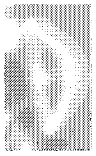

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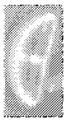

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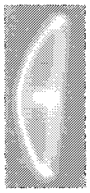

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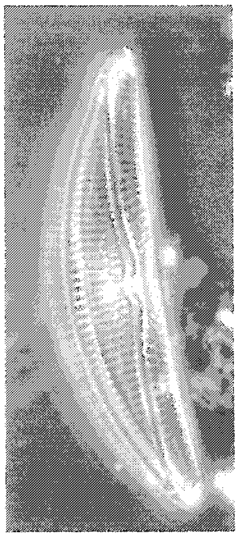

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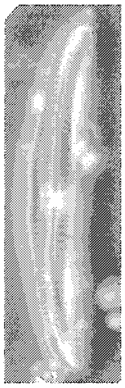

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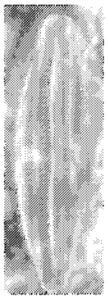

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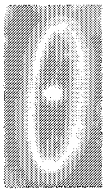

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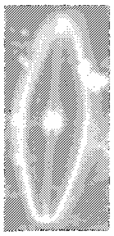

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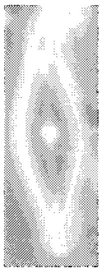

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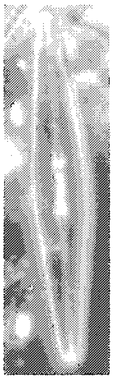

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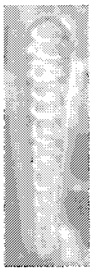

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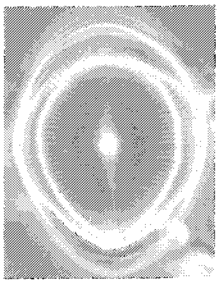

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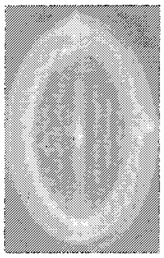

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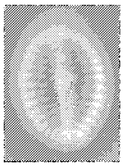

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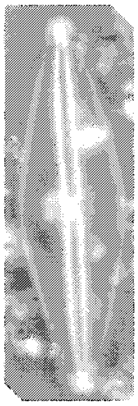

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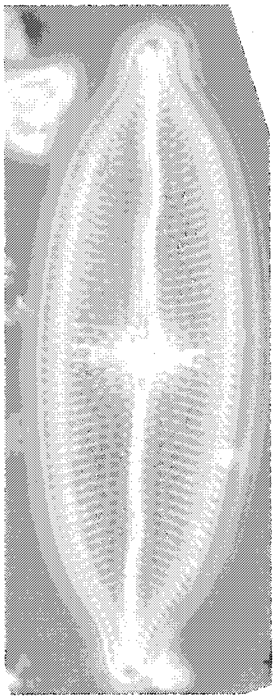

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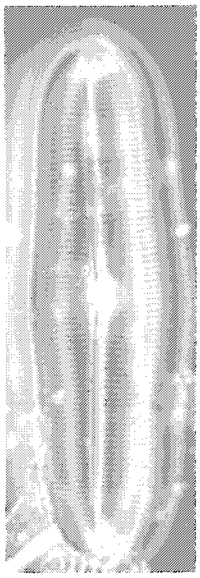
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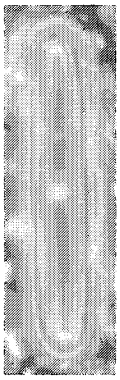
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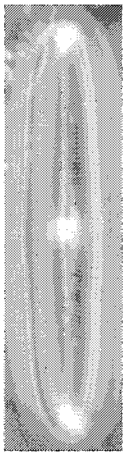
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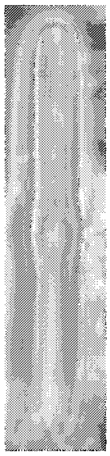
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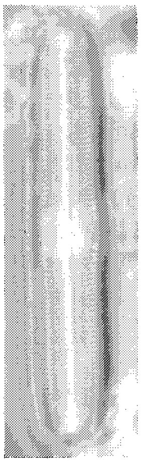
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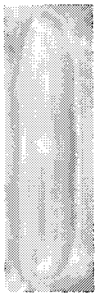
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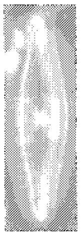
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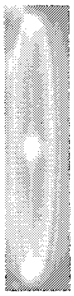
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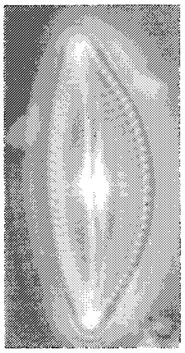
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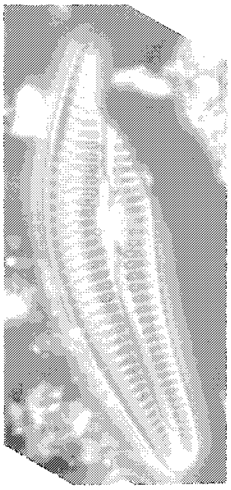
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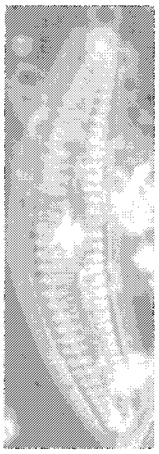
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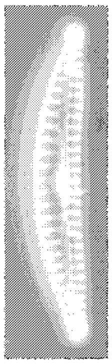
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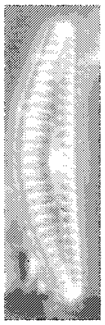
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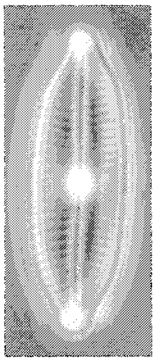
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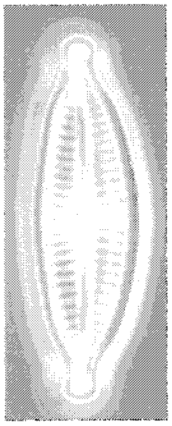
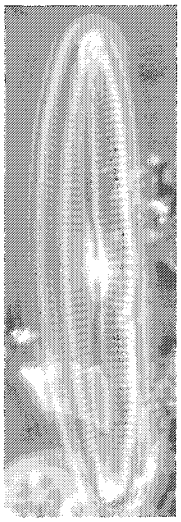

72

10µm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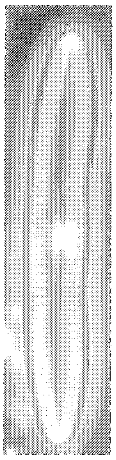
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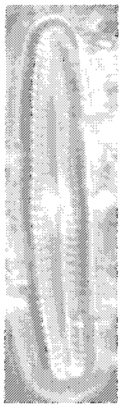
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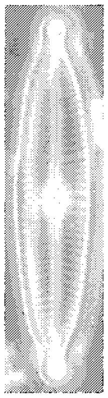
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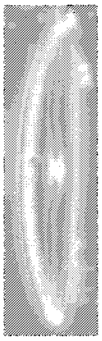
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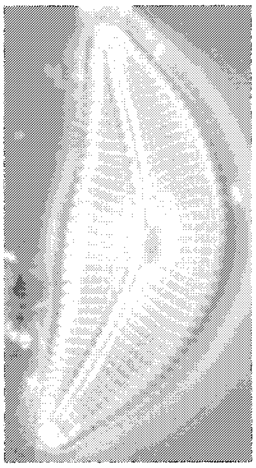
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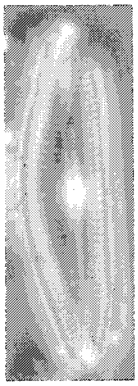
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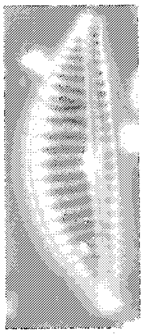
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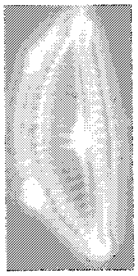
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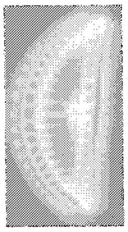
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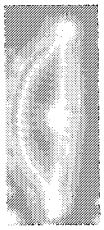
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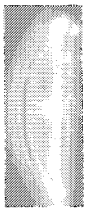
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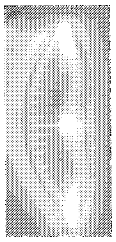
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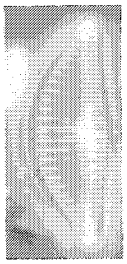
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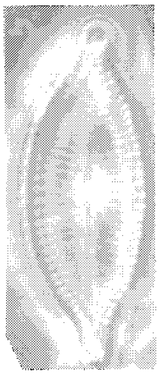
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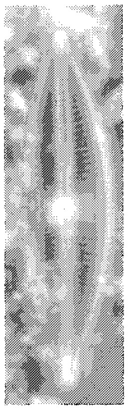
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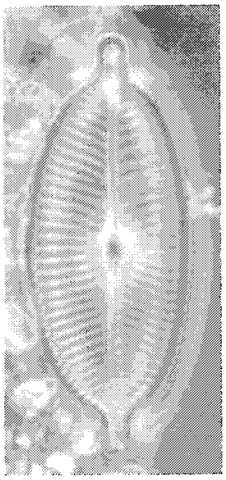
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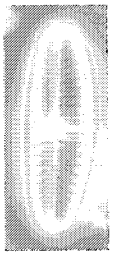
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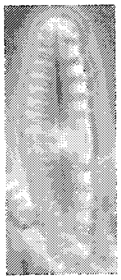
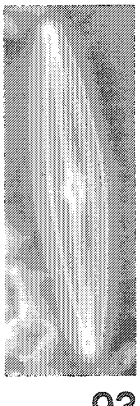

92

10 µm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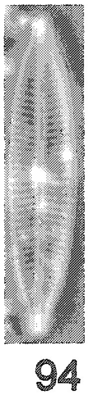
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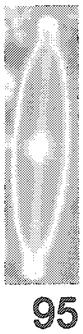
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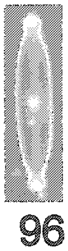
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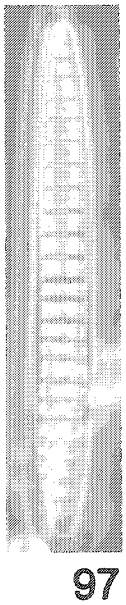
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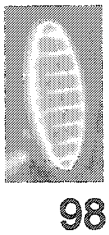
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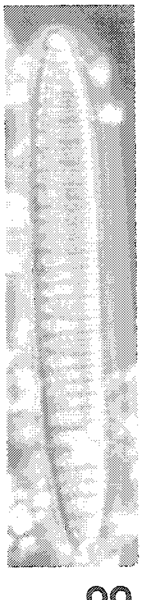
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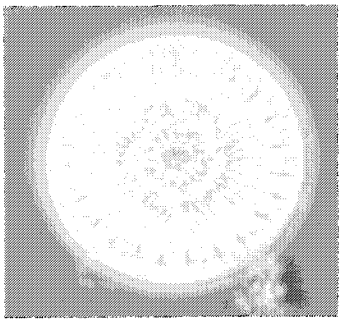
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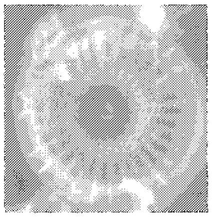
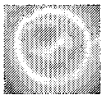

101


102

10µm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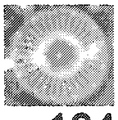
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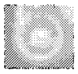
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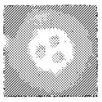
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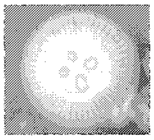
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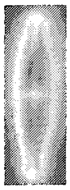
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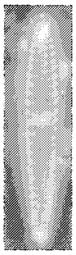
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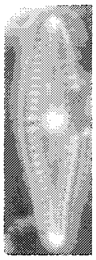
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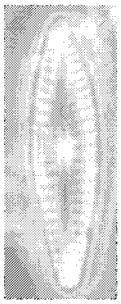
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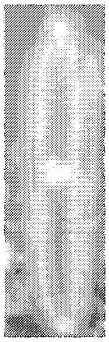
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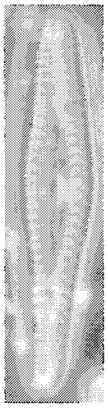
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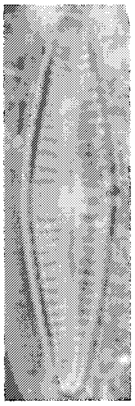
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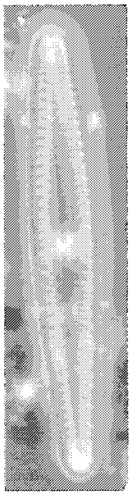
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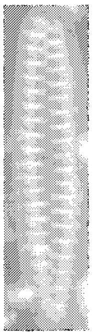
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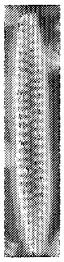
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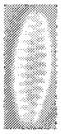
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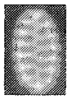
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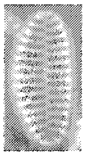
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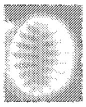
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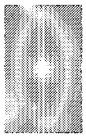
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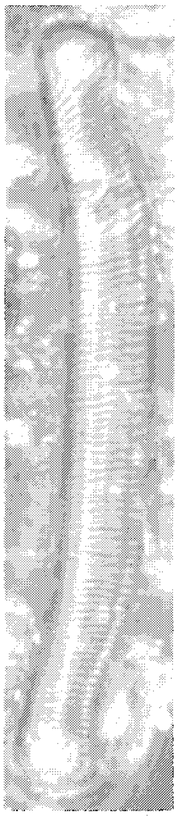
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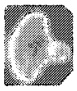
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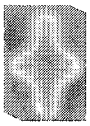
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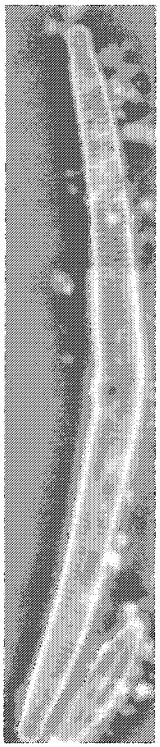
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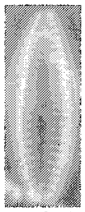
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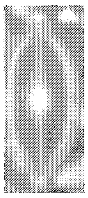
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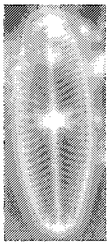
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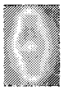
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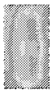
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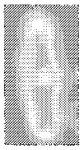
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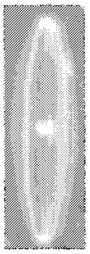
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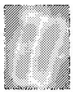
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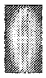
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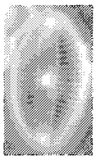
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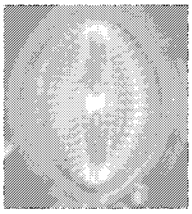
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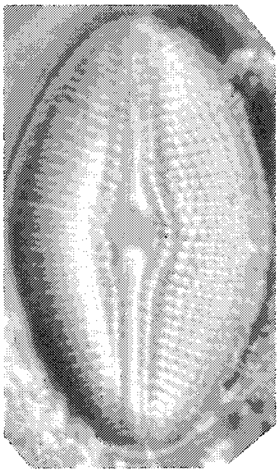
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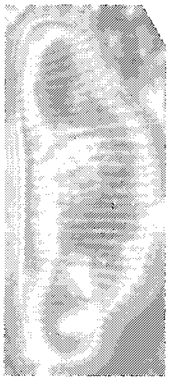
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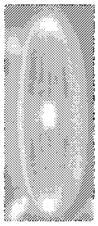
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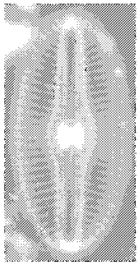
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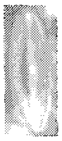
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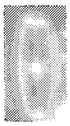
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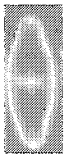
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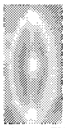
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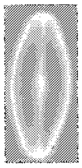
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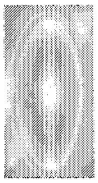
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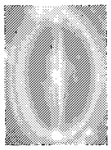
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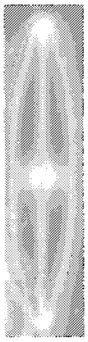
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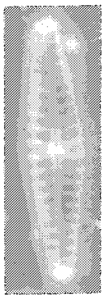
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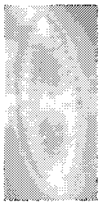
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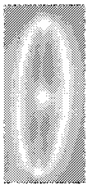
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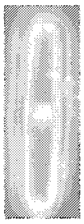
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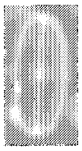
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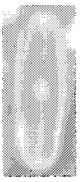
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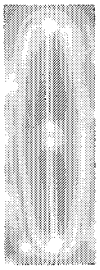
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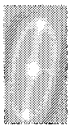
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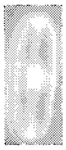
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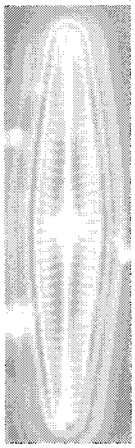
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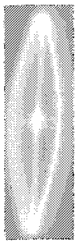
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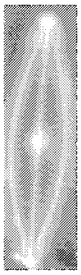
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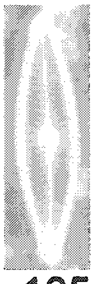
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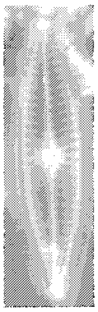
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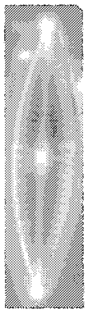
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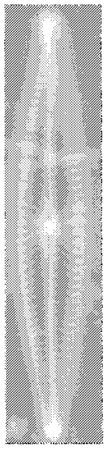
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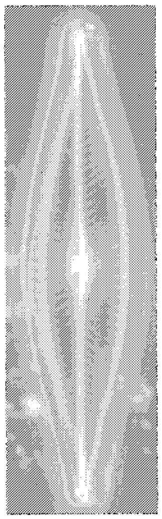
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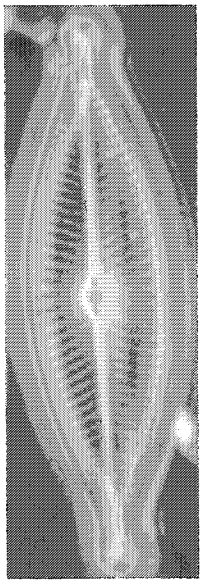
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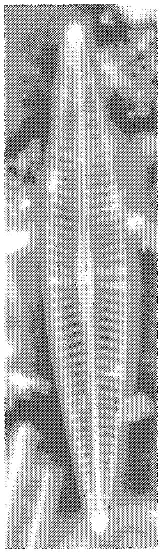
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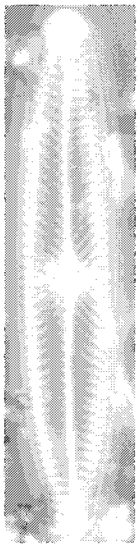
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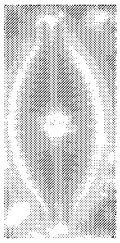
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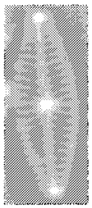
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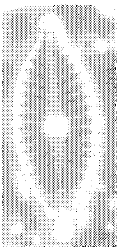
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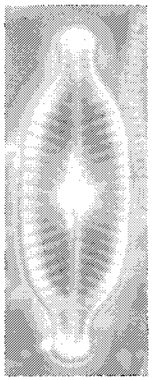
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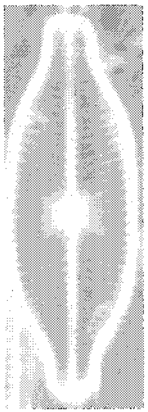
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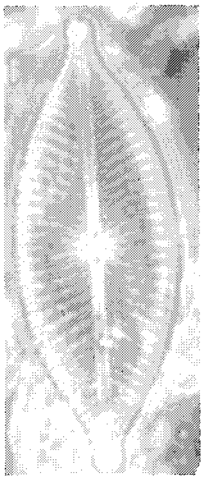
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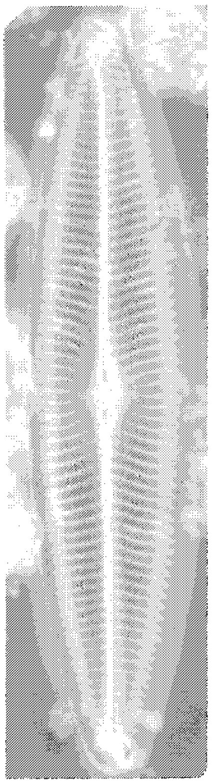
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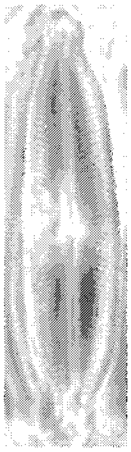
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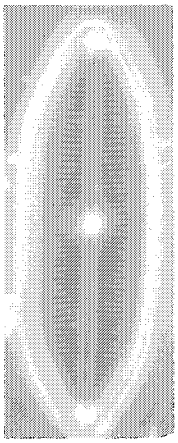
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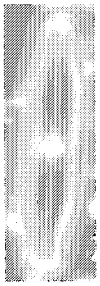
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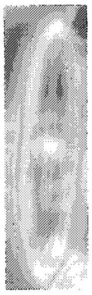
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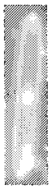
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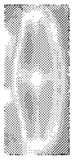
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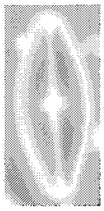
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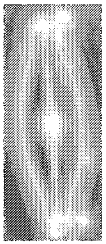
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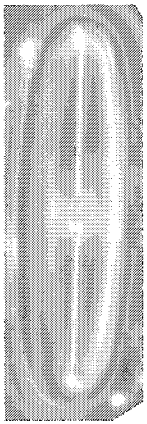
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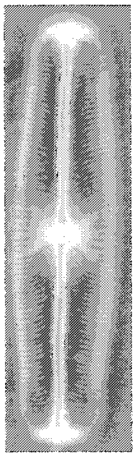
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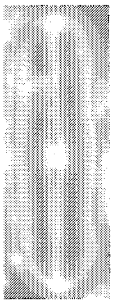
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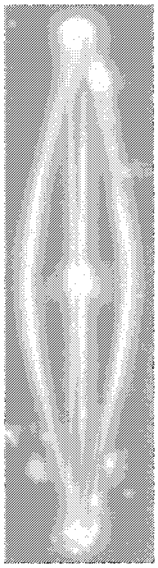
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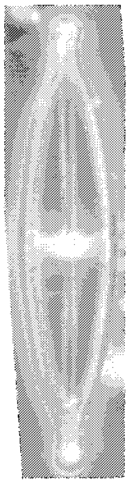
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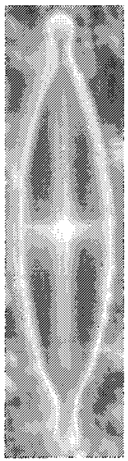
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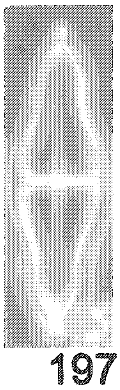
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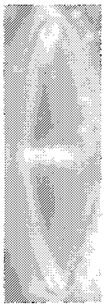
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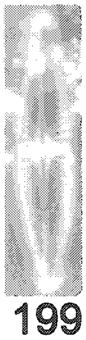
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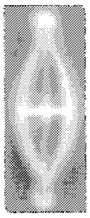
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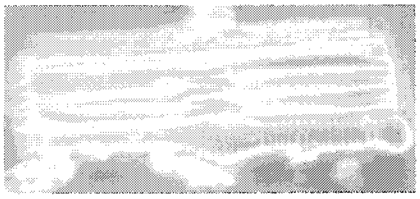
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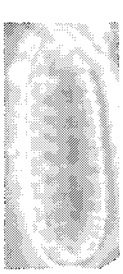
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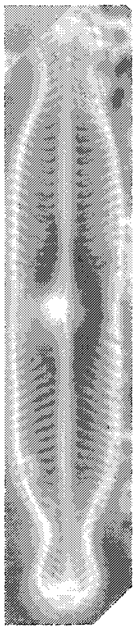
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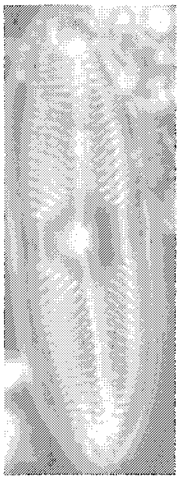
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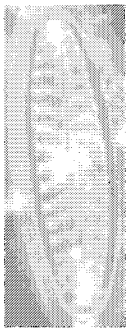
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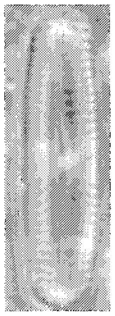
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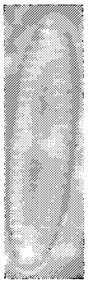
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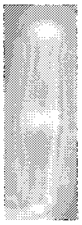
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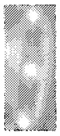
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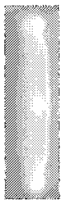
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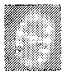
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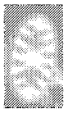
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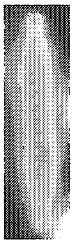
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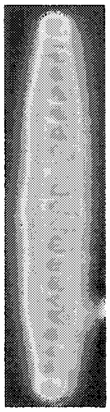
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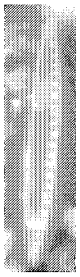
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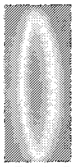
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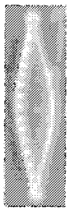
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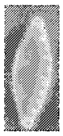
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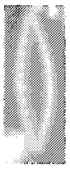
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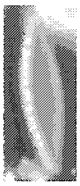
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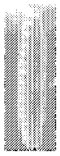
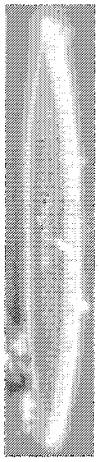

224


225

10µm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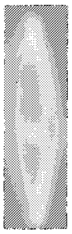
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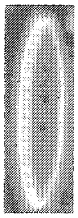
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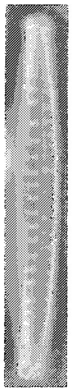
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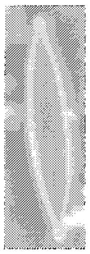
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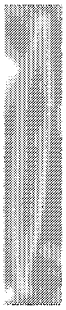
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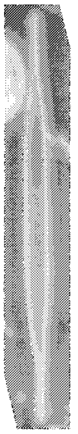
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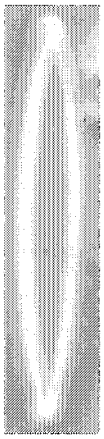
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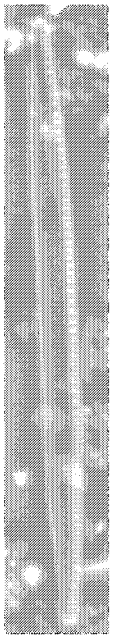
234

# 4. Results: Freshwater Diatom Biogeography in the Canadian Arctic Archipelago

## *4.1. Limnology*

The study lakes are neutral to slightly alkaline (pH 7 – 8.6; mean 7.8; Table 4.1) with higher values found on Devon Island where carbonate rocks, such as limestone and dolomite predominate (Thorsteinsson & Mayr, 1986). The lowest pH values were found in lakes underlain by non-marine sedimentary rock (i.e. granite, quartz, sandstone and other silicates) that are more resistant to weathering and have a lower buffering capacity. These values reflect the strong relationship between lake water chemistry and local geology.

Conductivity (Cond) values were highly variable across the study area ranging between 5.0 and 998.0 $\mu S \cdot cm^{-1}$ with a mean value of 131.2 $\mu S \cdot cm^{-1}$. Only three lakes, all at low elevation and located near the ocean coast, had values greater than 500 $\mu S \cdot cm^{-1}$. Otherwise, conductivity values here are typical for lakes with pH 6-8.5 where bicarbonate is the dominant form of carbon (Kalff, 2002). Dissolved Inorganic Carbon (DIC) varied between 0.2 and 42.6 $mg \cdot L^{-1}$, while the concentration of the major ions were ranked in order $Ca^{2+}>Mg^{2+}>Na^{+}>K^{+}$, as is typical for inland lakes (Kalff, 2002). Inorganic carbon acts as the primary carbon source for photosynthesis in aquatic systems (Wetzel, 2001). It therefore has a role in the creation of organic compounds by algae and other plants due to its influence on nutrient availability. A direct relationship between DIC, major ions (salts), and conductivity is also evident (Table 4.2) as expected for these conservation elements (Hamilton et al., 2001). The highest concentrations of $Na^{+}$ and $Cl^{-}$ were observed in lakes located near the ocean (distance from coast < 3400 m), although some lakes near the coast had extremely low values as well. These low values may be partly due to dilution by melting surface ice at the time of sampling. Conductivity was also correlated with $Si0_2$ concentrations (r=0.58). $Si0_2$ concentrations were generally highest in lakes on Ellesmere and Axel Heiberg Islands, reflecting the silicate-clastic bedrock that characterises this region.

Dissolved organic carbon (DOC) values ranged from 0.5 to 13.50 $mg \cdot L^{-1}$ with the lowest values occurring in the central islands and the highest on the northernmost islands (Table 4.1). Only four of the 16 lakes in the northern region had values below the mean (1.88 $mg \cdot L^{-1}$), and E516 had the maximum value of 13.5 $mg \cdot L^{-1}$. DOC values were weakly correlated with air temperature and depth but showed high correlations with total Kjeldahl

Table 4.1. Limnological characteristics of 62 lakes in the Canadian Arctic.

| Lake | pH | Ca (mg L$^{-1}$) | Mg (mg L$^{-1}$) | Na (mg L$^{-1}$) | K (mg L$^{-1}$) | Cl (mg L$^{-1}$) | SO$_4$ (mg L$^{-1}$) | SiO$_2$ (mg L$^{-1}$) | Cond (µS cm$^{-1}$) | DIC (mg L$^{-1}$) | DOC (mg L$^{-1}$) | TKN (mg L$^{-1}$) | NN (mg L$^{-1}$) | NH$_3$ (mg L$^{-1}$) | PP (mg L$^{-1}$) | TPuf (mg L$^{-1}$) | CHLa (µg L$^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 7.7 | 30.60 | M.D. | 0.99 | 1.510 | 1.60 | 2.10 | 0.960 | 183.0 | 22.50 | 9.00 | 0.750 | 0.010 | 0.006 | 0.005 | 0.008 | 1.33 |
| **Long** | 7.3 | 12.30 | M.D. | 0.41 | 0.600 | 0.60 | 1.00 | 0.840 | 79.2 | 10.60 | 3.00 | 0.183 | 0.010 | 0.005 | 0.004 | 0.007 | <0.10 |
| **Kettle** | 8.3 | 45.70 | M.D. | 41.80 | 13.600 | 46.20 | 246.30 | 0.070 | 985.0 | 42.60 | 7.70 | 0.503 | 0.010 | 0.005 | 0.003 | 0.007 | <0.10 |
| **E509** | 7.1 | 7.70 | 0.60 | 0.40 | 0.200 | 0.89 | 1.80 | 1.240 | 32.0 | 5.40 | 2.40 | 0.144 | 0.046 | 0.005 | 0.004 | 0.006 | <0.10 |
| **E507** | 7.1 | 52.10 | 11.00 | 54.40 | 3.600 | 1.77 | 2.20 | 1.780 | 21.0 | 3.50 | 5.10 | 0.322 | 0.010 | 0.005 | 0.015 | 0.021 | 1.20 |
| **E506** | 7.0 | 2.50 | 0.60 | 0.60 | 0.200 | 1.30 | 2.10 | 0.880 | 19.0 | 2.20 | 0.70 | 0.065 | 0.005 | 0.010 | <0.002 | <0.005 | 0.40 |
| **HW06** | 8.0 | 24.10 | 9.86 | 11.40 | 1.100 | 16.30 | 17.50 | 1.750 | 293.0 | 19.70 | 2.70 | M.D. | 0.010 | 0.005 | <0.002 | <0.005 | M.D. |
| **HW05** | 8.0 | 38.90 | 17.50 | 101.00 | 4.170 | 202.00 | 2.10 | 0.350 | 998.0 | 25.00 | 2.70 | M.D. | 0.010 | 0.005 | <0.002 | 0.006 | M.D. |
| **E505** | 7.1 | 5.20 | 1.10 | 0.50 | 0.300 | 0.60 | 2.80 | 0.530 | 56.0 | 3.80 | 2.20 | 0.167 | 0.005 | 0.008 | 0.007 | 0.009 | <0.10 |
| **E503** | 7.1 | 57.10 | 11.40 | 2.60 | 0.900 | 2.18 | 73.30 | 2.250 | 26.0 | 24.80 | 4.90 | 0.411 | 0.019 | 0.039 | 0.005 | 0.013 | <0.10 |
| **HW03** | 7.8 | 37.70 | 15.20 | 24.60 | 3.860 | 48.30 | 89.40 | 1.690 | 524.0 | 8.60 | 1.10 | M.D. | 0.010 | 0.005 | <0.002 | <0.005 | M.D. |
| **HW02** | 7.7 | 13.50 | 2.49 | 4.55 | 1.460 | 1.94 | 24.40 | 0.170 | 126.0 | 4.90 | 1.10 | M.D. | 0.010 | 0.007 | <0.002 | 0.006 | M.D. |
| **HW07** | 7.3 | 9.90 | 1.52 | 1.71 | 0.590 | 1.40 | 4.90 | 0.410 | 79.0 | 5.80 | 3.60 | M.D. | 0.010 | 0.005 | <0.002 | <0.005 | M.D. |
| **E516** | 7.7 | 58.70 | 3.20 | 2.10 | 0.700 | 3.60 | 111.00 | 1.120 | 162.0 | 16.00 | 13.50 | 1.100 | 0.010 | 0.014 | 0.004 | 0.006 | <0.10 |
| **E515** | 7.4 | 7.80 | 2.20 | 2.30 | 0.600 | 3.57 | 5.40 | 0.710 | 41.0 | 5.90 | 2.60 | 0.209 | 0.010 | 0.005 | 0.003 | <0.005 | 0.50 |
| **E511** | 7.4 | 5.30 | 0.90 | 0.50 | 0.200 | 0.48 | 8.10 | 1.710 | 31.0 | 2.60 | <0.50 | 0.078 | 0.010 | 0.005 | 0.007 | 0.007 | 1.40 |
| **CI17** | 8.0 | 17.50 | 2.50 | 1.78 | 0.510 | 1.90 | 3.70 | 0.370 | 80.0 | 9.45 | 1.26 | 0.150 | 0.010 | 0.005 | 0.005 | <0.005 | 0.69 |
| **CI20** | 8.2 | 13.40 | 1.15 | 0.69 | 0.102 | 1.02 | 1.32 | 0.120 | 50.0 | 7.28 | <0.50 | 0.070 | 0.010 | 0.016 | 0.004 | <0.005 | 0.77 |
| **CI22** | 8.1 | 23.00 | 2.90 | 0.49 | 0.690 | 0.39 | 7.54 | 2.100 | 90.0 | 11.61 | 1.02 | 0.190 | <0.003 | 0.018 | 0.026 | 0.022 | 0.82 |
| **CI23** | 8.0 | 18.90 | 0.46 | 0.65 | 0.111 | 0.83 | 0.36 | 0.138 | 70.0 | 9.84 | 0.51 | 0.090 | 0.020 | 0.015 | 0.003 | <0.005 | 0.80 |
| **CI25** | 7.8 | 32.00 | 4.00 | 2.30 | 0.400 | 4.28 | 22.72 | 0.350 | 140.0 | 14.17 | 2.03 | 0.160 | <0.003 | 0.011 | 0.007 | <0.005 | 1.68 |
| **CI27** | 8.4 | 0.56 | 0.04 | 0.38 | 0.041 | 0.45 | 0.16 | <0.003 | 6.0 | 0.39 | <0.50 | 0.040 | <0.003 | 0.009 | 0.003 | <0.005 | 0.87 |
| **CI26** | 7.4 | 0.23 | 0.01 | <0.07 | 0.018 | <0.10 | <0.10 | <0.003 | 10.0 | 0.20 | <0.50 | 0.060 | <0.003 | 0.008 | 0.006 | <0.005 | 0.55 |
| **CI29** | 7.8 | 1.09 | 1.11 | 4.00 | 0.370 | 8.54 | 1.17 | 0.210 | 30.0 | 0.59 | 1.05 | 0.160 | <0.003 | 0.007 | 0.005 | <0.005 | 1.32 |
| **DV23** | 7.6 | 15.10 | 4.90 | 2.80 | 0.200 | 6.34 | 3.30 | 0.140 | 134.0 | 12.80 | 0.80 | 0.129 | 0.021 | 0.016 | 0.010 | 0.012 | 0.64 |
| **DV24** | 7.6 | 26.50 | 4.60 | 0.90 | 0.200 | 2.17 | 2.40 | 0.250 | 88.0 | 16.60 | 0.70 | 0.050 | 0.015 | 0.005 | 0.009 | 0.011 | 0.64 |
| **DV10** | 8.3 | 11.80 | 5.20 | 0.90 | 0.200 | 1.78 | 0.80 | 0.050 | 92.0 | 11.30 | <0.50 | 0.026 | 0.023 | 0.005 | <0.002 | <0.005 | <0.10 |
| **DV05** | 8.6 | 24.20 | 4.30 | 0.90 | 0.200 | 2.28 | 1.30 | 0.280 | 153.0 | 17.10 | 0.80 | 0.033 | 0.011 | 0.005 | <0.002 | <0.005 | <0.10 |
| **DV06** | 8.4 | 25.80 | 4.40 | 0.90 | 0.200 | 2.05 | 0.60 | 0.470 | 158.0 | 17.90 | 0.80 | 0.047 | 0.010 | 0.006 | <0.002 | <0.005 | <0.10 |
| **DV07** | 8.4 | 24.70 | 4.30 | 0.90 | 0.400 | 2.32 | 0.90 | 0.480 | 148.0 | 17.40 | 1.20 | 0.080 | 0.010 | 0.005 | <0.002 | <0.005 | 0.30 |
| **DV08** | 8.4 | 27.30 | 6.40 | 1.00 | 0.200 | 2.06 | 8.70 | 1.280 | 175.0 | 18.60 | 0.80 | 0.030 | 0.010 | 0.007 | <0.002 | <0.005 | 0.30 |
| **DV01** | 8.4 | 29.20 | 4.80 | 0.70 | 0.200 | 1.64 | 1.10 | 0.280 | 91.0 | 19.90 | 2.20 | 0.054 | 0.010 | 0.017 | <0.002 | <0.005 | <0.10 |
| **DV02** | 7.9 | 140.00 | 17.20 | 2.30 | 0.400 | 4.22 | 395.00 | 1.280 | 445.0 | 13.40 | 1.10 | 0.072 | 0.010 | 0.011 | <0.002 | <0.005 | <0.10 |
| **CI34** | 7.8 | 4.20 | 0.79 | 0.34 | 0.060 | 0.70 | 0.70 | <0.003 | 29.0 | 2.36 | <0.50 | 0.080 | 0.010 | 0.012 | 0.004 | <0.005 | 1.06 |
| **CI33** | 7.9 | 7.30 | 0.97 | 0.58 | 0.060 | 0.81 | 0.87 | <0.003 | 30.0 | 4.33 | <0.50 | 0.040 | 0.010 | <0.003 | <0.002 | <0.005 | 0.69 |
| **CI32** | 7.8 | 2.10 | 0.14 | 0.18 | 0.015 | 0.28 | <0.10 | <0.003 | 10.0 | 1.38 | <0.50 | <0.02 | <0.003 | 0.005 | <0.002 | <0.005 | 0.61 |
| **CI31** | 7.7 | 0.50 | 0.16 | 0.14 | 0.041 | <0.10 | <0.10 | <0.003 | <5.0 | 0.39 | <0.50 | 0.080 | <0.003 | 0.013 | <0.002 | <0.005 | 0.66 |
| **Allen** | 7.7 | 11.60 | 4.40 | 0.80 | 0.200 | 1.68 | 2.30 | 0.480 | 68.0 | 11.20 | 0.70 | 0.103 | 0.010 | 0.011 | <0.002 | <0.005 | 0.20 |
| **Wolf** | 8.4 | 14.60 | 5.30 | 0.80 | 0.300 | 1.58 | 4.10 | 0.490 | 65.0 | 13.60 | 1.30 | 0.150 | 0.010 | 0.014 | 0.003 | <0.005 | 0.60 |
| **CI01** | 7.6 | 22.00 | 3.90 | 0.67 | 0.220 | 1.27 | 2.22 | 0.115 | 150.0 | 14.17 | 0.72 | 0.100 | <0.003 | 0.008 | 0.004 | <0.005 | 0.71 |
| **CI14** | 8.1 | 0.08 | 0.11 | <0.07 | 0.008 | <0.10 | <0.10 | <0.003 | <5.0 | 0.20 | <0.50 | 0.050 | <0.003 | 0.012 | <0.002 | <0.005 | 0.42 |
| **CI07** | 7.8 | 16.00 | 5.90 | 1.60 | 0.290 | 4.50 | 1.61 | 0.470 | 80.0 | 11.22 | 1.82 | 0.150 | <0.003 | 0.008 | 0.006 | 0.012 | 0.90 |
| **CI08** | 8.1 | 28.00 | 13.20 | 2.20 | 0.660 | 3.87 | 25.05 | 0.058 | 170.0 | 18.11 | 3.20 | 0.370 | <0.003 | 0.029 | 0.011 | 0.024 | 1.03 |
| **CI09** | 8.2 | 6.30 | 2.10 | 0.55 | 0.149 | 0.88 | 1.62 | 0.038 | 30.0 | 3.94 | 0.54 | 0.090 | <0.003 | 0.012 | 0.004 | <0.005 | 0.61 |
| **CI12** | 7.9 | 8.40 | 3.20 | 0.71 | 0.181 | 1.31 | 1.80 | 0.162 | 60.0 | 6.30 | 0.76 | 0.100 | 0.010 | 0.011 | 0.005 | <0.005 | 1.41 |
| **CI11** | 7.9 | 10.00 | 3.60 | 1.02 | 0.189 | 1.67 | 0.90 | 0.187 | 60.0 | 7.48 | 1.24 | 0.100 | <0.003 | 0.008 | 0.006 | <0.005 | 0.80 |
| **CI10** | 7.9 | 5.80 | 1.97 | 0.53 | 0.119 | 1.06 | 1.11 | 0.067 | 30.0 | 3.94 | 0.57 | 0.030 | 0.010 | 0.007 | 0.003 | <0.005 | 0.35 |
| **WB07** | 8.1 | 15.00 | 4.20 | 0.33 | 0.200 | 0.50 | 1.90 | 0.280 | 79.0 | 5.64 | <0.50 | 0.050 | <0.003 | <0.003 | 0.005 | 0.013 | 1.24 |
| **WB01** | 8.0 | 23.00 | 5.10 | 0.53 | 1.400 | 1.80 | 3.30 | 0.470 | 139.0 | 8.28 | 2.00 | 0.070 | <0.003 | <0.003 | 0.064 | 0.071 | 1.37 |
| **WB05** | 7.9 | 14.00 | 7.10 | 0.45 | 0.400 | 0.70 | 1.30 | 0.320 | 99.0 | 6.72 | 1.00 | 0.080 | <0.003 | <0.003 | <0.002 | 0.016 | 1.53 |
| **WB02** | 8.0 | 26.00 | 5.00 | 0.57 | 0.200 | 1.00 | 3.10 | 0.470 | 88.0 | 9.12 | <0.50 | 0.060 | 0.018 | <0.003 | 0.059 | 0.065 | 1.13 |
| **WB04** | 8.0 | 23.00 | 5.80 | 0.48 | 0.300 | 0.50 | 3.80 | 0.530 | 75.0 | 8.40 | <0.50 | 0.080 | 0.010 | <0.003 | 0.012 | 0.012 | 1.36 |
| **WB03** | 7.8 | 3.20 | 1.10 | 0.09 | 0.200 | 0.30 | 0.25 | 0.120 | 80.0 | 1.56 | <0.50 | 0.090 | <0.003 | <0.003 | 0.060 | 0.068 | 1.77 |
| **KR07** | 7.6 | 25.00 | 11.30 | 1.51 | 0.560 | 2.00 | 22.00 | 1.550 | 154.8 | 15.16 | M.D. | 0.230 | <0.003 | 0.008 | 0.008 | 0.010 | 0.38 |
| **KR02** | 7.4 | 12.60 | 4.80 | 0.59 | 0.179 | 0.70 | 4.30 | 0.950 | 79.0 | 8.27 | M.D. | 0.140 | 0.040 | 0.021 | 0.008 | 0.008 | 0.30 |
| **KR01** | 7.7 | 12.30 | 5.10 | 0.65 | 0.250 | 0.90 | 3.40 | 0.690 | 34.2 | 8.46 | M.D. | 0.120 | 0.040 | 0.040 | 0.006 | 0.007 | 0.24 |
| **KR04** | 7.6 | 5.70 | 3.00 | 0.28 | 0.188 | 0.60 | 1.60 | 0.210 | 9.8 | 4.33 | M.D. | 0.100 | 0.010 | 0.013 | 0.012 | 0.013 | 0.10 |
| **KR08** | 8.1 | 78.00 | 18.80 | 1.53 | 1.760 | 1.70 | 128.00 | 1.610 | 420.0 | 20.87 | M.D. | 0.190 | 0.020 | 0.013 | 0.008 | 0.007 | 0.45 |
| **JR02** | 8.0 | 33.40 | 16.40 | 1.57 | 0.615 | 3.00 | 0.88 | 0.604 | 198.0 | 29.92 | 3.10 | 0.720 | 0.017 | 0.070 | 0.030 | 0.030 | 0.33 |
| **JR01** | 8.1 | 42.40 | 21.70 | 2.11 | 0.557 | 5.10 | 2.40 | 1.210 | 220.0 | 37.80 | 4.70 | 0.810 | 0.024 | 0.050 | 0.030 | 0.040 | 0.44 |
| **JR05** | 7.3 | 1.73 | 0.76 | 0.19 | 0.060 | 0.40 | 0.34 | 0.055 | 10.0 | 1.38 | 0.80 | 0.130 | 0.008 | <0.003 | 0.020 | 0.020 | 0.34 |
| **JR06** | 7.1 | 3.54 | 1.23 | 0.37 | 0.060 | 0.70 | 0.45 | 0.077 | 39.0 | 2.76 | 1.70 | 0.190 | 0.008 | 0.004 | 0.010 | 0.020 | 0.51 |
| **Mean** | 7.8 | 20.91 | 5.15 | 4.73 | 0.765 | 6.69 | 20.41 | 0.572 | 131.2 | 10.80 | 1.88 | 0.173 | 0.011 | 0.011 | 0.009 | 0.012 | 0.65 |
| **Median** | 7.9 | 14.80 | 4.25 | 0.76 | 0.210 | 1.59 | 2.10 | 0.360 | 79.1 | 8.53 | 1.10 | 0.102 | 0.010 | 0.008 | 0.004 | 0.006 | 0.62 |
| **Minimum** | 7.0 | 0.08 | 0.01 | 0.07 | 0.008 | 0.01 | 0.10 | 0.003 | 5.0 | 0.20 | 0.50 | 0.020 | 0.003 | 0.003 | 0.002 | 0.005 | 0.10 |
| **Maximum** | 8.6 | 140.00 | 21.70 | 101.00 | 13.600 | 202.00 | 395.00 | 2.250 | 998.0 | 42.60 | 13.50 | 1.100 | 0.046 | 0.070 | 0.064 | 0.071 | 1.77 |
| **s.d.** | 0.4 | 22.30 | 5.15 | 15.35 | 1.860 | 26.58 | 62.19 | 0.597 | 188.6 | 8.94 | 2.24 | 0.203 | 0.009 | 0.012 | 0.013 | 0.015 | 0.45 |

Values at or below the detection limit are indicated by a 'less than' symbol (<). Missing data are represented by M.D.

Table 4.2. Correlation matrix of physical and chemical characteristics of 62 lakes in the Canadian Arctic. Correlations significant at p<0.05 are in bold while those significant at p<0.01 are marked with an asterisk (*).

| | LAT | LONG | AT | DFC | Elev | SfcA | Dep | Cond | WT | pH | Ca | Mg | Cl | Na | K | SO4 | SiO2 | DOC | DIC | TKN | NN | NH3 | PP | TPuf | CHLa | Erich | Conc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LAT | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LONG | ***0.78** | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| AT | ***-0.42** | ***-0.46** | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | |
| DFC | **-0.25** | **-0.28** | **0.26** | 1.00 | | | | | | | | | | | | | | | | | | | | | | | |
| Elev | ***0.35** | ***0.34** | -0.16 | ***0.33** | 1.00 | | | | | | | | | | | | | | | | | | | | | | |
| SfcA | -0.25 | -0.23 | -0.11 | 0.17 | -0.20 | 1.00 | | | | | | | | | | | | | | | | | | | | | |
| Dep | -0.09 | -0.18 | -0.06 | -0.21 | -0.09 | 0.24 | 1.00 | | | | | | | | | | | | | | | | | | | | |
| Cond | 0.16 | 0.13 | 0.10 | 0.06 | 0.02 | 0.04 | -0.15 | 1.00 | | | | | | | | | | | | | | | | | | | |
| WT | 0.04 | 0.21 | -0.12 | -0.08 | -0.08 | 0.04 | -0.12 | ***0.47** | 1.00 | | | | | | | | | | | | | | | | | | |
| pH | **-0.29** | -0.22 | -0.18 | -0.21 | **-0.31** | **0.26** | 0.05 | **0.31** | ***0.35** | 1.00 | | | | | | | | | | | | | | | | | |
| Ca | 0.15 | 0.10 | 0.16 | 0.13 | 0.04 | -0.11 | -0.16 | ***0.83** | ***0.33** | 0.19 | 1.00 | | | | | | | | | | | | | | | | |
| Mg | -0.04 | 0.01 | **0.29** | 0.23 | 0.04 | -0.03 | -0.12 | ***0.76** | ***0.34** | 0.18 | ***0.87** | 1.00 | | | | | | | | | | | | | | | |
| Cl | **0.29** | **0.26** | 0.18 | -0.16 | -0.10 | -0.02 | -0.10 | ***0.78** | **0.31** | 0.18 | ***0.69** | ***0.71** | 1.00 | | | | | | | | | | | | | | |
| Na | ***0.45** | ***0.35** | 0.16 | -0.23 | -0.08 | -0.25 | -0.15 | ***0.64** | 0.22 | 0.05 | ***0.61** | ***0.61** | ***0.87** | 1.00 | | | | | | | | | | | | | |
| K | ***0.42** | **0.27** | 0.20 | 0.10 | 0.17 | -0.17 | -0.14 | ***0.75** | **0.31** | 0.01 | ***0.74** | ***0.74** | ***0.76** | ***0.82** | 1.00 | | | | | | | | | | | | |
| SO4 | **0.28** | 0.13 | 0.15 | 0.10 | 0.17 | -0.15 | -0.14 | ***0.67** | 0.11 | 0.00 | ***0.73** | ***0.66** | ***0.63** | ***0.62** | ***0.73** | 1.00 | | | | | | | | | | | |
| SiO2 | 0.22 | 0.08 | **0.27** | **0.32** | **0.29** | -0.12 | -0.12 | ***0.58** | 0.18 | -0.16 | ***0.71** | ***0.72** | ***0.51** | ***0.45** | ***0.68** | ***0.64** | 1.00 | | | | | | | | | | |
| DOC | ***0.35** | ***0.41** | 0.20 | 0.22 | 0.18 | -0.11 | ***-0.35** | ***0.47** | 0.10 | -0.21 | ***0.54** | ***0.53** | ***0.57** | ***0.59** | ***0.68** | ***0.56** | ***0.58** | 1.00 | | | | | | | | | |
| DIC | 0.10 | 0.14 | 0.13 | 0.16 | 0.05 | 0.06 | -0.19 | ***0.83** | ***0.40** | **0.27** | ***0.93** | ***0.86** | ***0.70** | ***0.54** | ***0.67** | ***0.63** | ***0.66** | ***0.57** | 1.00 | | | | | | | | |
| TKN | 0.21 | **0.26** | **0.29** | **0.27** | 0.16 | -0.10 | ***-0.42** | ***0.37** | 0.08 | **-0.28** | ***0.40** | ***0.43** | ***0.39** | ***0.48** | ***0.63** | ***0.48** | ***0.47** | ***0.76** | ***0.40** | 1.00 | | | | | | | |
| NN | 0.15 | 0.13 | 0.15 | **0.32** | 0.07 | -0.06 | -0.08 | **0.26** | 0.00 | -0.09 | ***0.41** | ***0.34** | **0.28** | 0.24 | 0.22 | **0.26** | ***0.38** | **0.30** | ***0.45** | 0.19 | 1.00 | | | | | | |
| NH3 | -0.20 | -0.07 | 0.09 | 0.15 | -0.03 | 0.15 | -0.19 | -0.02 | -0.24 | 0.05 | 0.12 | 0.15 | 0.01 | 0.03 | -0.01 | 0.14 | 0.11 | **0.32** | 0.20 | ***0.39** | 0.23 | 1.00 | | | | | |
| PP | ***-0.38** | ***-0.41** | ***0.45** | **0.28** | 0.00 | -0.07 | -0.01 | -0.04 | -0.17 | -0.24 | 0.04 | 0.10 | -0.12 | -0.13 | 0.09 | -0.01 | 0.12 | 0.01 | -0.03 | ***0.35** | -0.05 | 0.11 | 1.00 | | | | |
| TPuf | -0.21 | -0.24 | ***0.54** | ***0.42** | 0.19 | -0.06 | 0.05 | 0.21 | 0.15 | -0.21 | **0.30** | ***0.36** | 0.06 | 0.04 | ***0.33** | 0.18 | ***0.39** | 0.20 | 0.25 | ***0.42** | 0.11 | 0.03 | ***0.77** | 1.00 | | | |
| CHLa | -0.13 | **-0.28** | 0.02 | -0.13 | 0.01 | -0.06 | 0.14 | -0.03 | -0.01 | 0.03 | -0.08 | -0.06 | -0.07 | -0.04 | 0.03 | -0.12 | -0.08 | **-0.30** | -0.21 | -0.02 | ***-0.43** | **-0.30** | ***0.40** | 0.24 | 1.00 | | |
| Erich | ***-0.40** | **-0.31** | -0.09 | 0.12 | -0.21 | ***0.44** | 0.11 | -0.08 | 0.10 | **0.27** | -0.13 | 0.04 | -0.21 | **-0.30** | -0.21 | -0.21 | -0.12 | **-0.30** | -0.04 | -0.20 | -0.22 | 0.03 | -0.03 | -0.11 | 0.12 | 1.00 | |
| Conc | 0.03 | -0.07 | 0.11 | **-0.29** | -0.19 | -0.01 | -0.09 | -0.15 | -0.17 | 0.15 | -0.21 | ***-0.34** | -0.08 | 0.03 | -0.10 | -0.04 | **-0.28** | -0.03 | -0.21 | 0.01 | -0.11 | 0.11 | -0.02 | -0.14 | 0.04 | -0.13 | 1.00 |

nitrogen (TKN) and $SiO_2$ (Table 4.2). TKN values were within the range observed by other surveys of arctic lakes (Hamilton et al., 2001; Michelutti et al., 2002a, b; Lim et al., 2001c; Antoniades et al., 2003). Lake E516 also had the highest value of TKN (1.1 $mg \cdot L^{-1}$). Both forms of phosphorous (TPuf and PP) were positively correlated with air temperature (AT) and TKN. TPuf also showed positive relationships with $Ca^{2+}$, $Mg^{2+}$, and $SiO_2$. Interestingly, TPuf increased with increasing distance from coast. This is likely a result of the warmer mesoclimate found inland (Atkinson & Gajewski, 2002), which allows for greater plant biomass.

Chlorophyll-*a* (CHLa) is used as a measure of aquatic productivity in a system and often reflects the level of nutrient concentrations (Kalff, 2002). In this study, CHLa was correlated (significant at $p<0.05$) with some nutrients and DOC (Table 4.2). It has been suggested that chlorophyll-*a* is not effective in measuring productivity in oligotrophic lakes like the ones in this study (Hamilton et al., 2001).

Principal Components Analysis (PCA) was used to examine relationships among the lake characteristics. Only properties of the water were included in the analysis; spatial variables (latitude, longitude, elevation, and distance from coast (DFC)) were excluded to reveal patterns among the lake characteristics alone. A correlation biplot of the PCA (Figure 4.1) summarizes major patterns among the lakes. Environmental variables are represented by arrows where direction indicates the correlation of the principal components with the original data. Arrow length represents the size of the correlation coefficient and acute angles between arrows indicate high correlations between those variables. Sites are positioned near the variables that were highly significant for that lake if the relationship was positive and in the opposite quadrant of that variable if the relationship was negative. Lakes with similar characteristics are located near each other.

Eigenvalues show that 39.6% of the variation is explained in the first axis while axes two and three explained 13.1% and 9.6% of the variation respectively. The first axis of the PCA is highly correlated (negative) with major ions, DIC and DOC (Figure 4.1). Lakes from the central Islands with low concentrations of these variables were clustered in the right quadrant of the biplot. The shallowest lakes had higher DOC and ions. This was also observed by Lim et al. (2001c) where shallow ponds were distinctly separated from deeper lakes by the values of DOC. Variables loading heavily on the second axis include pH

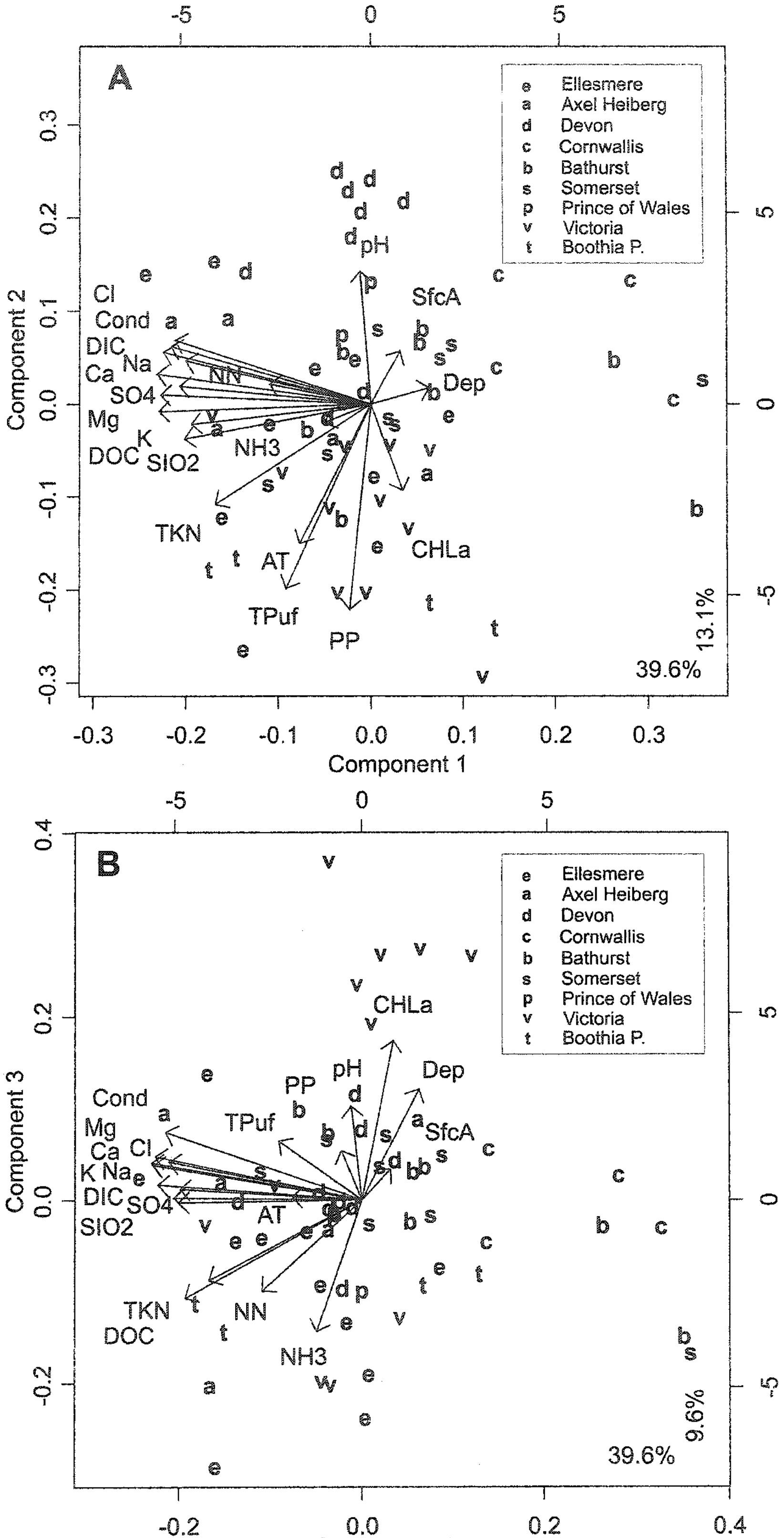

Figure 4.1. Principal Components Analysis correlation biplots of the limnological characteristics of 62 lakes in the Canadian Arctic. Components 1 and 2 (A) and 1 and 3 (B) are shown. Lakes are represented by the initial of their island except for Boothia peninsula (t). Codes of abbreviated variables are Cond (conductivity), DIC (dissolved inorganic carbon), DOC (dissolved organic carbon), AT (mean July air temperature), TKN (total Kjeldahl nitrogen), NN (nitrate-nitrite), PP (particulate phosphorous), TPuf (total unfiltered phosphorous), SfcA (surface area), and CHLa (chlorophyll-*a*).

(positive), air temperature (AT), and both TPuf and PP (negative). All sites from Victoria Island and Boothia Peninsula, as well as four lakes from the Fosheim region, are situated in the negative quadrant of this axis. Lakes with the higher pH values from Devon Island scored positively on the second axis and are tightly clustered. This shows the broad similarity of the chemical characteristics of the lakes within any area. The third axis is positively correlated with chlorophyl-*a* (CHLa) and negatively correlated with $NH_3$ and nitrate-nitrite (NN). Lakes on northern Victoria Island had high values of TKN and CHLa but low values of NN and $NH_3$. Similar values were reported by Michelutti et al. (2002b) from the same region.

### *4.2. Diatoms*

*Concentrations*

Diatom concentrations estimated as a function of volume (valves·cc$^{-1}$ sediment) were highly correlated with those estimated as a function of weight (valves·g$^{-1}$ wet sediment; $r = 0.99$; Figure B.1). Volumetric concentrations are used in this paper. Total diatom concentrations ranged from $4.4 \times 10^6$ to $4.3 \times 10^{10}$ valves·cc$^{-1}$, thus varying over five orders of magnitude (Figure 1.1C; Table B.1). There does not appear to be a relation between total diatom concentration and latitude (Figure 1.1C). Within any region, diatom concentrations varied greatly. For example, concentrations ranged between $6.3 \times 10^7 - 4.5 \times 10^9$ valves·cc$^{-1}$ in the Fosheim region of Ellesmere Island. Values on Devon Island were the most consistent between lakes, with generally low values. The lowest concentrations were found in lakes on northeastern Ellesmere, Devon, Victoria, and Bathurst Islands. Low concentrations are as thus found over a wide range of latitudes and across the full longitudinal extent of this study. The highest concentrations occurred on Bathurst, Ellesmere, and Somerset Islands with four of these eight lakes located on Bathurst Island.

Principal Components Analysis (PCA) was used to relate diatom concentration and richness to the environmental factors of the 62 study lakes. Spatial information including Latitude (Lat), Longitude (Long), distance from coast (DFC), and elevation (Elev) were also included in the analysis. The first three components explained 31.5, 13.4, and 10.6% of the variance. The first axis was a linear combination of major ions, conductivity and dissolved inorganic carbon (DIC). Spatial variables (Lat, Long, and DFC) and phosphorous were highly loaded on the second component (Figure 4.2). Lakes underlain by non-marine sedimentary bedrock were positioned in the positive quadrant of the second axis due to their high latitude location. Diatom concentrations are not highly correlated with any measured environmental variable although weak, negative relationships with $Mg^{2+}$ (significant at $p<0.01$), distance from coast (DFC), and $SiO_2$ were found (Table 4.2).

*Taxonomic richness & general flora description*

A total of 326 taxa (including species, forms and variants) were identified in the 62 lakes (Table 3.1). A maximum of 86 taxa was recorded from the largest lake in this dataset (Allen Lake) while the minimum number of taxa in a lake was eight (CI25). Rarefaction estimated richness values varied among lakes within each region (Figure 1.1D; Table B.1). Estimated richness (Erich) was significantly correlated ($p<0.01$) with lake surface area (SfcA) as illustrated in the biplot (Figure 4.2). Other variables highly loaded on this axis included Elevation (Elev; negative) and pH (positive) on the third component. Lakes with low diversity are positioned in the negative quadrant of component 3. Estimated richness was negatively correlated with latitude (LAT), $Na^{+}$, and DOC (Table 4.2).

The taxa found in this study represent 63 different genera, although some genera were monospecific. The majority of taxa belonged to the genera *Navicula* (37 taxa) and *Nitzschia* (30 taxa) comprising 11.3% and 9% of the total number of recorded taxa, respectively. Forty-nine of the 62 lakes were dominated (abundance > 50%) by small *Staurosira, Staurosirella*, *Pseudostaurosira*, and *Fragilaria* (fragilaroid) taxa while 3 lakes did not contain any of these taxa (Figure 4.3). Taxa from this group consistently dominated more organic-rich lakes (based on field observations and degree of chemical reaction with strong acid during processing). This is in contrast to Douglas & Smol (1993) who noted the near absence of these small forms from the organic ponds of the Cape Hershel region. Lake sediments consisting mostly of sand (JR05, S40, CI29) tended to have diatom assemblages with less than 50% of these taxa.

Other dominant taxa included *Amphora* spp. (*A. copulata, A. inariensis, A. pediculus*), *Psammothidium* spp. (*P. grischunum* f. *daonensis, P. marginulatum*), *Nitzschia* spp. (*N. frustulum, N. palea*), and *Achnanthidium minutissimum*. Larger, more heavily silicified taxa, such as *Denticula kuetzingii*, were also common and even dominant in some lakes (Figure 4.3). Centric forms were present in 47 of the 62 lakes across the study area (Figure C.1),

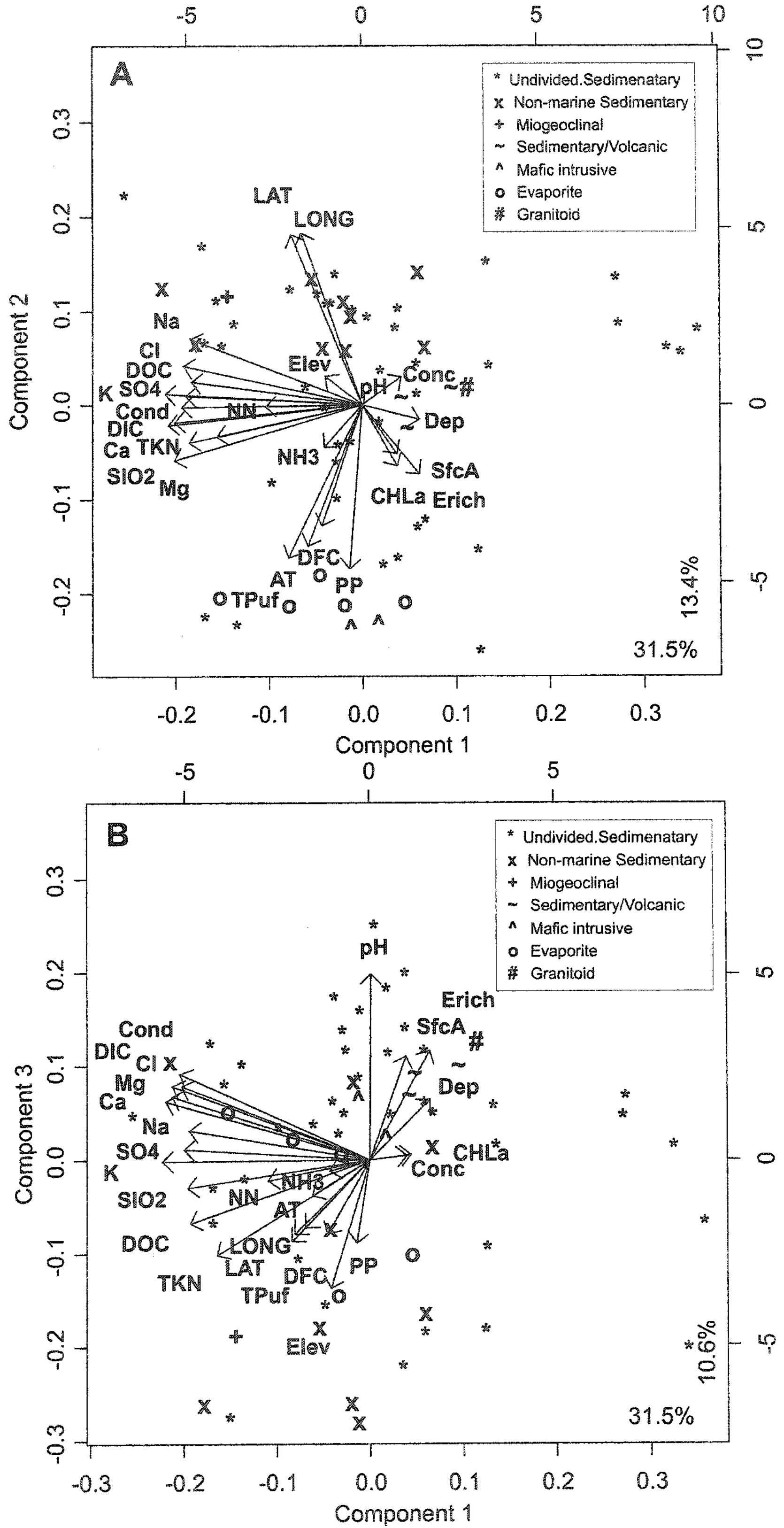

Figure 4.2. Principal Components Analysis correlation biplots of physical and chemical characteristics of 62 lakes in the Canadian Arctic including diatom estimated richness (Erich) and concentration (valves cc$^{-1}$; Conc). Components 1 and 2 (A) and 1 and 3 (B) are shown. Lakes are represented by subrocktype. Codes of abbreviated variables are Cond (conductivity), DIC (dissolved inorganic carbon), DOC (dissolved organic carbon), AT (mean July air temperature), TKN (total Kjeldahl nitrogen), NN (nitrate-nitrite), PP (particulate phosphorous), TPuf (total unfiltered phosphorous), SfcA (surface area), and CHLa (chlorophyll-*a*).

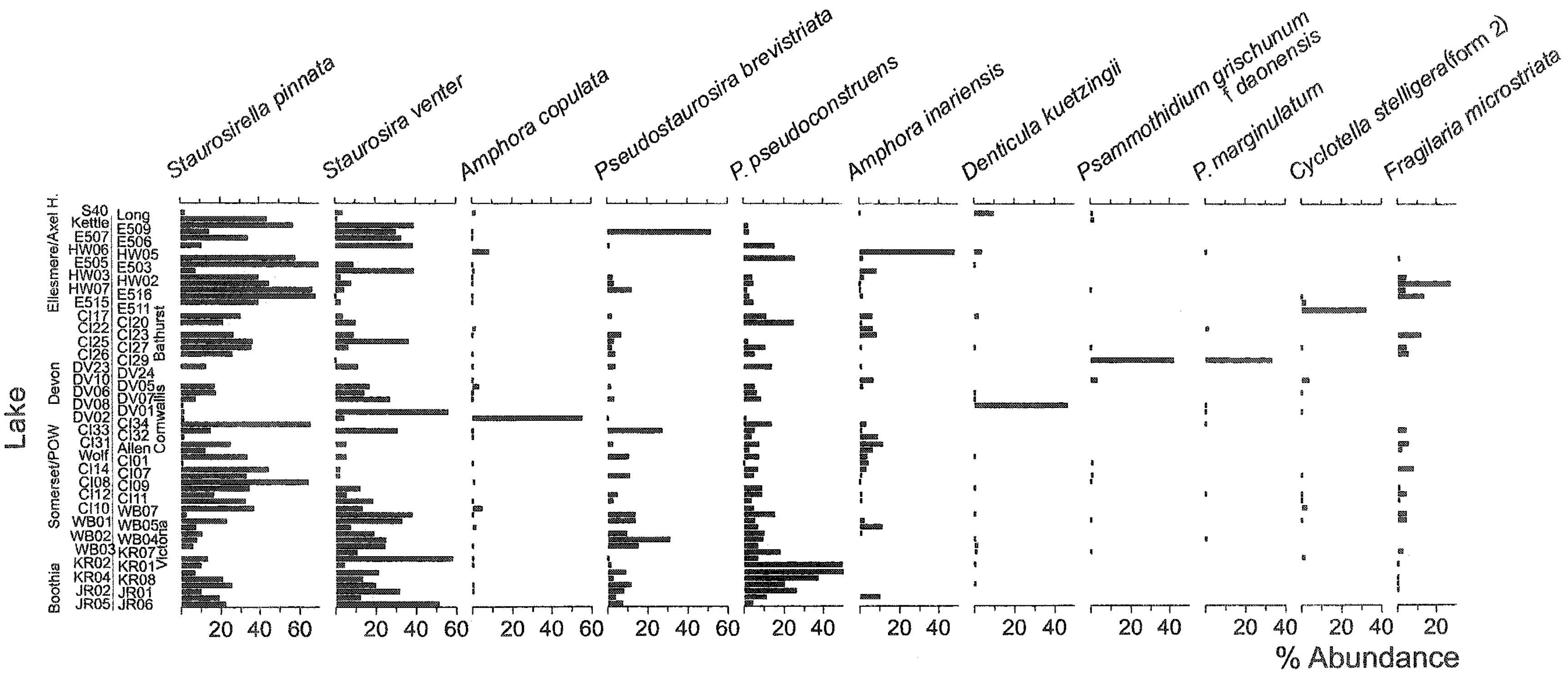

Figure 4.3. Diagram of the thirty dominant diatom taxa in 62 lakes of the Canadian Arctic. Lakes are arranged by decreasinglatitude and by region.

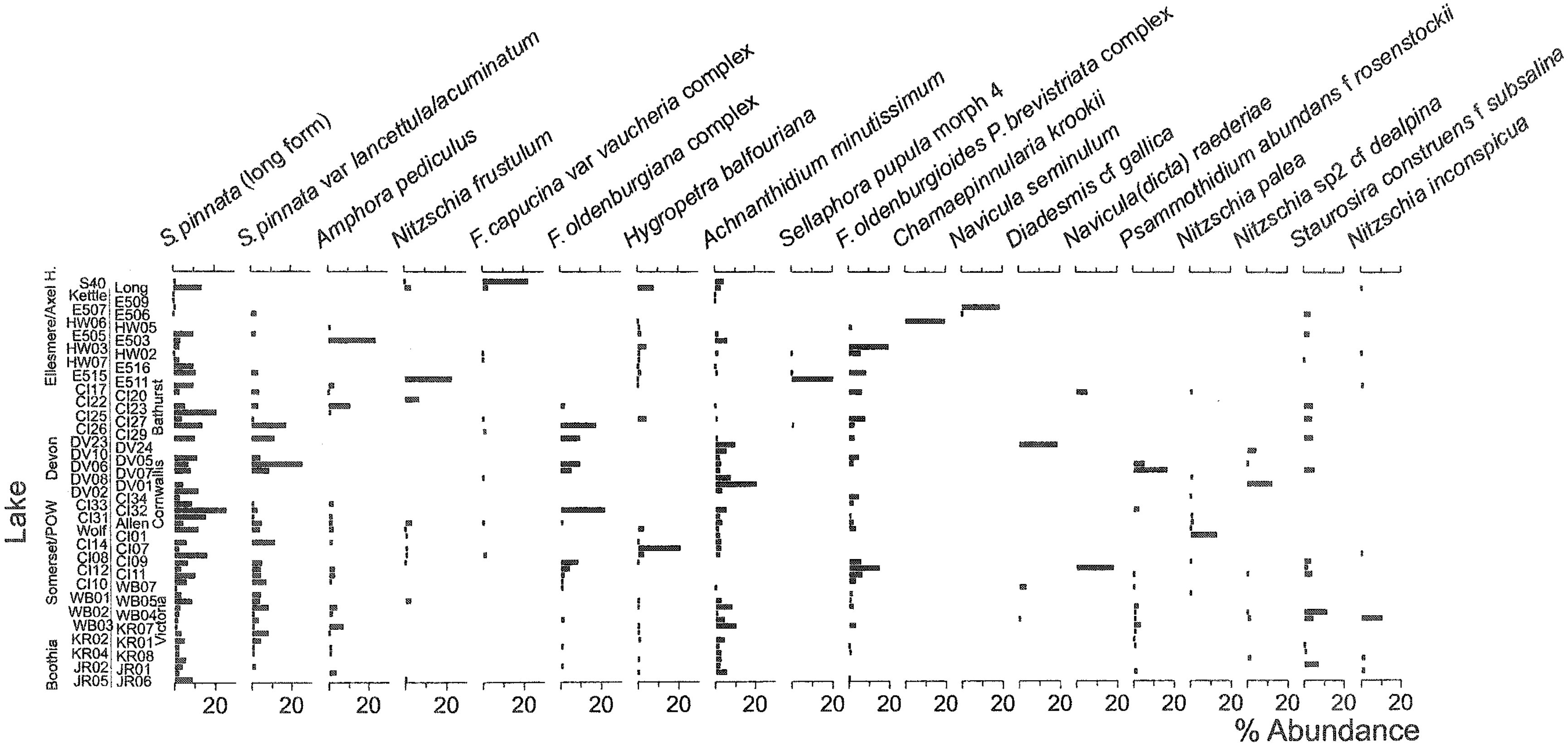

Figure 4.3. (continued)

with *Cyclotella stelligera* (form 2) dominant in one lake (E511) on Ellesmere Island. This lake is relatively deep (11m) and represents the highest elevation included in this study. In contrast, *Cyclotella antiqua* was rare, occurring in only 11 of the study lakes. Its highest abundance was in a relatively large and deep lake (DV24).

### *Diatom Distributions*

Generic distributions were quite variable across the study area with some groups showing widespread distributions. *Staurosirella* spp., *Nitzschia* spp., *Amphora* spp., *Cyclotella* spp., and *Neidium* spp. were found in every region, often in high abundances (Figure 4.4a-e). Some genera were absent from certain regions, for example, *Eunotia* spp., *Denticula* spp., and *Geissleria* spp. were not found on Cornwallis Island (Fig. 4.4f, g, h), while *Gomphonema* (Fig. 4.4j) taxa were not found in study lakes on Somerset Island. *Brachysira* spp. (Fig. 4.4i) were only found on Devon and Victoria Islands and the Boothia Peninsula. There were no dominant genera limited to High-Arctic regions. *Caloneis* spp. and *Eucocconeis* spp. appeared to be more common and dominant in lakes on Devon Island (Fig. 4.4k, l).

The distribution of genera formerly grouped into the genus *Achnanthes sensu lato* showed wide variation across the study region (Figure 4.5A). *Achnanthidium* spp. were widespread with low abundances consistently observed on Bathurst Island. *Karayevia* spp. were absent from both Axel Heiberg and Ellesmere Islands with highest abundances occurring on Somerset and Prince of Wales Islands. Other groups, such as *Eucocconeis* spp. and *Rossithidium* spp. increased in abundance from south to north. Of the four sites on Cornwallis Island, taxa belonging to the genera *Planothidium* and *Rossithdium* were only found in lake CI34. Vegetation around lake CI34 is classified as Graminoid tundra whereas the other three are classified as Barrens.

Genera formerly grouped in *Cymbella sensu lato* showed less spatial variations than the *Achnanthes sensu lato* group (Figure 4.5B). *Cymbopleura* taxa were not encountered in lakes on Cornwallis Island. *Encyonema* spp. were more common and abundant than *Cymbella* spp. Other groups containing complex taxa, such as *Amphora* and *Gomphonema*, showed wide distributions across the region although *Gomphonema* was rare on Bathurst Island.

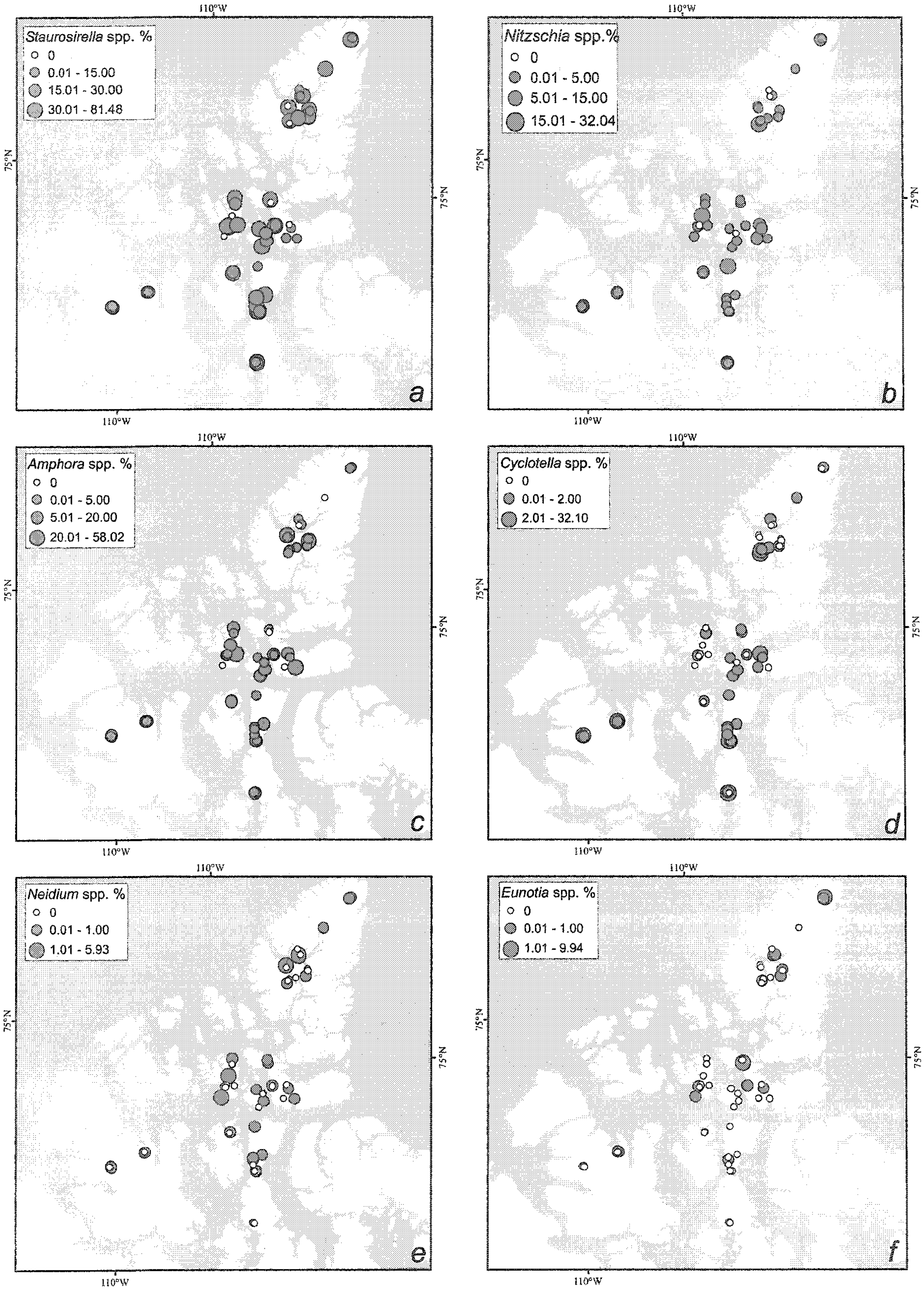

Figure 4.4. Spatial distribution of selected diatom genera in 62 lakes of the Canadian Arctic. Values are expressed as percent abundance.

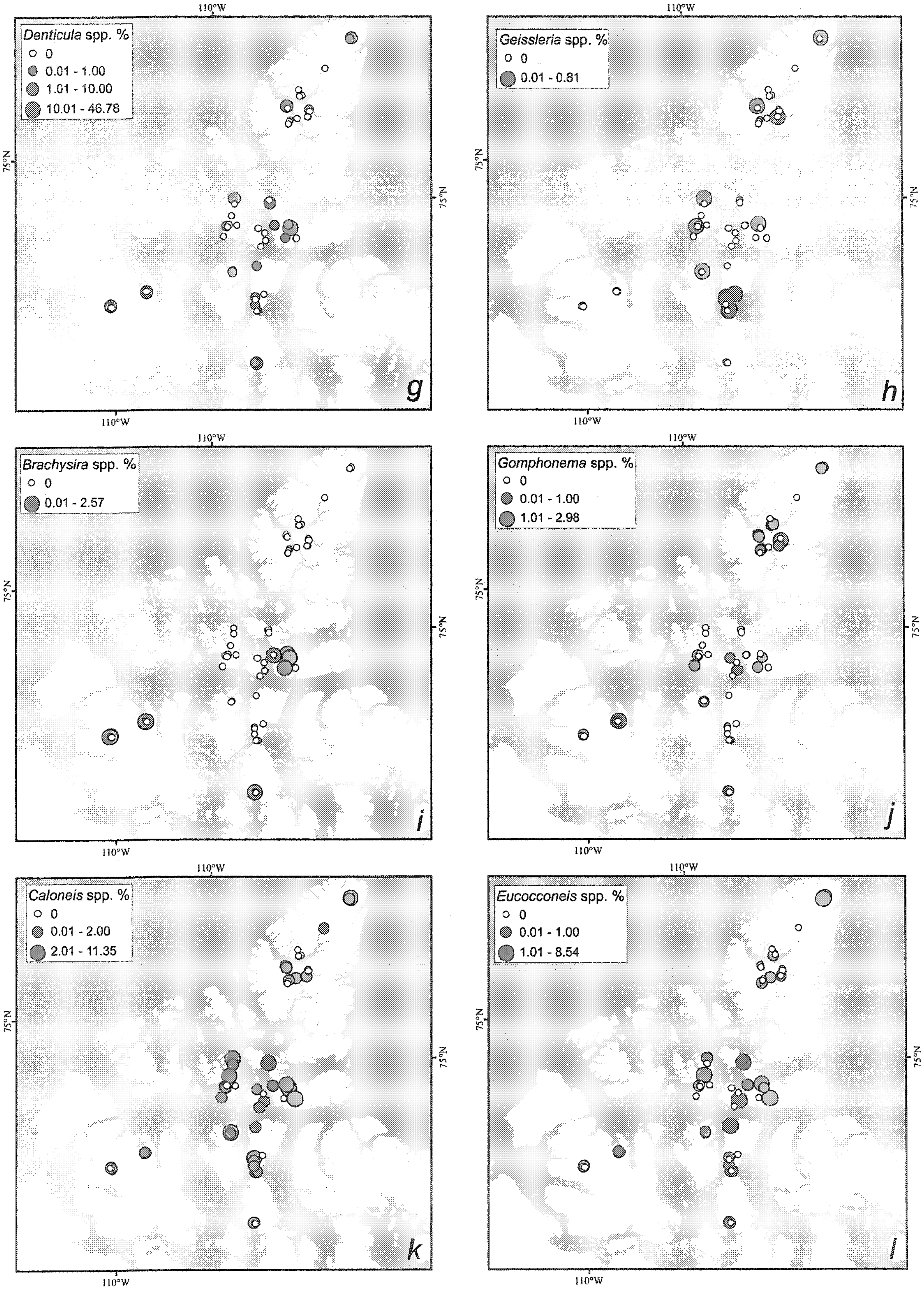

Figure 4.4. (continued)

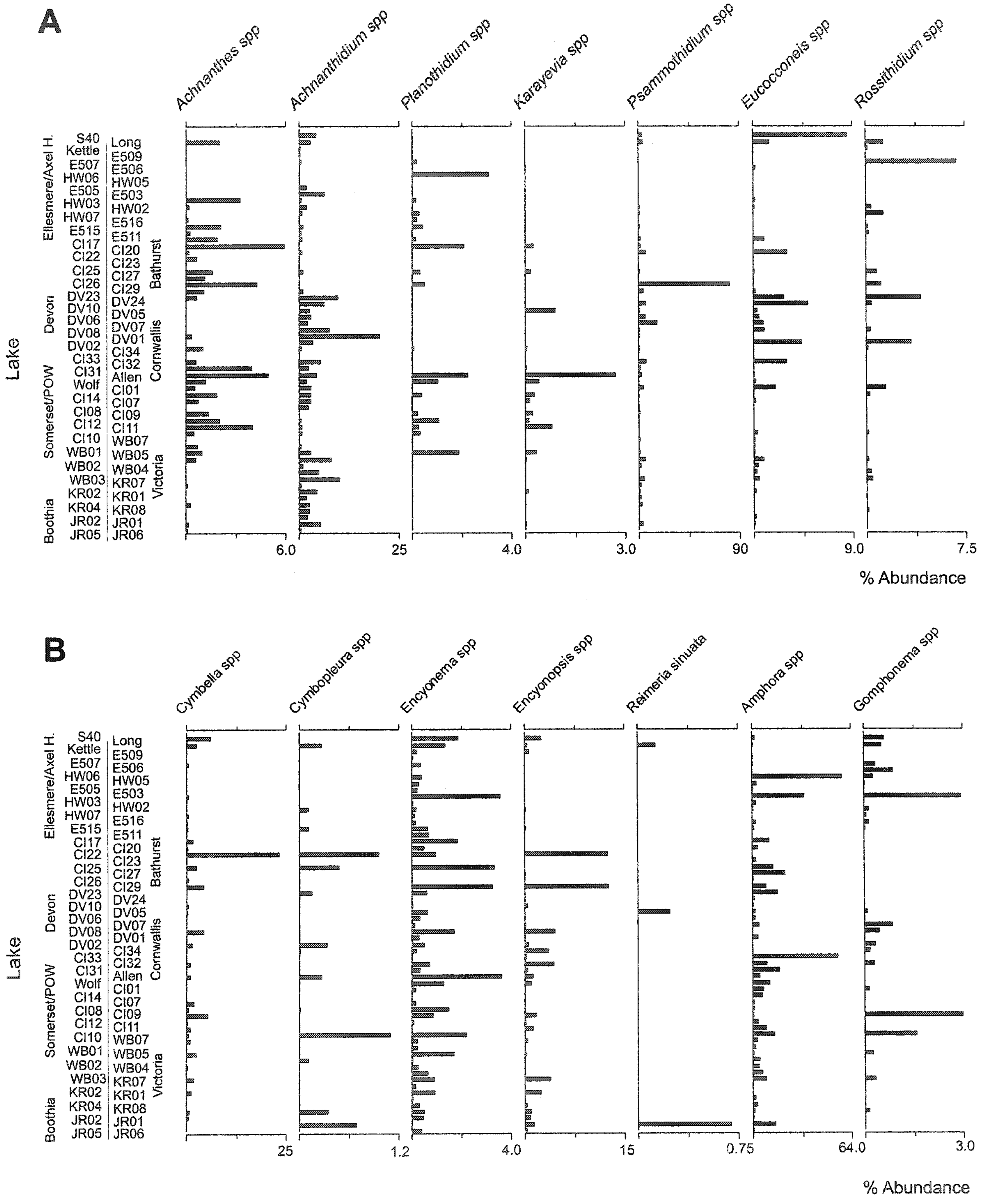

Figure 4.5. Relative abundance of genera formerly included in *Achnanthes sensu lato* (A) and *Cymbella sensu lato* (B). *Amphora* spp. and *Gomphonema* spp. are also included in (B). Lakes are arranged by decreasing latitude and by region.

Generally, the dominant taxa (*Staurosirella* spp., *Staurosira venter, Achnanthidium minutissimum* and *Pseudostaurosira pseudoconstruens*) were also the most widely distributed, although none of these taxa were present in every lake (Figure 4.6a, b, c). Other common taxa were also absent from certain regions. For example, *Hygropetra balfouriana, Cyclotella stelligera* (form 2), and *Cymbella angustata* were not found in lakes on Cornwallis Island (Figure 4.6d, e, f) and *H. balfouriana* was present in only one lake on Devon Island. *Eucocconeis laevis* was recorded from lakes on Bathurst Island while *E. flexella* was not (Figure 4.6g, i). *Brachysira neoexilis* was only recorded from Devon Island, Victoria Island, and Boothia Peninsula in low abundances (Figure 4.6j). *Amphora thumensis, Stauroneis smithii* var. *borgei, Achnanthes gracillima*, and *Karayevia laterostrata* were limited to regions south of 77 °N, thus not occurring on Ellesmere or Axel Heiberg Islands (Figure 4.6k, l, m, o). Similarly, *Cyclotella ocellata* was not recorded in lakes north of Somerset Island (Figure 4.6n). In contrast, *Neidium distinctepunctatum* was not found in the southernmost regions of this study (Victoria Island, Somerset Island, or Boothia Peninsula; Figure 4.6p). *Psammothidium ventralis*, known to be associated with sand habitats (Bukhtiyarova & Round, 1996) seemed to be limited to barren regions with the poorest vegetation cover and coldest temperatures (Figure 4.6q). Most of these taxa were rare, usually comprising less than 5% of the total assemblage.

Interesting results were also found at the scale of individual lakes. For example, the common benthic forms of the genera *Achnanthes, Achnanthidium, Karayevia, Kolbesia, Planothidium*, *Psammothidium*, and *Rossithidium* (formerly *Achnanthes sensu lato*) were absent from lake CI33 on Cornwallis Island (Figure 4.5). Richness in this lake was low (estimated richness 21) with an assemblage almost entirely composed of *Pseudostarosira, Staurosira*, and *Staurosirella* taxa. The mean July air temperature attributed to this site is low at 3.87 °C and major ions and nutrients are dilute relative to other lakes. One shallow lake with relatively high conductivity (CI25) on Bathurst Island lacked *Nitzschia* taxa, the second most common group in the study. The two most northern and coldest lakes (Long and S40) were very diverse (estimated richness of 49 and 48 respectively). Lake S40 was dominated by *Fragilaria capucina* var. *vaucheria* and larger taxa such as *Denticula kuetzingii, Eunotia arcus* and *E. praerupta*. In contrast, the assemblage of Long Lake was dominated by forms of *Staurosirella pinnata, Nitzschia* spp. and *Hygropetra balfouriana*.

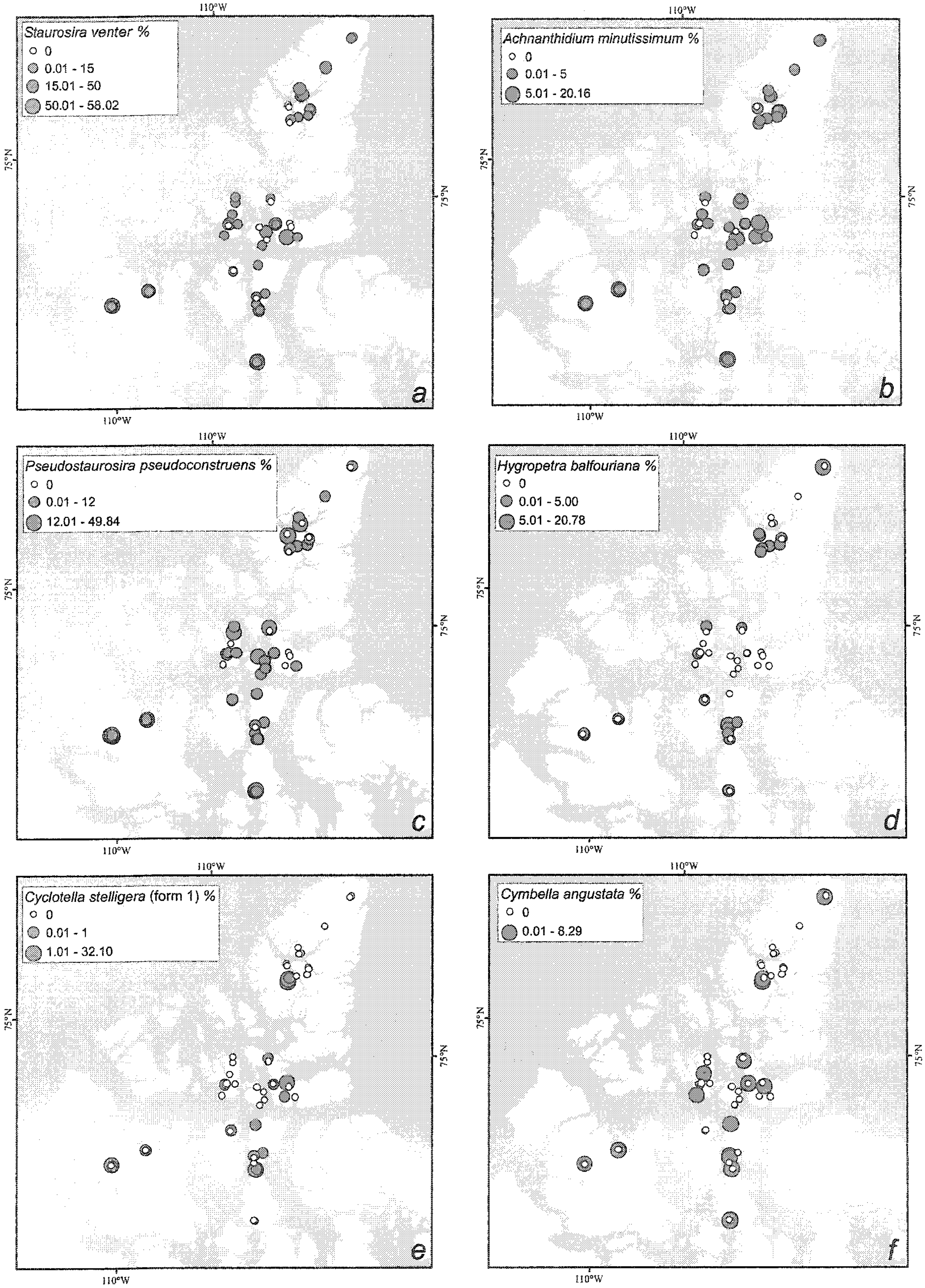

Figure 4.6. Spatial distribution of selected taxa in lakes of the Canadian Arctic. Values are expressed in percent abundance. Note proportional circles vary between maps.

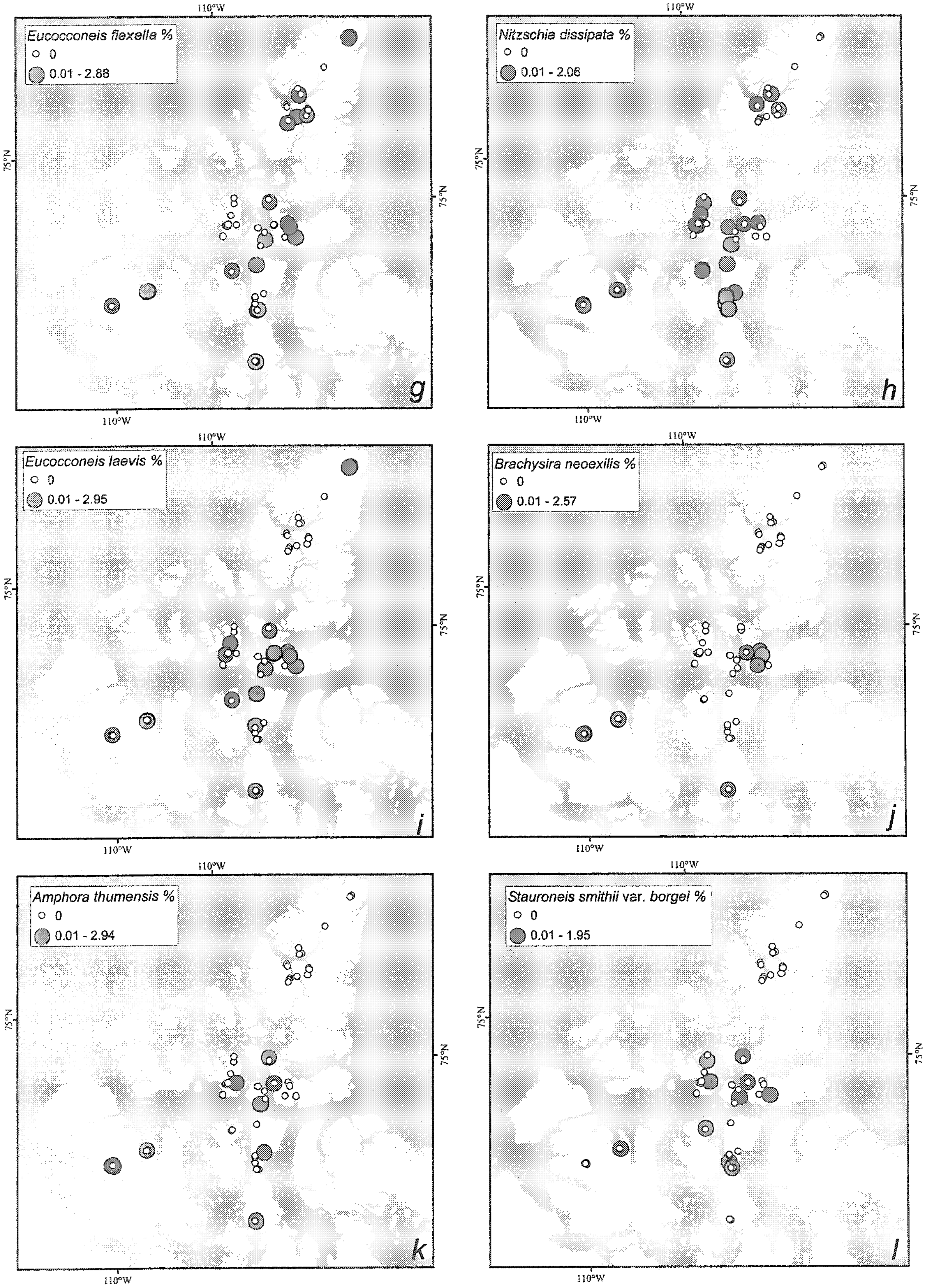

Figure 4.6. (continued)

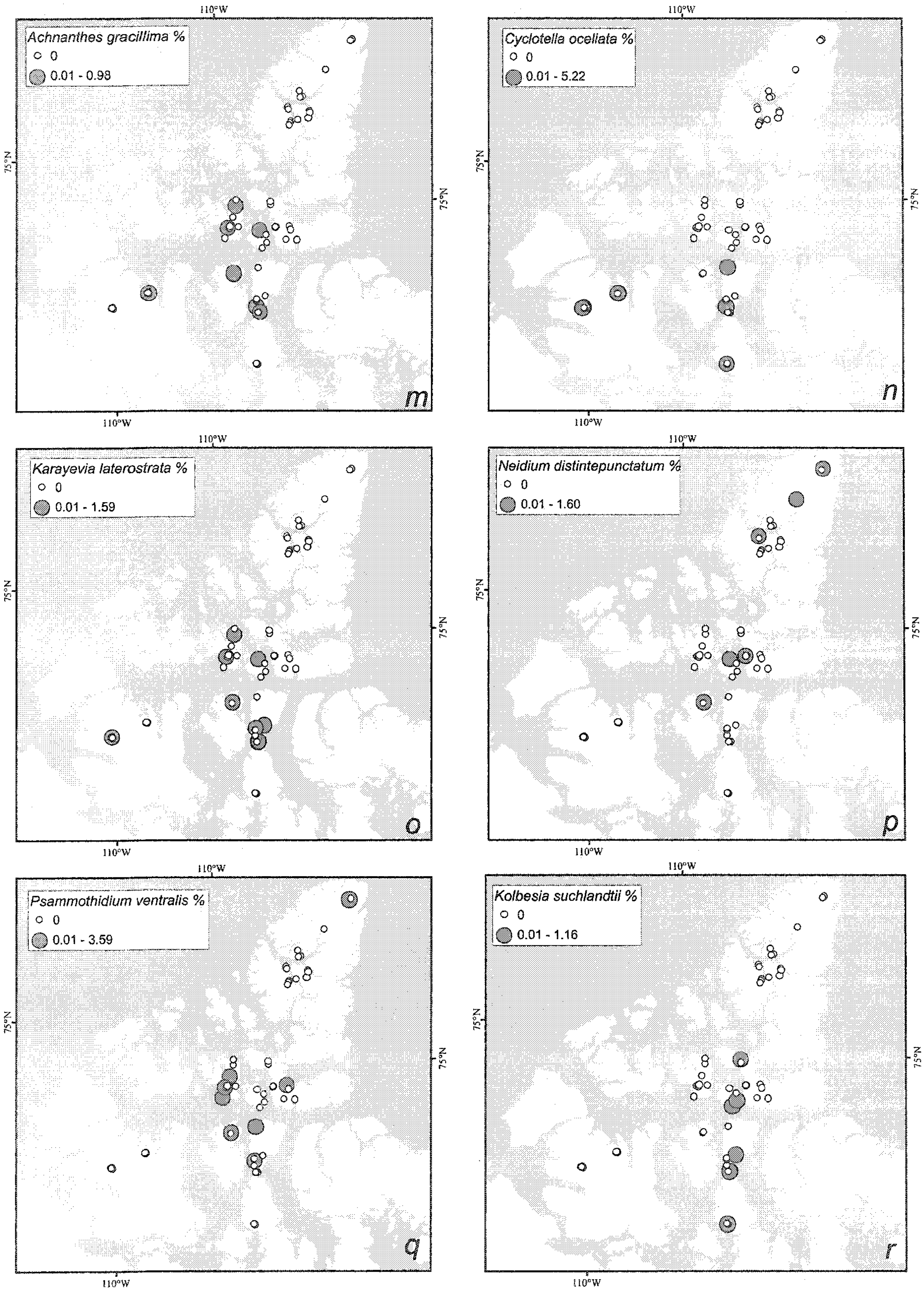

Figure 4.6. (continued)

Three species of *Psammothidium* were found in both lakes likely due to a sandy substrate. Maps depicting the spatial distributions of selected genera, the 30 most common taxa, and selected taxa are provided in Figures C.2, C.3, and C.4 respectively.

### *4.3. Diatoms & environment*

The 145 taxa used in the statistical analyses are listed in Table 4.3. Eigenvalues of the first two Detrended Correspondence Analysis (DCA) axes were 0.439 and 0.214 respectively, together explaining 20% of the diatom assemblage variation (Table 4.4).

Table 4.4. Summary of Detrended Correspondence Analysis (DCA) and Canonical Correspondence Analysis (CCA; after forward selection) results of the first three axes.

| | Ordination results | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| **DCA** | | | |
| Eigenvalues (λ) | 0.439 | 0.214 | 0.138 |
| Gradient length | 4.012 | 2.921 | 2.435 |
| Cumulative % variance of species | 13.4 | 20.0 | 24.2 |
| **CCA (with forward selection)** | | | |
| Eigenvalues (λ) | 0.135 | 0.080 | 0.061 |
| Species-environment correlations | 0.624 | 0.771 | 0.691 |
| Cumulative % of species data | 4.1 | 6.6 | 8.4 |

Common taxa with wide distributions across the study region grouped in the far right side of the DCA biplot (Figure 4.7). In the DCA, lakes are positioned according to the taxa most characteristic of their assemblages (ter Braak & Šmilauer, 2002). Convex hulls show that assemblages are somewhat specific to geographic regions with overlap due to the common taxa found in all regions (Figure 4.7). Lakes from Ellesmere and Axel Heiberg Islands have the most overlap with other regions containing widely variable assemblages. In contrast, lakes of the Boothia Peninsula and Cornwallis Island regions have assemblages largely limited to the common taxa. This is interesting since Boothia Peninsula is the southernmost region of this study, where assemblage diversity was expected to be relatively high. However, this region is represented by only four sites from a small area. The highest turnover rate of taxa across the first DCA axis was in lakes of Bathurst Island with lakes on the left-hand side of the joint plot containing assemblages much different from those on the far right.

Table 4.3. List of the 145 taxa used in ordination analyses with corresponding numbers and codes. Maximum relative abundance and number of lakes in which each taxon was found are included.

| Num. | code | Taxon name | Maximum % | # Lakes |
|---|---|---|---|---|
| 1 | slpin | *Staurosirella pinnata* (Ehrenberg) D.M. Williams & Round | 69.39 | 55 |
| 2 | sacfv | *Staurosira venter* (Ehrenberg) Cleve & Möller | 58.02 | 51 |
| 3 | ampcop | *Amphora copulata* (Kützing) Schoeman & Archibald | 55.11 | 45 |
| 4 | pseubre | *Pseudostaurosira brevistriata* (Grunow) D.M. Williams & Round | 51.65 | 35 |
| 5 | pseupseu | *Pseudostaurosira pseudoconstruens* (Marciniak) D.M. Williams & Round | 49.84 | 50 |
| 6 | ampina | *Amphora inariensis* Krammer | 47.86 | 41 |
| 7 | dentkue | *Denticula kuetzingii* Grunow | 46.47 | 26 |
| 8 | psmgfd | *Psammothidium grischunum* f. *daonensis* (Lange-Bertalot) Bukhtiyarova & Round | 42.16 | 15 |
| 9 | psammar | *Psammothidium marginulatum* (Grunow) Bukhtiyarova & Round | 33.17 | 9 |
| 10 | cycstell | *Cyclotella stelligera (* form 2) Cleve & Grunow | 32.10 | 19 |
| 11 | framic | *Fragilaria microstriata* Marciniak | 26.72 | 26 |
| 12 | slpinvi | *Staurosirella pinnata* (long form) (Ehrenberg) D.M. Williams & Round | 25.39 | 55 |
| 13 | slpinvla | *Staurosirella pinnata* var. *lancettula/acuminatum* (Ehrenberg) D.M. Williams & Round | 25.03 | 37 |
| 14 | ampped | *Amphora pediculus* (Kützing) Grunow | 23.69 | 29 |
| 15 | nitfrus | *Nitzschia frustulum* (Kützing) Grunow | 22.56 | 21 |
| 16 | fracvvc | *Fragilaria capucina* var. *vaucheria complex* (Kützing) Lange-Bertalot | 22.05 | 12 |
| 17 | fraolda | *Fragilaria oldenburgiana* complex Hustedt | 21.42 | 20 |
| 18 | hygbal | *Hygropetra balfouriana* (Grunow ex Cleve) Krammer & Lange-Bertalot | 20.78 | 28 |
| 19 | acdmin | *Achnanthidium minutissimum* (Kützing) Czarnecki | 20.16 | 55 |
| 20 | selpmor | *Sellaphora pupula* morph 4 (Kützing) Mereschkowski | 19.87 | 7 |
| 21 | fraoldpbc | *Fragilaria oldenburgioides* Lange-Bertalot/ *P. brevistriata* (Grunow) D.M. Williams & Round complex | 19.40 | 30 |
| 22 | diacfgal | *Diadesmis* cf. *gallica (* Wm. Smith) Van Heurck | 18.34 | 3 |
| 23 | navrae | *Navicula (dicta ) raederiae* Lange-Bertalot | 17.86 | 3 |
| 24 | psamafr | *Psammothidium rosenstockii* (Lange-Bertalot) Bukhtiyarova & Round | 16.50 | 19 |
| 25 | nitpal | *Nitzschia palea* (Kützing) W. Smith | 12.87 | 12 |
| 26 | nitscdea | *Nitzschia* sp.2 cf. *dealpina* Lange-Bertalot | 11.97 | 11 |
| 27 | sacfsub | *Staurosira construens* f. *subsalina* (Hustedt) Bukhtiyarova | 11.21 | 17 |
| 28 | nitinc | *Nitzscia inconspicua* Grunow | 10.10 | 14 |
| 29 | enpmic | *Encyonopsis microcephala* (Grunow) Krammer | 8.61 | 20 |
| 30 | cymang | *Cymbella angustata* (W. Smith) Cleve | 8.29 | 20 |
| 31 | ampneg | *Amphora neglecta* Stoermer & Yang | 8.23 | 6 |
| 32 | nitper | *Nitzschia perminuta* (Grunow) Peragallo | 8.08 | 27 |
| 33 | cymivc | *Cymbella incerta* var. *crassipunctata* Krammer | 7.66 | 12 |
| 34 | navaphy | *Navicula* aff. *phylepta* Kützing | 7.64 | 7 |
| 35 | calhen | *Caloneis hendyii* complex Lange-Bertalot | 7.61 | 32 |
| 36 | stakeo | *Stauroneis koeltzii* Metzeltin, Witkowski & Lange-Bertalot | 7.37 | 10 |
| 37 | navcncc | *Navicula cryptocephala* Kützing/*notha* Hohn & Hellerman/*chiarae* Lange-Bertalot & Genkal complex | 7.31 | 30 |
| 38 | eunarc | *Eunotia arcus* Ehrenberg | 7.30 | 13 |
| 39 | pseubref | *Pseudostaurosira brevistriata* form 1 (Grunow) D.M. Williams & Round | 7.23 | 4 |
| 40 | rospus | *Rossithidium pusillum* (Grunow) Round & Bukhtiyarova | 6.85 | 19 |
| 41 | adabry | *Adalfia bryophila* (Petersen) Lange-Bertalot | 6.85 | 18 |
| 42 | cocpleu | *Cocconeis placentula* var. *euglypta* Ehrenberg | 6.74 | 22 |
| 43 | hiphun | *Hippodonta hungarica* (Grunow) Lange-Bertalot, Metzeltin & Witkowski | 6.50 | 21 |
| 44 | navmen | *Navicula menisculus* Schumann | 6.43 | 8 |
| 45 | enpsubm | *Encyonopsis subminuta* Krammer & Reichardt | 6.36 | 9 |
| 46 | nitfont | *Nitzschia fonticola* Grunow | 6.30 | 19 |
| 47 | neiampl | *Neidium ampliatum* (Ehrenberg) Krammer | 5.93 | 14 |
| 48 | navabs | *Navicula absoluta* Hustedt | 5.68 | 30 |
| 49 | cocped | *Cocconeis pediculus* Ehrenberg | 5.65 | 10 |
| 50 | chasoes | *Chamaepinnularia soehrensis* (Krasske) Lange-Bertalot & Krammer | 5.58 | 8 |
| 51 | nitscfon | *Nitzschia* sp.1 cf. *fonticola* Grunow | 5.53 | 19 |
| 52 | navlibo | *Navicula libonensis* Schoeman | 5.37 | 3 |
| 53 | cycoce | *Cyclotella ocellata* Pantocsek | 5.22 | 11 |
| 54 | calten | *Caloneis tenuis* (Gregory) Krammer | 5.21 | 18 |
| 55 | fallen | *Fallacia lenzii* (Hustedt) D.G. Mann | 5.08 | 19 |
| 56 | navvulp | *Navicula vulpina* Kützing | 5.07 | 13 |
| 57 | enpdes | *Encyonopsis descripta* (Hustedt) Krammer | 4.87 | 17 |
| 58 | euclep | *Eucocconeis leptostriata* Lange-Bertalot | 4.81 | 10 |
| 59 | nitssad | *Nitzschia* sp. 3 aff. *dealpina* Lange-Bertalot | 4.45 | 9 |
| 60 | dipocc | *Diploneis occulata* (Brébisson) Cleve | 4.44 | 26 |
| 61 | cymdel | *Cymbella delicatula* Kützing | 4.40 | 6 |
| 62 | rospet | *Rossithidium petersenii* (Hustedt) Round & Bukhtiyarova | 4.15 | 10 |

| Num. | code | Taxon name | Maximum % | # Lakes |
|---|---|---|---|---|
| 63 | enpces | *Encyonopsis cesatii* (Rabenhorst) Krammer | 3.83 | 3 |
| 64 | tabfloc | *Tabellaria flocculosa* (Roth) Kützing | 3.76 | 9 |
| 65 | achgran | *Achnanthes grana* Hohn & Hellermann | 3.68 | 7 |
| 66 | psamven | *Psammothidium ventralis* (Krasske) Bukhtiyarova & Round | 3.59 | 8 |
| 67 | psamlev | *Psammothidium levanderi* (Hustedt) Bukhtiyarova & Round | 3.40 | 15 |
| 68 | adaminu | *Adalfia minuscula* (Grunow) Lange-Bertalot | 3.35 | 19 |
| 69 | encvent | *Encyonema ventricosum* (Agardh) Grunow | 3.33 | 18 |
| 70 | cymbot | *Cymbella botellus* (Lagerstedt) A. Schmidt | 3.19 | 8 |
| 71 | ampcopb | *Amphora copulata* morph B (Kützing) Schoeman & Archibald | 3.17 | 11 |
| 72 | achrupe | *Achnanthes rupestris* Krasske | 3.10 | 4 |
| 73 | cavcoc | *Cavinula cocconeiformis* (Gregory) D.G. Mann & Stickle | 3.02 | 3 |
| 74 | neiber | *Neidium bergii* (Cleve-Euler) Krammer | 3.01 | 5 |
| 75 | euclae | *Eucocconeis laevis* (Østrup) Lange-Bertalot | 2.95 | 19 |
| 76 | gomgra | *Gomphonema gracile* Ehrenberg (in Lange-Bertalot 2/1 fig. 26,27) | 2.94 | 6 |
| 77 | ampthu | *Amphora thumensis* (Mayer) Cleve-Euler | 2.94 | 15 |
| 78 | navcflu | *Navicula* cf. *fluens* Hustedt | 2.93 | 17 |
| 79 | calsilva | *Caloneis arctica* (Krasske) Lange-Bertalot | 2.91 | 6 |
| 80 | eucfle | *Eucocconeis flexella* (Kützing) Cleve | 2.88 | 23 |
| 81 | chasp | *Chamaepinnularia* sp.1 | 2.82 | 3 |
| 82 | navdigs | *Navicula digitulus* Hustedt | 2.82 | 13 |
| 83 | cymsubb | *Cymbella subaequalis* morph B Grunow | 2.80 | 5 |
| 84 | fraten | *Fragilaria tenera* (W. Smith) Lange-Bertalot | 2.80 | 13 |
| 85 | calbac | *Caloneis bacillum* (Grunow) Cleve | 2.76 | 12 |
| 86 | gomangm | *Gomphonema angustum* Agardh | 2.74 | 5 |
| 87 | planper | *Planothidium peragallii* (Brun & Héribaud) Round & Bukhtiyarova | 2.67 | 5 |
| 88 | navmod | *Navicula modica* Hustedt | 2.57 | 7 |
| 89 | braneo | *Brachysira neoexilis* Lange-Bertalot | 2.57 | 11 |
| 90 | pinbir | *Pinnularia birnirkiana* Patrick & Freese | 2.54 | 6 |
| 91 | psamhel | *Psammothidium helveticum* (Hustedt) Bukhtiyarova & Round | 2.38 | 19 |
| 92 | mickra | *Microcostasis krasskei* (Hustedt) Johansen & Sray | 2.22 | 12 |
| 93 | navvito | *Navicula vitiosa* Schimanski | 2.20 | 3 |
| 94 | nitfrusvi | *Nitzschia frustulum* var. *inconspicua* Grunow | 2.12 | 3 |
| 95 | achcari | *Achnanthes carissima* Lange-Bertalot | 2.11 | 15 |
| 96 | nitdiss | *Nitzschia dissipata* (Kützing) Grunow | 2.06 | 28 |
| 97 | planfre | *Planothidium frequentissimum* (Lange-Bertalot) Round & Bukhtiyarova | 2.06 | 9 |
| 98 | navcost | *Hippodonta costulata* (Grunow) Lange-Bertalot, Metzeltin & Witkowski | 2.06 | 7 |
| 99 | selmut | *Sellaphora mutata* (Krasske) Lange-Bertalot | 2.06 | 16 |
| 100 | selhel | *Fallacia helensis* (*Sellaphora* ?) (E. Schulz) D.G. Mann | 2.06 | 7 |
| 101 | staanc | *Stauroneis anceps* Ehrenberg | 2.06 | 14 |
| 102 | encobva | *Encyonema obscurum* var. *alpina* Krammer | 2.01 | 3 |
| 103 | achingra | *Achnanthes ingratiformis* Lange-Bertalot | 1.99 | 4 |
| 104 | sellae | *Sellaphora laevissima* (Kützing) D.G. Mann | 1.96 | 3 |
| 105 | stasmvb | *Stauroneis smithii* var. *borgei* (Manguin) Hustedt | 1.95 | 10 |
| 106 | ampaeq | *Amphora aequalis* Krammer | 1.90 | 5 |
| 107 | navdea | *Navicula dealpina* Lange-Bertalot | 1.89 | 5 |
| 108 | anetus | *Aneumastus tusculus* (Ehrenberg) D.G. Mann | 1.86 | 15 |
| 109 | psamsac | *Psammothidium sacculum* (Carter) Bukhtiyarova | 1.84 | 14 |
| 110 | achdaui | *Achnanthes daui* Foged | 1.82 | 5 |
| 111 | encsil | *Encyonema silesiacum* (Bleisch) D.G.Mann | 1.76 | 32 |
| 112 | selpvp | *Sellaphora pupula* var. *pupula* (Ehrenberg) Mereschkowsky | 1.76 | 23 |
| 113 | nitpur | *Nitzschia pura* Hustedt | 1.74 | 3 |
| 114 | stasmi | *Stauroneis smithii* Grunow | 1.74 | 11 |
| 115 | navsch | *Navicula schmassmannii* Hustedt | 1.74 | 8 |
| 116 | planoes | *Planothidium oestrupii* (Cleve-Euler) Round & Bukhtiyarova | 1.72 | 8 |
| 117 | cymsad | *Cymbella* sp. [aff. *designata* Krammer] | 1.71 | 13 |
| 118 | achcons | *Achnanthes conspicua* Mayer | 1.67 | 11 |
| 119 | neidist | *Neidium distincte-punctatum* Hustedt | 1.60 | 6 |
| 120 | karlat | *Karayevia laterostrata* (Hustedt) Round & Bukhtiyarova | 1.59 | 9 |
| 121 | pinrhom | *Pinnularia rhombarea* Krammer | 1.54 | 9 |
| 122 | achimpex | *Achnanthes impexiformis* Lange-Bertalot | 1.52 | 10 |
| 123 | navcryl | *Navicula cryptotenella* Lange-Bertalot | 1.44 | 16 |
| 124 | nitcam | *Nitzschia* cf. *amphibia* Grunow | 1.43 | 9 |
| 125 | psambio | *Psammothidium bioretti* (Germain) Bukhtiyarova & Round | 1.35 | 16 |
| 126 | navdiff | *Navicula difficillima* Hustedt | 1.27 | 6 |

| Num. | code | Taxon name | Maximum % | # Lakes |
|---|---|---|---|---|
| 127 | dippar | *Diploneis parma* Cleve | 1.26 | 15 |
| 128 | enpcesf | *Encyonopsis cesatiformis* Krammer | 1.24 | 6 |
| 129 | diagavp | *Diadesmis perpusilla* (Grunow) D.G. Mann | 1.23 | 8 |
| 130 | cycros | *Cyclotella rossii* Håkansson | 1.19 | 14 |
| 131 | falsubl | *Fallacia sublucidula* (Hustedt) D.G. Mann | 1.17 | 6 |
| 132 | achsuch | *Kolbesia suchlandtii* (Hustedt) Kingston | 1.16 | 7 |
| 133 | dentten | *Denticula tenuis* Kützing | 1.16 | 15 |
| 134 | staneo | *Stauroneis neohyalina* Lange-Bertalot & Krammer | 1.16 | 3 |
| 135 | stapho | *Stauroneis phoenicentron* (Nitzsch) Ehrenberg | 1.16 | 7 |
| 136 | dipnsjo | *Diploneis* nov. spec. Nr. 1 Julma Ölkky | 1.14 | 8 |
| 137 | navdigo | *Navicula digituloides* Lange-Bertalot | 1.12 | 5 |
| 138 | surbreb | *Surirella brebissonii* Krammer & Lange-Bertalot | 1.12 | 7 |
| 139 | cymamva | *Cymbella amphicephala* Näegeli | 1.12 | 16 |
| 140 | karcvr | *Karayevia clevei var. rostrata (Grunow) Kingston* | 1.11 | 10 |
| 141 | navatro | *Navicula* c.f. *trophicatrix* Lange-Bertalot | 1.10 | 9 |
| 142 | cymivi | *Cymbella incerta* (Grunow) Cleve | 1.08 | 3 |
| 143 | diacvc | *Diadesmis contenta* (Grunow) D.G. Mann | 1.07 | 7 |
| 144 | placexpl | *Navicula (Placoneis?) explanata* Hustedt | 1.01 | 6 |
| 145 | achgrac | *Achnanthes gracillima* Hustedt | 1.00 | 8 |

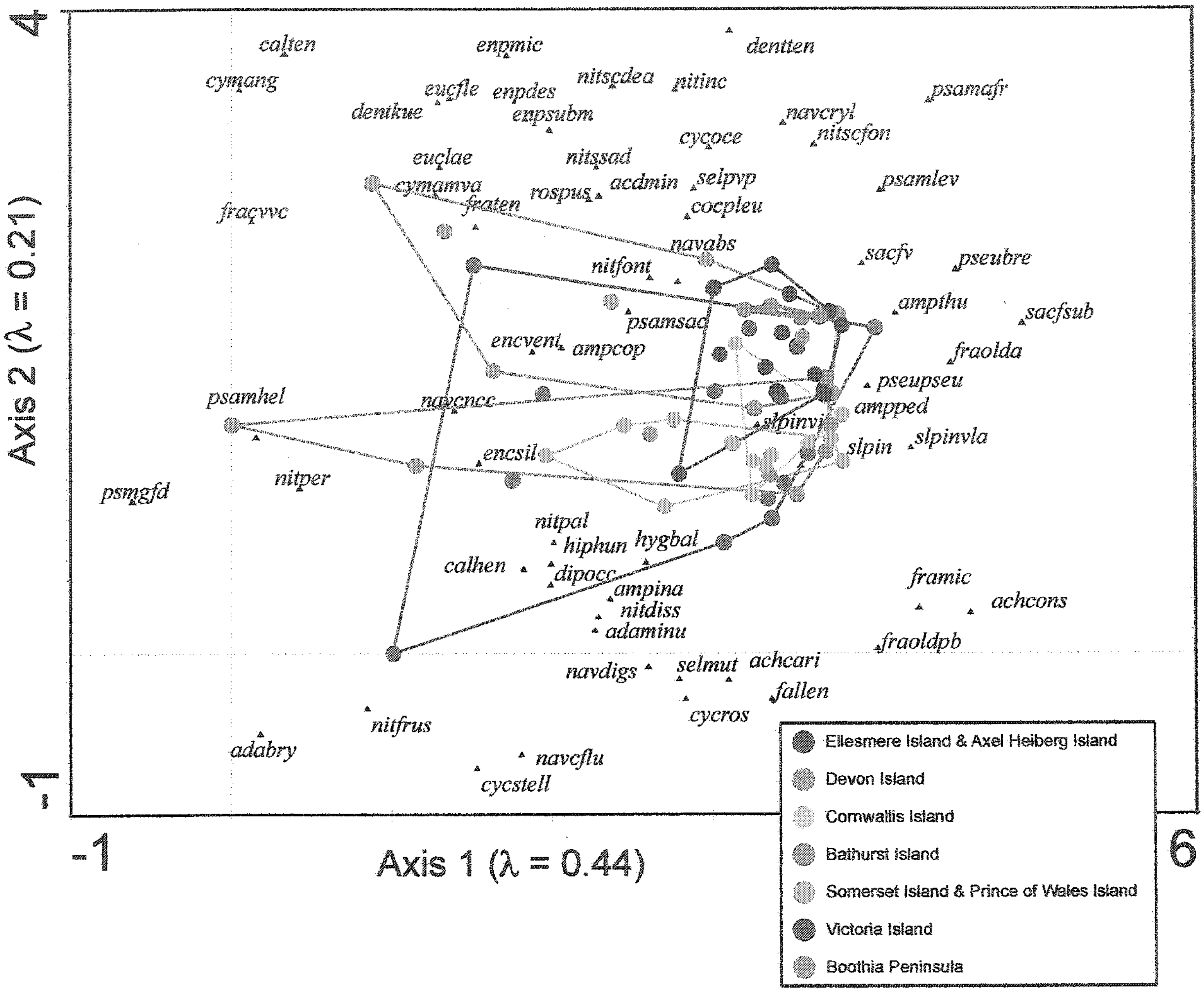

Figure 4.7. Joint plot of 62 lakes in the Canadian Arctic based on a Detrended Correspondence Analysis (DCA) of 145 diatom taxa. Convex hulls are placed around the lakes of each region. Taxa with a minimum 2% weight in the DCA are shown. The key to species is given in Table 4.3.

Canonical Correspondence Analysis (CCA) was used to assess possible relationships between the environmental variables and diatom assemblages. Spatial variables (latitude, longitude, elevation, and distance from coast) were excluded from the CCA analysis as their effects are reflected in lake water characteristics directly experienced by the diatoms. Air temperature is also correlated to lake water characteristics but is recognized as having a direct influence on diatom growth and distribution. Chlorophyll-*a* was not used in this analysis since it is a measure of algal growth and not an environmental variable. As expected, the exploratory CCA revealed collinear variables ($Ca^{2+}$, $Cl^{-}$, $Na^{+}$, $K^{+}$, and DIC) based on their high variance inflation factors (VIF >10). High correlations between these variables were also evident in the PCA (Figure 4.1). This multicollinearity causes the canonical coefficients to be unstable and can produce an arch effect in the CCA biplot (ter Braak, 1986). Therefore, these variables were removed from further analysis.

Forward selection with unrestricted Monte Carlo permutation tests (199 random permutations) used in the CCA of the remaining 14 variables revealed three that significantly ($p \leq 0.05$) explained diatom assemblage variation. In decreasing order these were mean July air temperature (AT; $p<0.01$), $SiO_2$ ($p<0.01$), and total Kjeldahl nitrogen (TKN; $p<0.03$). Other variables believed to be important in controlling diatom distributions were illustrated in the biplot as supplementary variables. Depth, $Mg^{2+}$, Surface Area (SfcA), and total unfiltered phosphorous (TPuf) were selected based on their cannonical coefficients and associated approximate *t*-values from an exploratory CCA (highly collinear variables excluded). Intraset correlations were also examined to assess the relative contributions of each variable to the first two axes (ter Braak, 1995).

Eigenvalues of the first three axes of the CCA (with forward selection) were 0.135, 0.08, and 0.06 respectively, together explaining 8.4% of the diatom assemblage variation. Although this only explains a small amount of the species variation, the first 3 axes of the CCA capture 35% of the species variation explained by the DCA (Table 4.4). All three were significant ($p \leq 0.05$) based on Monte Carlo permutation tests (199 permutations). The significance of the second and third axes was tested by including the constrained sample scores (linear combinations of the environmental variables) of the first and second axes of the CCA as a covariable in a new analysis (Leps & Šmilauer, 2003).

The first axis of the CCA is defined primarily by mean July air temperature (AT). $SiO_2$ also contributed significantly to axis 1 although it was also highly correlated with the third axis (Table 4.5). Axis 2 is associated with total Kjeldahl nitrogen (TKN) with an intra-set correlation of 0.87.

Table 4.5. Canonical coefficients, associated *t*-values, and intra-set correlations of the three forward selected variables in the final CCA for the first three axes.

| Environmental | Canonical coefficients | | | *t*-values | | | Intra-set correlations | | |
|---|---|---|---|---|---|---|---|---|---|
| variable | axis 1 | axis 2 | axis 3 | axis 1 | axis 2 | axis 3 | axis 1 | axis 2 | axis 3 |
| AT | -1.02 | -0.2 | -0.42 | -5.5* | -1.67 | -2.81* | -0.79 | -0.01 | -0.61 |
| SiO2 | 0.71 | -0.53 | -0.86 | 3.49* | -3.98* | -5.16* | 0.38 | 0.04 | -0.92 |
| TKN | -0.05 | 1.23 | 0.04 | -0.22 | 9.2* | 0.21 | 0.04 | 0.87 | -0.50 |

* denotes those significant at $p<0.05$

Lakes of similar vegetation classes were grouped in the CCA biplot (Figure 4.8A). Lakes surrounded by Graminoid tundra ordinated in the top-left quadrant of the biplot and those in Prostrate-shrub tundra are positioned on the left side of the biplot. Both groups positively associated with increasing air temperature on the first axis. These included lakes of various latitudes, particularly those of Boothia Peninsula and Victoria Island in the southern part of the study region and lakes of the Fosheim region on Ellesmere Island. Lakes in areas of Barren vegetation (polar desert) were positioned in the quadrant of higher $SiO_2$, $Mg^{2+}$, Depth, and Surface area (SfcA) where temperatures were lower. Generally, this separated Devon Island from the other regions. Although lakes DV06 and DV05 are classified as Prostrate-shrub tundra, vegetation more characteristic of a Barren Polar Desert environment was observed in the field. As vegetation classifications used here were largely obtained through remote sensing techniques (CAVM team, 2003) some discrepancies are expected to occur.

A large number of taxa have strong, positive scores on the first axis indicating that the diatom assemblages in the study area are generally restricted to cold water (Figure 4.8B). Many species of the genera *Psammothidium* and *Nitzschia* are positioned on the right side of the diagram on the colder portion of axis 1. *Eucocconeis flexella, E. laevis*, and *E. leptostriata* all have low weighted averages (WA) with respect to air temperature while those of *Denticula tenuis* and *Navicula cryptotenella* were relatively high. Lakes void of the

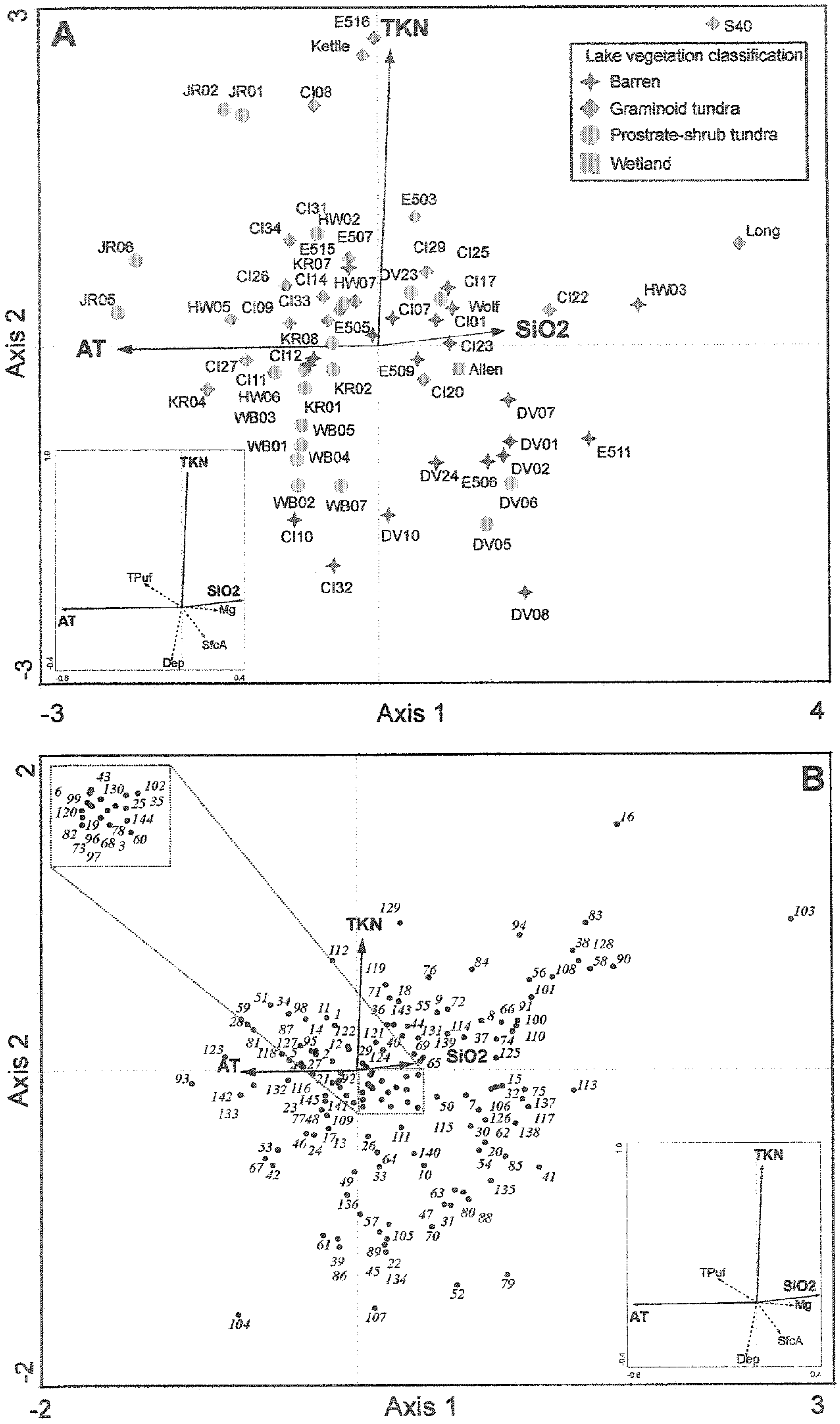

Figure 4.8. Biplots of the CCA (with forward selection) showing lakes (A), and diatoms (B) with the three forward selected variables. Lakes are represented by their respective vegetation classification. Supplementary variables are included in the inset ordination diagrams. Taxa names corresponding to numbers in (B) are provided in Table 4.3.

often dominant, small benthic forms of *Staurosira, Staurosirella, Pseudostaurosira,* and *Fragilaria* (fragilaroid taxa) were all positioned on the right side of the biplot, except for HW06 (Figure 4.8A). With the absence of these forms, other taxa reach higher abundances and diversity generally increased. The position of these lakes in the biplot suggests possible relationships between non-fragilaroid taxa with lake surface area and silica. Many stalked or tube-dwelling taxa, such as those belonging to *Gomphonema, Encyonopsis*, and *Cymbella* have high weighted averages with respect to surface area. These taxa are positioned in the bottom-right quadrant where the supplementary variable surface area is found (Figure 4.8B).

Other taxa were strongly associated with the second axis (total Kjeldahl Nitrogen; TKN). For example, *Stauroneis smithii* var. *borgei, Cyclotella stelligera* (form 2), and *Navicula dealpina* all had low weighted averages with respect to TKN and were positioned in the negative portion of axis 2 (Figure 4.8B).

A series of response surfaces were plotted to identify the response of several taxa to various combinations of environmental variables. Those exhibiting the strongest changes in relative abundance as a function of selected environmental gradients are presented (Figure 4.9). Higher abundances of *Nitzschia* spp., *Eucoconeis* spp., and *Caloneis* spp. were found with cooler mean July air temperature and relatively high $Mg^{2+}$ (Figure 4.9a, b, c). *Staurosira* spp. consistently had higher abundances in smaller lakes with no clear relationship with total unfiltered phosphorous (TPuf) concentrations (Figure 4.9e). In contrast, *Fallacia* spp. was more abundant at lower phosphorous values with little relationship to lake size (Figure 4.9f). Other groups, such as *Encyonema* spp. had no clear relationships with measured environmental variables (Figure 4.9d).

Many of the individual taxa showed relationships with temperature (Figure 4.10). *Psammothidium helveticum, Eucocconeis flexella, Caloneis tenuis*, *Encyonema* sp. aff. *designata, and Nitzschia perminuta* all exhibited preference for the colder environments of this study (Figure 4.10a, c, d, e, g). There seems to be little interaction of temperature and phosphorous in determining the abundance of these taxa, although *N. perminuta* seems to have higher abundances in cold lakes with high nutrient concentrations. Other taxa, such as *Denticula tenuis, Pseudostaurosira pseudoconstruens*, and *Navicula cryptotenella* exhibit preference for warmer lakes and *D. tenuis* also prefers higher total phosphorous levels

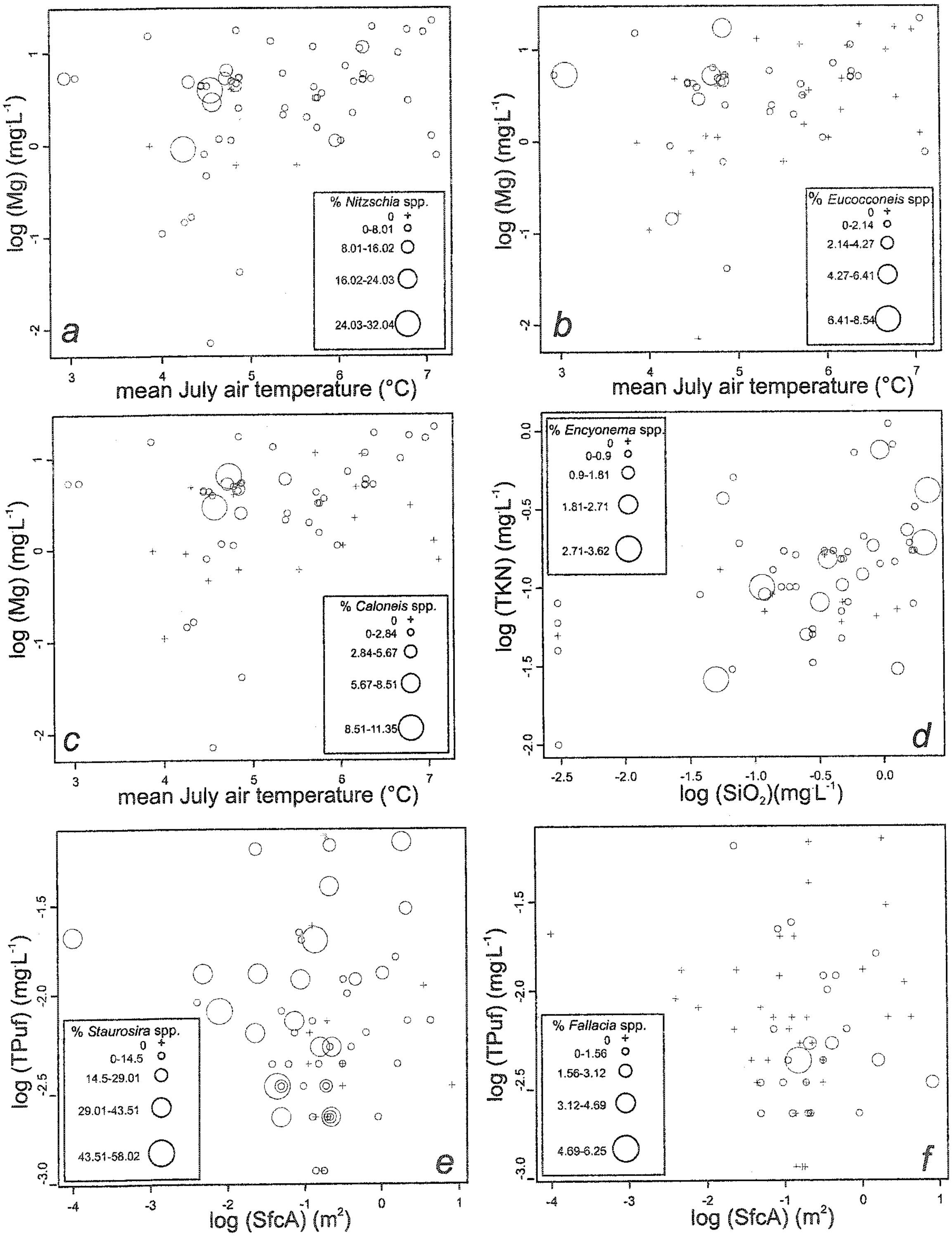

Figure 4.9. Response surfaces of selected genera assessing changes in relative abundance and diatom presence as a function of gradients in environmental variables. Note variables differ from graph to graph. Codes of environmental varibles are TPuf (total unfiltered phosphorous), SfcA (lake surface area), and TKN (total Kjeldahl nitrogen).

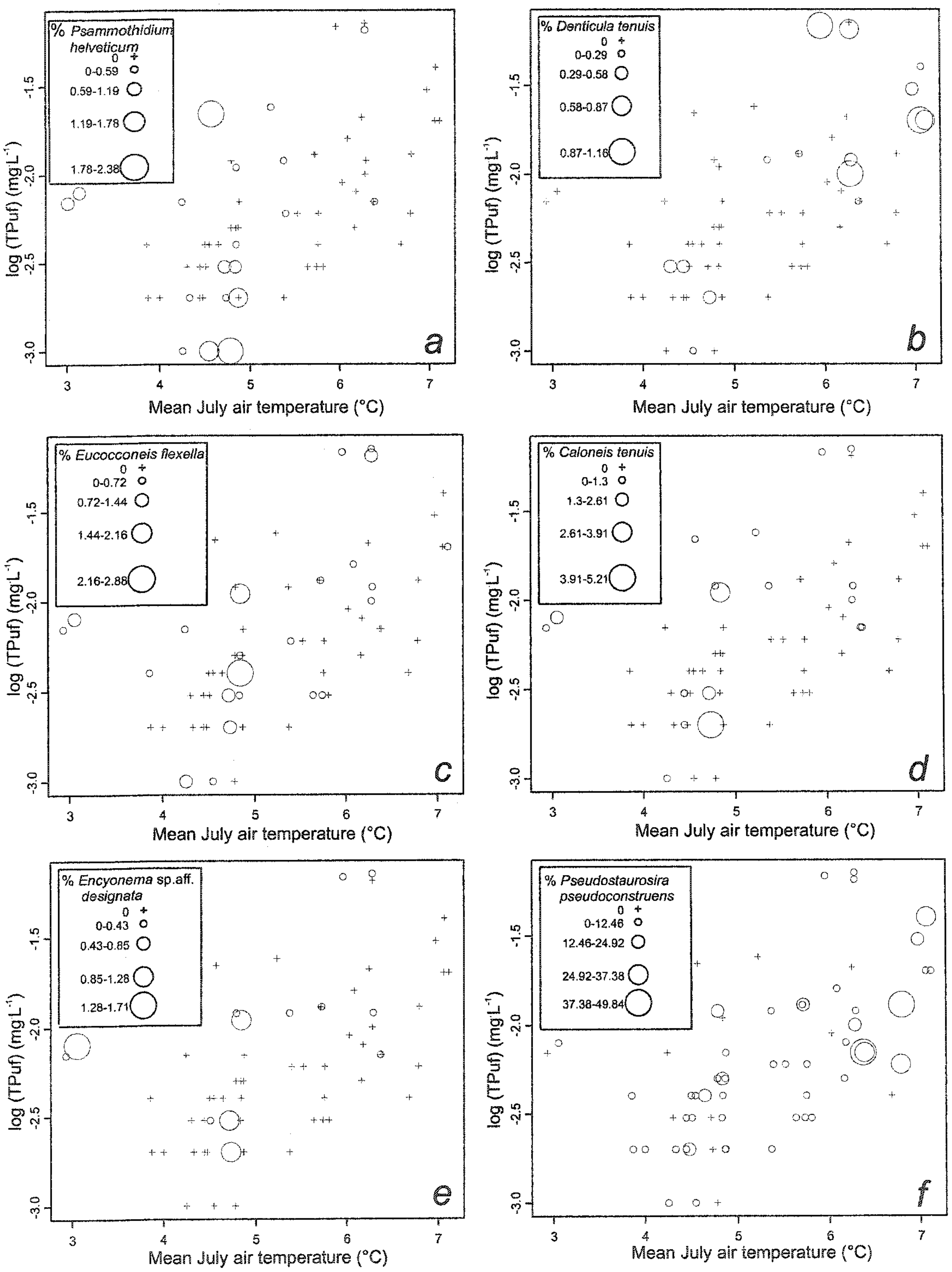

Figure 4.10. Response surfaces of various taxa along gradients of mean July air temperature, total unfiltered phosphorous (TPuf), total Kjeldahl nitrogen (TKN), $SiO_2$, and $Mg^{2+}$. Note variables differ from graph to graph.

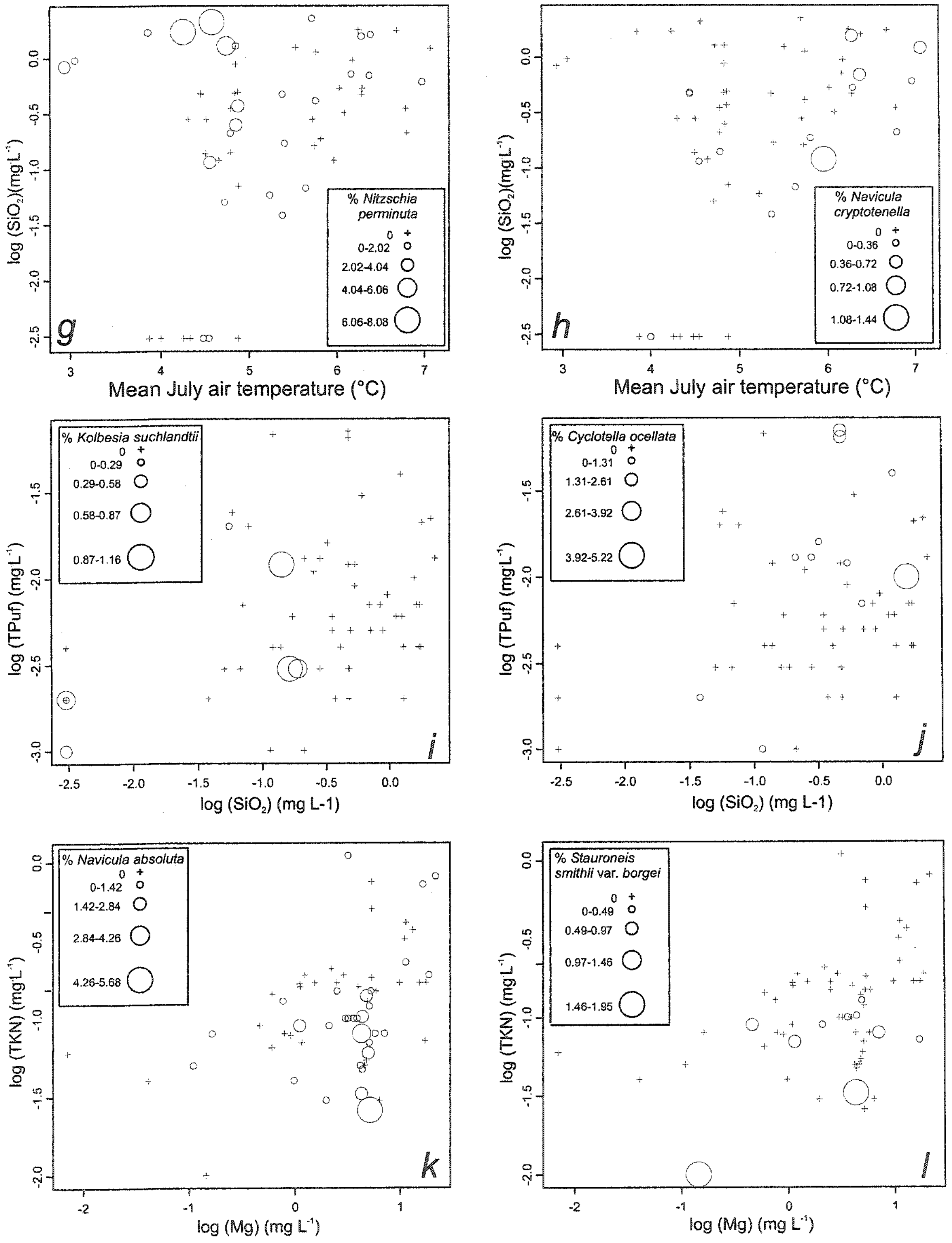

Figure 4.10 (continued)

(Figure 4.10b, f, h). *Cyclotella ocellata* is more abundant in lakes with low concentrations of $SiO_2$ and higher concentrations of phosphorous (Figure 4.10j). The positive relationship between this taxon and phosphorous was also reported by Wunsam et al. (1995). *Kolbesia suchlandtii* is more abundant at low values of $SiO_2$ than phosphorous (Figure 4.10i). The abundance of *Stauroneis smithii* var. *borgei* appears to increase with decreasing total Kjeldahl nitrogen (TKN) concentrations with little relationship to $Mg^{2+}$ (Figure 4.10l). Similarly, *Navicula absoluta* is more abundant with low TKN concentrations but has a higher abundance in lakes with $Mg^{2+}$ concentrations near the mean of all study lakes (Figure 4.10k). A summary of some observed relationships described above is provided in Table 4.6.

The direct relationship between mean July air temperature and the abundance of *Fragilaria sensu lato* (*Fragilaria, Pseudostaurosira, Staurosirella,* and *Staurosira*) was further examined (Figure 4.11). Both *Fragilaria* spp. and *Staurosirella* spp. showed a slight preference for colder temperatures. *Pseudostaurosira* spp. showed increased abundance with increased temperature while *Staurosira* spp. also exhibited a slightly positive relationship with temperature.

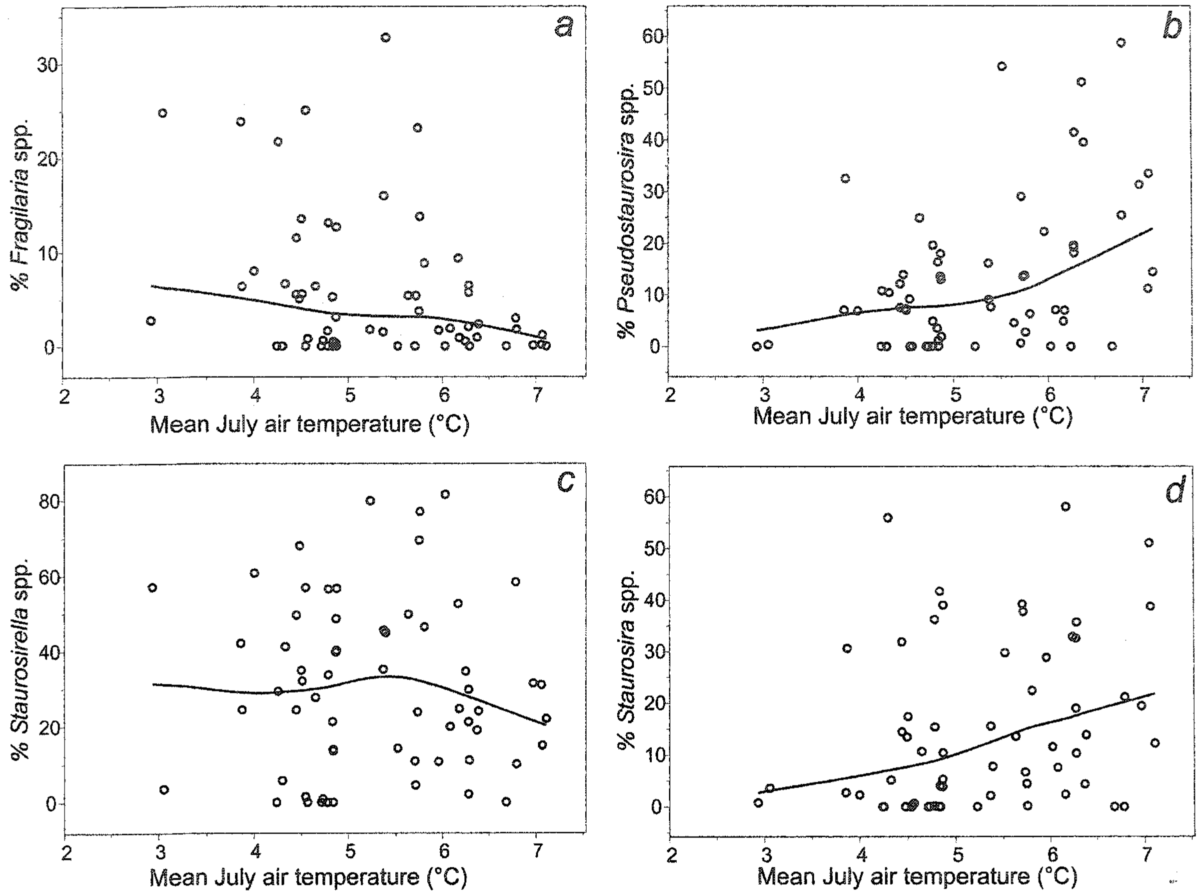

Figure 4.11. Relative abundance of *Fragilaria* spp. (a), *Pseudostaurosira* spp. (b), *Staurosirella* ssp. (c), and *Staurosira* ssp. (d) as a function of mean July air temperature. A loess scatterplot smoother was used to fit a curve to the data.

Table 4.6. Summary of some environmental preferences exhibited by selected diatom taxa.

| **Diatom taxa** | **General environmental** | **Figure #** |
|---|---|---|
| *Psammothidium* (many taxa) | colder environment | 4.8 |
| *Psammothidium helveticum* | colder environment | 4.10a; 4.8 |
| *Eucocconeis* spp. | colder environment | 4.8; 4.9b |
| *Eucocconeis flexella, E. leptostriata, E. laevis* | colder environment | 4.8; 4.10c |
| *Caloneis* spp. | colder environment | 4.9c |
| *Caloneis tenuis* | colder environment | 4.10d |
| *Encyonema* sp. aff. *designata* | colder environment | 4.10e |
| *Staurosirella* spp. | colder environment | 4.11 |
| *Pinnularia birnirkiana* | colder environment | 4.8 |
| *Nitzschia* (many taxa) | colder environment; larger lake | 4.8; 4.9a |
| *Nitzschia perminuta* | colder environment; higher silica | 4.10g |
| *Kolbesia suchlandtii* | lower silica | 4.10i |
| *Gomphonema* (many taxa) | larger lake surface area | 4.8 |
| *Encyonopsis* (many taxa) | larger lake surface area | 4.8 |
| *Cymbella* (many taxa) | larger lake surface area | 4.8 |
| *Encyonema* (many taxa) | larger lake surface area | 4.8 |
| *Naviclua cryptotenella* | warmer environment | 4.10h |
| *Denticula tenuis* | warmer environment | 4.10b |
| *Pseudostaurosira pseudoconstruens* | warmer environment; higher total | 4.11b |
| *Fallacia* spp. | lower total phosphorous | 4.9f |
| *Stauroneis smithii* var. *borgei* | lower total Kjeldahl nitrogen | 4.8; 4.10l |
| *Cyclotella stelligera* (form 2) | lower total Kjeldahl nitrogen | 4.8 |
| *Navicula dealpina* | lower total Kjeldahl nitrogen | 4.8 |
| *Navicula absoluta* | median Mg concentration | 4.10k |

# 5. Discussion

## *5.1 Limnology*

The limnological characteristics of the lakes in this study are similar to other surface waters in the Canadian Arctic (e.g. Hamilton et al., 1994a; Douglas & Smol, 1993; Hamilton et al., 2001; Michelutti et al., 2002a, b; Lim et al., 2001c). Most lakes and ponds in the Arctic Archipelago are neutral to slightly alkaline since much of the region is underlain by sedimentary rock composed largely of calcareous materials (Trettin, 1991b). Exceptions to this generalization have been found. Michelutti et al. (2002a) reported two extremely acidic lakes from the central area of Axel Heiberg Island, which they suggest may be due to $H_2SO_4$ regeneration. Antonaides et al. (2003) attributed low pH values (mean = 6.8) in ponds and one lake on Ellef Ringnes Island to the shale and gabbro bedrock of that region. Although two lakes (WB01 and WB02) in this study are underlain by intrusive rocks containing diorite and gabbro, their pH values remain basic. This is likely due to the large influence of the surrounding carbonate bedrock on northern Victoria Island.

The Principal components analysis revealed two major gradients explaining the variation in lake characteristics; 1) major ions, conductivity, and DIC, and 2) nutrients and air temperature. There is a clear separation of the lakes based on the island or region where they are located, with the exception of lakes from the Fosheim region on Ellesmere and Axel Heiberg Islands. Some of these lakes more clearly resemble those from more southerly locations (Figure 4.1), as expected given the climate and vegetation of this area. The different geological and climatic conditions on the various islands of the Archipelago produce slightly different limnological characteristics.

Dissolved organic carbon (DOC) values were consistently higher in lakes of the Ellesmere/Axel Heiberg region both in the Fosheim area and northward (Table 4.1). For the most part, arctic lakes have lower DOC values than those in forested regions (Hamilton et al., 2001). Despite this, values observed in the Fosheim were comparable to values reported from lakes in the Boreal forest (Moser et al., 1998) and the Forest-Tundra (Rühland et al., 2003b). This is due to the unique mesoenvironment of the Fosheim region where warmer temperatures occur due to the high physical relief surrounding the region (Edlund & Alt, 1989). Warmer temperatures, more characteristics of mid-arctic regions lead to increased terrestrial plant growth, which is reflected in the lake water chemistry due to an increase in allochthonous carbon to the lacustrine system. The degradation of peat that had accumulated in this region during the early Holocene may also be contributing carbon to the system, as do Tertiary deposits of sandstones, siltstones, mudstones, and coal (Hamilton et al., 1994a). Although DOC was only weakly correlated with air temperature, a strong correlation (r=0.76) was found between temperature and TKN. The highest value of TKN also occurred in the Fosheim region (E516 = 1.1 $mg \cdot L^{-1}$) followed by the southernmost sites on Boothia Peninsula. The range in TKN presented here (0.02 to 1.1 $mg \cdot L^{-1}$) is similar to those reported in other surveys. However, TKN concentrations of the eight Bathurst Island sites in the present study were all below 0.19 $mg \cdot L^{-1}$ while a higher range was reported from a combination of lakes and ponds on Bathurst Island by Lim et al. (2001c). The higher values reported by Lim et al. (2001c) likely reflect the difference between lakes and ponds. Ponds have a smaller volume than lakes causing them to be warmer. They also tend to have higher conductivity values and nutrient concentrations than lakes (see Lim et al., 2001c, Michelutti et al., 2002a, b) due to the smaller volume of water, higher evaporation, and greater interaction with the sediment and shoreline. Wildlife may have a greater impact on ponds than lakes since they can walk directly through them contributing nutrients through faeces and resuspending nutrients from the sediments. Also, allothonous vegetation and nitrogen fixing algae, such as *Nostoc*, may contribute nitrogen to aquatic systems.

## *5.2 Diatoms*

### *Diatom concentrations and richness*

Increases in diatom (Gajewski et al., 1997; Smith, 2002; Wolfe, 2003) and pollen (Gajewski, 1995) concentrations in sediment cores have been used to infer warmer climates in the past. Pollen concentrations also decreased in modern sediment samples from mid- to high-arctic regions (Gajewski, 1995). Relationships between diatom concentration and climate were also observed in this study. The lowest values occurred in the two lakes on northeastern Ellesmere Island, the coldest sites in this study. Concentrations were consistently low on Devon Island, where vegetation is sparse (Edlund & Alt, 1989) and the lakes were generally dilute and low in nutrients (phosphorous, nitrogen and $SiO_2$). Temperature values in this central region are below the mean of all study sites. Diatoms were more abundant in the relatively warm Fosheim region of Ellesmere Island where vegetation is more dense and diverse (Edlund & Alt, 1989; Figure 1.1D). Concentrations were computed on a volumetric basis, and some error may have been introduced due to varying proportions of water in the samples. However, comparison with previous studies suggests this is not significant. Sediments from lake JR01 had a concentration of $1.02 \times 10^9$ valves·$g^{-1}$ wet sediment while LeBlanc et al. (2004) obtained $9.5 \times 10^8$ valves·$g^{-1}$ dry sediment for the same lake. Similarly, Gajewski et al. (1997) recorded a value of $6.0 \times 10^7$ valves·$g^{-1}$ dry sediment in a lake close to DV08 and DV10 in this study where wet weight values of $1.36 \times 10^8$ valves·$g^{-1}$ and $6.17 \times 10^7$ valves·$g^{-1}$ were obtained, respectively. Concentration values of two study lakes on northeastern Ellesmere Island are in the same range as those reported from the same region by Smith (2002). These comparisons suggest that the values in this study are reasonably accurate. Other factors influencing concentrations include sediment influx rates and the presence of inflows.

A total of 183 taxa were recorded from the 16 sites on Ellesmere and Axel Heiberg Islands, the northernmost region of the Canadian Arctic. Van de Vijver et al. (2003) compared studies of similar latitude, including Douglas & Smol (1993) on Ellesmere Island and Beyens & Van de Vijver (2000) on Svalbard. In all cases, the number of taxa reported from these regions were lower than what is presented here. However, it is difficult to compare taxonomic richness from different studies, since richness depends greatly on search effort and sample size (Birks & Line, 1992) and the environment of the particular region studied. The use of recent advances in taxonomy in this study should not largely impact these results since in most cases the difference is simply a taxonomic transfer (genus change) and not the creation of new species. There is only a slight decrease in richness to the north revealing that site characteristics, such as lake size, are important factors in determining taxa richness in each lake. Therefore, the differences in taxa richness from region to region appear to depend more on lake-to-lake variation. Unlike the vegetation, diatom richness in the Fosheim region was low suggesting that factors other than climate have a large role. Most of these sites were small, closed basin lakes with little shoreline vegetation. The larger lakes generally contained more diverse diatom communities, presumably due to the wide range of habitats available for diatoms of different forms. Large lakes tend to have larger littoral areas containing rocks, macrophytes and mosses that are habitats for different species of diatoms. The more gradual slopes around larger lakes also lead to a greater area of benthic sediments around the lake perimeter being exposed to light. Pools, ponds and wetland areas are often observed surrounding larger lakes and inflows are generally larger. A diverse habitat allows for the growth of both small, more competitive benthic forms (i.e. fragilaroid taxa) and stalked or tube-dwelling forms (e.g. *Gomphonema* spp., *Encyonopsis* spp., *Encyonema* spp.) with decreased competition for space and resources. Further, between-lake richness comparisons must be made with caution due to unknown differences in sedimentation rates. For example, on Cornwallis Island two lakes in close proximity of one another showed sedimentation rates that varied over three orders of magnitude (Michelutti et al., 2003b).

Lake water characteristics also affect richness. High richness in small lakes on Bathurst Island may be attributed to the complex bedrock geology influencing lake water chemistry. In these cases, geochemical variables unrelated to climate may be influencing diatom quantities and richness. Limnological changes would affect diatom community composition and species distributions. An increase in productivity (i.e. diatom concentrations) could occur as a result of overall lake water changes not limited to increased nutrients (e.g. phosphorous or nitrogen) alone (Schindler et al., 1974).

### *5.3 Diatom biogeography & environment relationships*

The flora of the 62 lakes in this study is similar to that of other alkaline, arctic surface waters (Hamilton et al., 1994a; Michelutti et al., 2003a; Weckström & Korhola, 2001; Van de Vijer et al., 2003; Cremer & Wagner, 2003). Dominant forms seemed to be most similar to those reported by Bigler & Hall (2002). On Baffin Island, Joynt & Wolfe (2001) found more species of *Eunotia* and *Aulacosira* due to the more acidic lake water than in this study. Generally, planktonic forms are rare in arctic diatom surveys likely because most sites are too shallow for them to thrive. Although few forms of planktonic taxa were encountered, taxa such as *Cyclotella antiqua* and *C. stelligera* (form 2) showed wide distributions across the study area.

The distributions of diatom genera were examined to assess the importance of spatial variables (i.e. latitude, longitude, and distance from coast) on their biogeography (Figures 4.4 and 4.5). Information about diatom ecology at the genus level is particularly important since it is at this level where structural features are quantitative (always present) in its members and therefore taxa share strong similarities. Spatial patterns of newly delineated genera formerly grouped in *Achnanthes* were evident (Figure 4.5A). These results imply that more acute delineation of genera may enhance our understanding of diatom ecology. It is at the genus level where evolutionary changes are observed (Round, 1996) and biogeographic patterns are most distinct. The structural characteristics of each genus likely have a functional influence on the ecology of diatoms resulting in specific ecological preferences for each group. Examining relationships between genera and environmental variables increases our understanding of the factors controlling their specific distributions. For example, the distribution of *Eucocconeis* spp., *Caloneis* spp., and *Nitzshia* spp. along the gradient of mean July air temperature indicated a clear preference for colder environments (Figure 4.9).

Although east-west distinctions were difficult to assess in this study due to the limited range of sites, north-south patterns were observed. For example, *Brachysira* spp., *Karayevia* spp., *Amphora thumensis*, *Achnanthes gracillima, Cyclotella ocellata,* and *Stauroneis smithii* var. *borgei* were not found in any of the 16 sites of the Axel Heiberg Island and Ellesmere Island region (Figures 4.4 to 4.6). Other taxa had wide distributions but were not encountered in lakes in particular regions. For example, *Cyclotella stelligera* (form 2), *Cyclotella ocellata*, *Cymbella angustata*, *Psammothidium ventralis*, and *Hygropetra balfouriana* were not found on Cornwallis Island. Other species were absent from Devon, Somerset, and Bathurst Islands (Figure 4.6). These regional limitations in taxa distributions indicate the large influence of the physical and chemical characteristics on diatom distributions in the study region. In this study I am assuming that dispersal mechanisms have not limited diatom distrubutions in the Arctic. However, this remains to be further investigated.

Trends in individual taxa distributions along the gradients of selected variables were also evident (Figures 4.9 to 4.11). The CCA revealed potential relationships between individual taxa and environmental variables selected as the most important in controlling diatom assemblages. For example, the importance of air temperature in the CCA indicates that species distributions largely differ along this gradient (ter Braak, 1986). Although many oligothermal (cold-water) taxa were also shown to prefer the colder sites in this study, these results are limited by the short temperature gradient (3.9 to 7.1 °C) represented by the study region. Since the entire study area is cold it is difficult to assess which taxa are strictly limited to cold environments and which are not. Knowledge of their distributions is therefore key to understanding diatom ecology and environmental preferences.

Similar dominant forms were found in both cold and warm lakes (i.e. *Staurosira venter, Staurosirella pinnata, Pseudostaurosira pseudoconstruens,* and *P. brevistriata*). These results are exemplified by the different relationships exhibited between air temperature and the *Staurosirella, Staurosira*, *Pseudostarosira*, and *Fragilaria* genera (Figure 4.11). For example, *Pseudostaurosira* spp. showed increased abundance and *Staurosirella* spp. decreased abundance within the temperature range of this study (Figure 4.11). Joynt & Wolfe (2001) reported summer water temperature optima of 6.23 and 7.29 °C for *Staurosirella pinnata* and *Pseudostaurosira pseudoconstruens* respectively. These values are in the range of the highest values in the present study. However, the order of temperature preferences for these taxa is the same, with the latter preferring a slightly warmer environment than *S. pinnata*. Again, the short temperature range in this study makes it difficult to define diatom-environment relationships. For example, *Staurosira* spp. showed increased abundance with increased temperature. It is possible that the optimal temperature for this group occurs just above the temperature range of this data set and abundances would decline with increasing temperature.

The small, benthic diatoms of these genera are often grouped together (*Fragilaria sensu lato*) and defined as cold dwelling taxa, dominant in Arctic and Alpine lakes (Douglas & Smol, 1999). Most lakes in this study were also dominated by taxa of these groups. It has been suggested these taxa are *r*-strategists, as they colonize quickly and have high reproduction rates, which is more adaptive to a changing environment (Lotter & Bigler, 2000). The results in this study emphasize the importance of not grouping these taxa together since their ecological preferences appear to differ, at least with respect to temperature. As these diatoms are dominant in arctic systems, more research on their ecophysiology is needed to better understand how they influence the makeup of diatom communities in arctic surface waters, and what factors control their distributions.

The separation of lakes void of fragilaroid taxa in the CCA biplot (Figure 4.8A) indicates the potentially important role of $SiO_2$ in influencing diatom assemblages and distributions. Lakes with higher silica content had consistently lower abundance of these taxa. Larger lakes (greater surface area) tended to have more rare species resulting in higher richness. These assemblages were largely composed of *Encyonema, Encyonopsis, Cymbella*, and *Gomphonema* taxa. Therefore, the abundance of non-fragilaroid taxa is likely related to the size and silica content of the lake. Kociolek & Spaulding (2000) have suggested that species adaptations and interactions between diatom taxa control the distribution of rare taxa. Fragilaroid taxa are described as highly competitive and the first group to colonize a lake given the proper conditions (Lotter & Bigler, 2000). Perhaps lakes with limited habitats (i.e. small littoral areas with little macrophyte development) and higher nitrogen or phosphorous concentrations favour the more competitive fragilaroid taxa. The diverse range of habitats available in larger lakes allows rare forms of diatoms to proliferate, thus deflating the relative abundance of the small fragilaroids.

Lakes on Ellesmere and Axel Heiberg Islands had DOC values closer to the ranges observed in southern, treeline regions. Despite this, some taxa characteristic of these southern regions were not found in the Fosheim region of this study. For example, *Brachysira* spp. are often reported from southern or low altitude, forested regions where lake water pH can be neutral to acidic and DOC concentrations are generally higher than in the Arctic (Bigler & Hall, 2002; Rühland et al., 2003a). In the present study, *Brachysira* taxa (*B. neoexillis, B. styriaca*, and *B. zellensis*) were only encountered in regions south of Devon Island. Similarly, Lim et al. (2001b) did not report *Brachysira* spp. as dominant in ponds or lakes of Bathurst Island. Van de Vijver et al. (2003) also reported *B. zellensis* from southern Victoria Island moss habitats. *Brachysira zellensis* and *B. vitrea* were both found in highest abundances in forested lake regions (as opposed to above tree-limit) and assigned relatively warm July water temperature optima in lakes of Arctic Sweden (Bigler & Hall, 2002). Until the publication of Lange-Bertalot & Moser (1994) the species *B. neoexilis* was grouped with *B.vitrea*. The present study indicates a southern Arctic distribution of *Brachysira* spp. However, Douglas and Smol (1993) reported the species *Anomoeneis styriaca* (Grunow) Hustedt (*Brachysira styriaca*) as rare in weakly-acid to alkaline ponds of eastern Ellesmere Island.

Although diatom assemblages of the different regions could be distinguished in the Detrended Correspondance Analysis, the largest differences occurred between lakes in one region. For example, lake E516 was dominated (99%) by small fragilaroid taxa whereas the assemblage of nearby lake E511 completely lacked species from this group. These results may indicate that lake-specific chemical and physical characteristics (i.e. presence of inflow, steepness of slopes, habitat diversity) are equally important influences on diatom distributions as lake water properties. For example, *Hygropetra balfouriana* has been associated with moss habitats (Lim et al., 2001a; Michellutti et al., 2003a). This small diatom was dominant in Long Lake where moss was abundant along the shoreline and soils are acidic (Hamilton et al., 1994a). Although this species is widely distributed across the study area it is only present in one lake on Devon Island, where the highest lake water pH values are found. Therefore, it is suggested that the distribution of *H. balfouriana* is largely controlled by habitat availability and pH.

Generally speaking, endemic diatoms are most frequently described from ancient lakes in regions such as Indonesia (i.e. Hustedt, 1937, 1942). Although the study region is geologically young (i.e. deglaciated for less than 10,000 years) the presence of unique forms in the Canadian Arctic is plausible (Mann & Droop, 1996). For example, the diatom *Neidiopsis wulffii* (Petersen) Lange-Bertalot was only encountered in Long Lake in the northern region of Ellesmere Island. Lange-Bertalot (2001) states that this taxon is rare and has only been recorded from Greenland. The radiate and widely spaced striae differentiate it from *N. levanderi* forms recorded from the Rocky Mountains in Canada. The species *Kolbesia suchlandtii* (*Achnanthes suchlandtii*) was only identified in lakes of the central Arctic (Devon, Cornwallis, Somerset Islands and Boothia Peninsula). Others have reported this taxon from Labrador (Fallu et al., 2000), treeline regions (Laing et al., 1999; Ruhland & Smol, 2002), and Alaska (Foged, 1981; Gregory-Eaves et al., 1999) demonstrating the wider distribution of this species than what is exhibited in this study. This is likely the case for many apparently restricted taxa although comparisons are difficult as the distributions of rare forms are not often published in the literature. It is thus imperative that complete diatom counts be made available in published studies to allow for better determination of diatom biogeographic distributions.

# 6. Conclusion

This study has illustrated the distribution and abundance of diatom taxa from across the Canadian Arctic. Several different analyses have been used and each illustrates different aspects of diatom biogeography. Maps illustrating the abundance of taxa in the study lakes show both large-scale distributions and inter-regional variability. Response surfaces in one and two dimensions show the abundance of diatoms as a function of environmental variables while ordination illustrates community assemblages and their relation to environmental variables.

The 62 study lakes have similar characteristics (lakes were neutral to slightly alkaline and relatively dilute in nutrients) although regional differences are evident, demonstrating the strong influence of bedrock, climate, and surrounding vegetation. Therfore, the environmental gradients are not all simply related to geographic differences. For example, lakes from the Fosheim region of Ellesmere and Axel Heiberg Islands in some ways more closely resemble southern sites from Boothia Peninsula with similar air temperatures than more nearby sites on Devon and Cornwallis Islands.

Diatom richness in the study lakes showed high regional variability and was highly correlated with lake size. Examination of the diatom distributions in geographic space indicated that dominant species were generally widely distributed across the study area, although some genera and taxa were restricted to certain latitude bands. Also, distributions of newly delineated genera, such as those once grouped in *Achnanthes sensu lato*, were variable suggesting the importance of recent taxonomic work in improving our understanding of diatom ecology. Lakes of each region contained similar diatom assemblages with significant overlap between regions occurring due to lakes dominated by common taxa.

Although much of the variability of the diatom assemblages could be explained by lake water chemistry a significant proportion was not. Other environmental factors, specific to each lake that were not measured in this study, may also be influencing diatom distributions. Possible factors include the presence of large inflows, steepness of slope, light penetration, and habitat diversity. Surrounding vegetation also influences diatom assemblages and distributions indirectly by contributing nutrients to lake water. Also, diatom and vegetation distributions are influenced by similar environmental variables (e.g. air temperature).

Many of the taxa showed negative correlations with mean July air temperature, indicating their preference for colder environments. Four genera formerly grouped in *Fragilaria sensu lato* showed variable relationships with temperature, indicating the importance of accurate taxonomy and the relevance of separating these genera. Other strong relationships were observed between particular taxa with total unfiltered phosphorous, total Kjeldahl nitrogen, and $SiO_2$.

Several regional studies have defined diatom ecological optima and tolerances for various environmental factors, such as temperature, but in many of them ecological preferences are determined by few data points and short environmental gradients. Although these and the present study provide important information about diatom distributions and abundance, more work is needed to define the range of taxa more precisely as well as to define the relationship between diatoms and the environment over the entire range of the taxon. However, current practice in diatom work makes this task difficult. Several studies have documented diatom assemblages in Canadian Arctic lakes and ponds, although full species lists are not often provided in the literature making biogeographic comparisons of rare taxa difficult (Hamilton et al., 1994b). At present, preliminary records of diatom distributions are perhaps of greater importance than autecological information as we are still in the early stages of discerning biogeographic patterns of taxa common in northern regions. I suggest combining regional data sets existing from the circumpolar treeline limit to the High Arctic, thus incorporating a more complete range of environments where each taxon is found. This would incorporate the maximum amount of ecological information for northern taxa thus providing us with a more comprehensive understanding of their biogeography and the factors controlling it.

This study has illustrated the biogeography of diatoms in the Canadian Arctic Archipelago. Diatom distrubutions are determined by both geographic and environmental variables. Lake size is an important determinate of diatom richness, and water conditions also determine diatom community composition within any region.

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# APPENDIX A Limnology metadata

## Alkalinity and DIC

From 1989 to 1996 the National Laboratory for Inland Waters provided dissolved inorganic carbon (DIC; mg·L$^{-1}$) estimates whereas Alkalinity (mg·L$^{-1}$ $CaCO_3$) was reported from 1997 to 2002. Both of these parameters are affected by pH but they are not equivalent measures. Alkalinity is defined as the acid-neutralizing capacity of water and is comprised of the sum of weak acid anions such as $HCO_3^-$ and $CO_3^{2-}$ (Kalff, 2002). A higher alkalinity indicates that the lake water is more buffered as reflected by small changes in pH. Alkalinity is correctly expressed in meq or µeq·L$^{-1}$ (Kalff, 2002) but is often assigned the units mg·L$^{-1}$ $CaCO_3$. DIC is a measure of the carbon available for photosynthesis, which buffers fresh water against rapid changes in pH (Kalff, 2002). The different forms of DIC occur in varying proportions according to pH. Therefore, in the lakes of this study inorganic carbon occurs in the form of $HCO_3^-$ as determined by the lake pH values, which ranged from 7–8.6. To convert alkalinity values to DIC, a measure of carbon expressed as mg $HCO_3^-$ ·L$^{-1}$, I used the following equation based on the atomic weights of H (1.00794), C (12.011), and O (15.9994):

(1) $H + C + 3(O)/ C = 1.00794 + 12.011 + 3(15.9994) / 12.011 = 5.08$ and

(2) alkalinity (mg $CaCO_3$·L$^{-1}$) / 5.08 = DIC (mg $HCO_3^-$·L$^{-1}$).

DIC (mg·L$^{-1}$) = Alkalinity (mg $CaCO_3$·L$^{-1}$) /4.2 is an expression also used (Environment Canada, 1994). This obtains a slightly higher value than in equation 2. A third approach involves estimating the DIC value by multiplying alkalinity by a pH factor determined using the water temperature and pH (Wetzel & Likens, 2000). This approach obtained a value close to that using the Environment Canada equation.

## Total Nitrogen

The nitrogen cycle is very complex. Forms of nitrogen are constantly changing, thus making it difficult to measure, let along use with confidence in analysis. The various forms of nitrogen often used in surface water analysis include Total nitrogen (TN), nitrate-nitrite ($NO_2^-$ $+NO_3^{2-}$), total Kjeldahl nitrogen (TKN), particulate nitrogen (PN), and ammonia ($NH_3$). Ammonium ($NH_4^+$) is the most valuable form of nitrogen for plants and photosynthetic bacteria. Due to its positive charge, $NH_4^+$ is unstable and therefore often limiting and difficult to measure in isolation. The following relations are of interest:

Organic N = Particulate organic nitrogen (PON) + Dissolved organic nitrogen (DON)

$TKN = NH_3 + \text{Organic N}$

$TKN\ (\text{filtered}) = NH_3 + DON$

$TN = NO_2\text{-}NO_3 + TKN(\text{unfiltered})$

$TN = NO_2\text{-}NO_3 + TKN\ (\text{filtered}) + PN$

$PN \neq TKN - NH_3$

$TKN \neq PN + NH_3$

The methods used to measure these are described in Environment Canada (1994). In measuring TKN, acid is added to the sample, converting all nitrogen components to $NH_3$. It is standard protocol not to filter the sample for the measurment of TKN; to obtain TKN (filtered) one must filter the water through a 0.45 $\mu$m (or 0.22 $\mu$m) pore size membrane filter and submit the sample for TKN analysis as a separate sample. Since $NO_2$-$NO_3$ cannot be easily converted to $NH_3$, they must be measured and added separately in the calculation of TN.

**Particulate Phosphorous**

In some cases, particulate P was calculated as Particulate P = TP(unfiltered) – TP (filtered). For this reason, some values are zero.

# APPENDIX B Diatom concentrations & richness

## *Diatom concentrations*

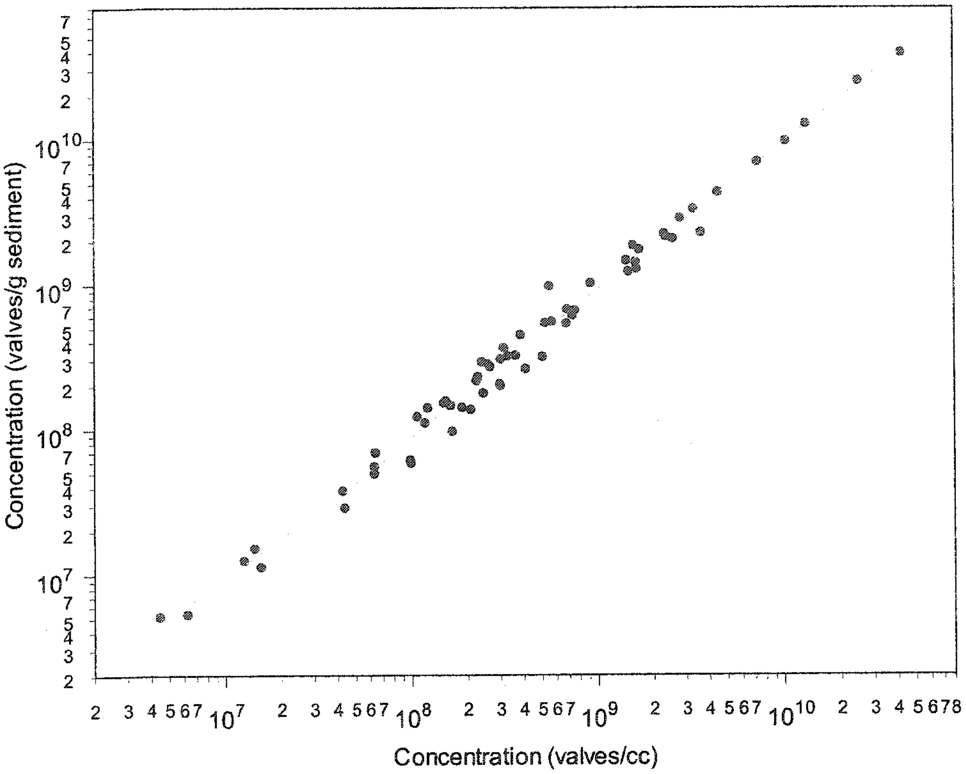

Figure B.1. Diatom concentrations measured in valves·g$^{-1}$ wet sediment versus concentrations in valves·cc$^{-1}$ wet sediment.

*Rarefaction estimated richness*

Figure B.2 illustrates that rarefaction richness estimates were notably lower than richness (number of taxa) values recorded in lakes with count sums greater than approximately 1,000 valves. These lakes were dominated by *Staurosirella* spp., *Staurosira* spp., *Pseudostaurosira* spp., and *Fragilaria* spp. (*Fragilaria sensu lato*) taxa. These results suggest that in addition to counting a set minimum number of valves, a maximum value for the dominant taxa should also be prescribed for every count. Otherwise, 'richness' values may more closely reflect the concentration of *Fragilaria sensu lato* taxa than the number of different species present in that lake.

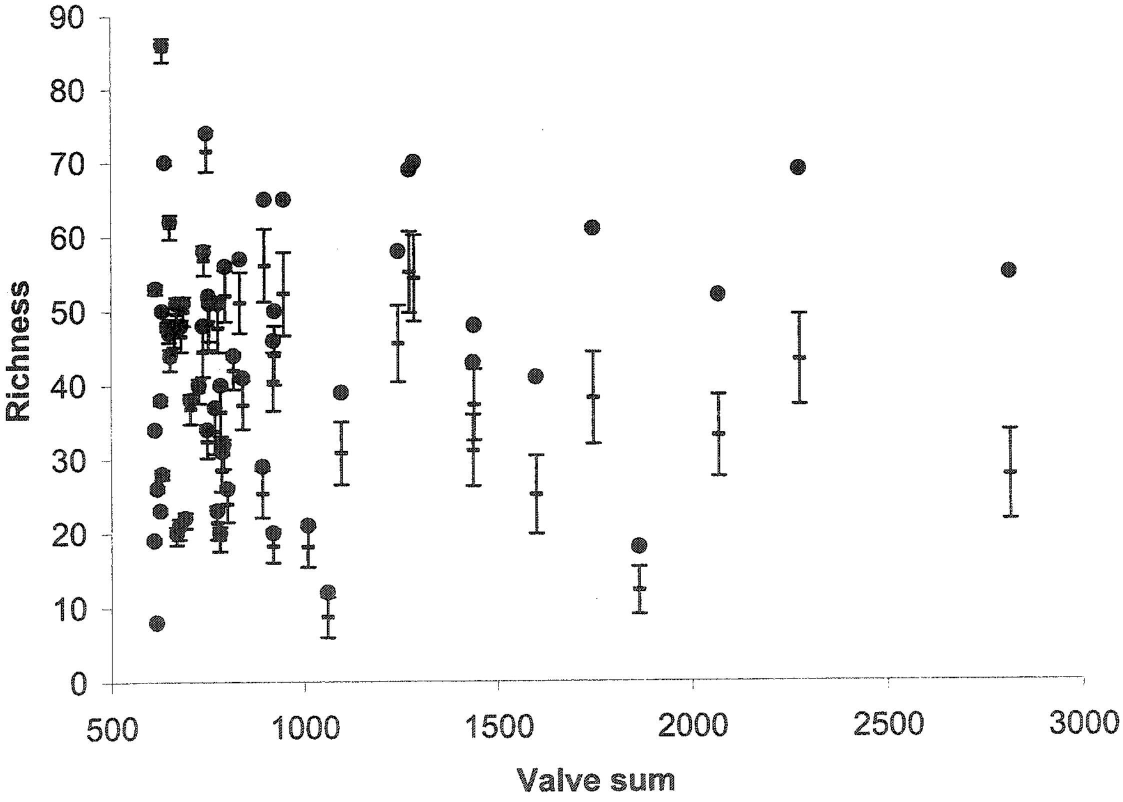

Figure B.2. Rarefaction estimated richness (-) with 95% confidence intervals and richness (number of taxa) (•) as a function of valve sum in 62 arctic lakes.

Table B.1. Diatom concentrations expressed as valves·cc$^{-1}$ and valves·g$^{-1}$ wet sediment and rarefaction richness estimates for 62 lakes in the Canadian Arctic. Lakes are ordered by decreasing latitude.

| Lake | Latitude d.d. | Longitude d.d. | Island | Richness Estimate | Diatom concentration | |
|---|---|---|---|---|---|---|
| | | | | | valves/cc | valves/g |
| S40 | 82.13 | -66.98 | Ellesmere | 48 | 4.43E+06 | 5.13E+06 |
| Long | 82.11 | -67.50 | Ellesmere | 49 | 1.42E+07 | 1.52E+07 |
| Kettle | 81.40 | -76.75 | Ellesmere | 12 | 1.55E+09 | 1.85E+09 |
| E509 | 80.83 | -84.45 | Ellesmere | 9 | 1.68E+09 | 1.73E+09 |
| E507 | 80.58 | -83.97 | Ellesmere | 20 | 2.37E+08 | 2.90E+08 |
| E506 | 80.57 | -84.47 | Ellesmere | 22 | 6.27E+07 | 5.55E+07 |
| HW06 | 80.26 | -87.77 | Axel Heiberg | 32 | 2.97E+08 | 2.05E+08 |
| HW05 | 80.18 | -87.69 | Axel Heiberg | 18 | 1.60E+09 | 1.42E+09 |
| E505 | 79.98 | -82.97 | Ellesmere | 18 | 7.29E+08 | 6.09E+08 |
| E503 | 79.92 | -82.93 | Ellesmere | 19 | 1.51E+08 | 1.56E+08 |
| HW03 | 79.73 | -85.81 | Ellesmere | 34 | 4.06E+08 | 2.60E+08 |
| HW02 | 79.73 | -83.47 | Ellesmere | 28 | 4.47E+09 | 4.31E+09 |
| HW07 | 79.72 | -83.52 | Ellesmere | 33 | 3.29E+09 | 3.31E+09 |
| E516 | 79.69 | -87.51 | Axel Heiberg | 25 | 2.54E+09 | 2.07E+09 |
| E515 | 79.65 | -87.75 | Axel Heiberg | 44 | 1.46E+09 | 1.22E+09 |
| E511 | 79.55 | -87.91 | Axel Heiberg | 25 | 6.74E+08 | 5.35E+08 |
| CI17 | 76.60 | -98.87 | Bathurst | 47 | 3.61E+09 | 2.27E+09 |
| DV23 | 76.56 | -92.72 | Devon | 46 | 5.17E+08 | 5.40E+08 |
| DV24 | 76.44 | -92.63 | Devon | 38 | 6.22E+06 | 5.33E+06 |
| CI20 | 76.37 | -98.81 | Bathurst | 42 | 2.26E+08 | 2.29E+08 |
| CI22 | 75.90 | -99.21 | Bathurst | 50 | 1.62E+09 | 1.28E+09 |
| DV07 | 75.53 | -91.97 | Devon | 24 | 2.22E+08 | 2.16E+08 |
| CI23 | 75.53 | -98.21 | Bathurst | 31 | 1.32E+10 | 1.27E+10 |
| DV10 | 75.53 | -89.75 | Devon | 57 | 9.78E+07 | 6.17E+07 |
| DV05 | 75.52 | -92.05 | Devon | 50 | 1.85E+08 | 1.41E+08 |
| CI25 | 75.52 | -99.53 | Bathurst | 8 | 1.03E+10 | 9.67E+09 |
| DV06 | 75.51 | -91.99 | Devon | 36 | 3.11E+08 | 3.62E+08 |
| CI27 | 75.46 | -99.91 | Bathurst | 55 | 4.24E+10 | 3.91E+10 |
| CI26 | 75.43 | -99.65 | Bathurst | 28 | 2.34E+09 | 2.14E+09 |
| CI34 | 75.40 | -94.67 | Cornwallis | 38 | 2.77E+09 | 2.85E+09 |
| DV08 | 75.37 | -89.49 | Devon | 43 | 2.07E+08 | 1.36E+08 |
| CI33 | 75.22 | -93.65 | Cornwallis | 21 | 5.62E+08 | 5.51E+08 |
| CI29 | 75.03 | -100.20 | Bathurst | 34 | 1.54E+07 | 1.13E+07 |
| DV01 | 74.98 | -90.36 | Devon | 19 | 2.42E+08 | 1.77E+08 |
| DV02 | 74.93 | -88.68 | Devon | 23 | 4.34E+07 | 2.89E+07 |
| CI32 | 74.91 | -93.52 | Cornwallis | 37 | 1.17E+08 | 1.11E+08 |
| CI31 | 74.68 | -94.27 | Cornwallis | 47 | 2.63E+08 | 2.69E+08 |
| CI01 | 73.88 | -94.87 | Somerset | 72 | 9.87E+07 | 5.87E+07 |
| Allen | 73.62 | -98.47 | Prince of Wales | 85 | 5.00E+08 | 3.15E+08 |
| Wolf | 73.58 | -98.48 | Prince of Wales | 48 | 4.23E+07 | 3.77E+07 |
| CI14 | 72.70 | -93.87 | Somerset | 48 | 2.50E+10 | 2.51E+10 |
| CI07 | 72.59 | -95.06 | Somerset | 52 | 1.65E+08 | 9.69E+07 |
| CI08 | 72.49 | -95.09 | Somerset | 45 | 2.99E+08 | 1.99E+08 |
| WB07 | 72.29 | -109.87 | Victoria | 37 | 6.35E+07 | 6.89E+07 |
| WB01 | 72.29 | -109.99 | Victoria | 31 | 2.28E+09 | 2.24E+09 |
| WB05 | 72.29 | -109.83 | Victoria | 70 | 1.06E+08 | 1.22E+08 |
| WB02 | 72.29 | -109.97 | Victoria | 47 | 3.60E+08 | 3.22E+08 |
| WB04 | 72.28 | -109.94 | Victoria | 41 | 3.82E+08 | 4.44E+08 |
| CI09 | 72.27 | -95.09 | Somerset | 56 | 1.42E+09 | 1.46E+09 |
| WB03 | 72.26 | -109.97 | Victoria | 51 | 6.29E+07 | 4.96E+07 |
| CI12 | 72.03 | -94.62 | Somerset | 52 | 7.51E+08 | 6.58E+08 |
| CI11 | 72.02 | -94.75 | Somerset | 43 | 7.24E+09 | 6.99E+09 |
| CI10 | 72.01 | -94.87 | Somerset | 53 | 2.55E+08 | 2.82E+08 |
| KR07 | 71.36 | -113.81 | Victoria | 61 | 1.48E+08 | 1.53E+08 |
| KR02 | 71.34 | -113.78 | Victoria | 28 | 1.25E+07 | 1.25E+07 |
| KR01 | 71.34 | -113.82 | Victoria | 54 | 6.80E+08 | 6.72E+08 |
| KR04 | 71.31 | -113.94 | Victoria | 26 | 3.27E+08 | 3.19E+08 |
| KR08 | 71.31 | -113.67 | Victoria | 50 | 5.45E+08 | 9.69E+08 |
| JR02 | 69.92 | -94.97 | Boothia | 37 | 2.99E+08 | 3.04E+08 |
| JR01 | 69.90 | -95.07 | Boothia | 31 | 9.11E+08 | 1.02E+09 |
| JR05 | 69.87 | -95.00 | Boothia | 39 | 1.21E+08 | 1.40E+08 |
| JR06 | 69.87 | -94.92 | Boothia | 21 | 1.61E+08 | 1.46E+08 |

# APPENDIX C
## Diatom distrubutions

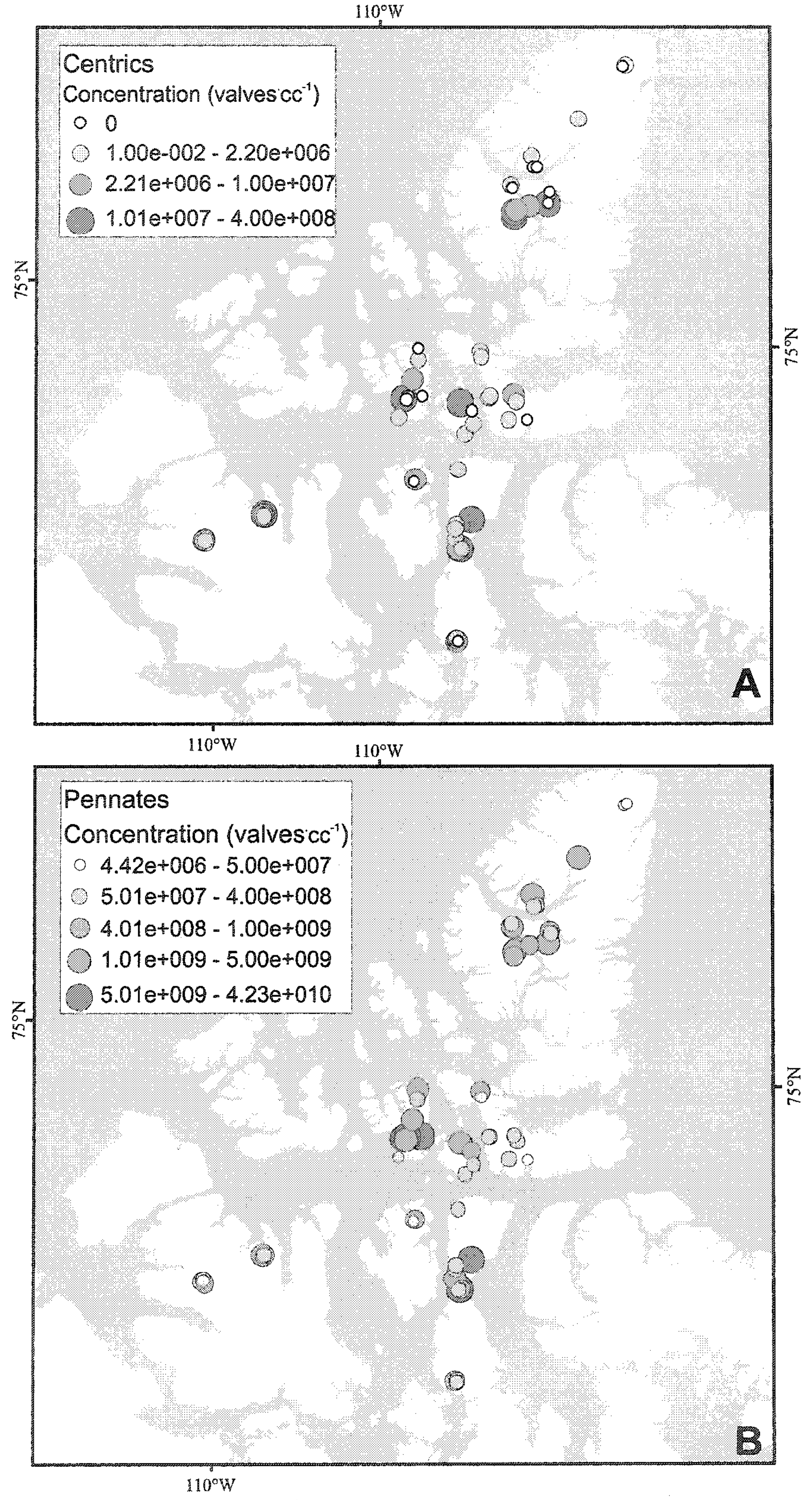

Figure C.1. Total concentration (valves·cc$^{-1}$) of centric (A) and pennate (B) diatoms in lakes of the Canadian Arctic.

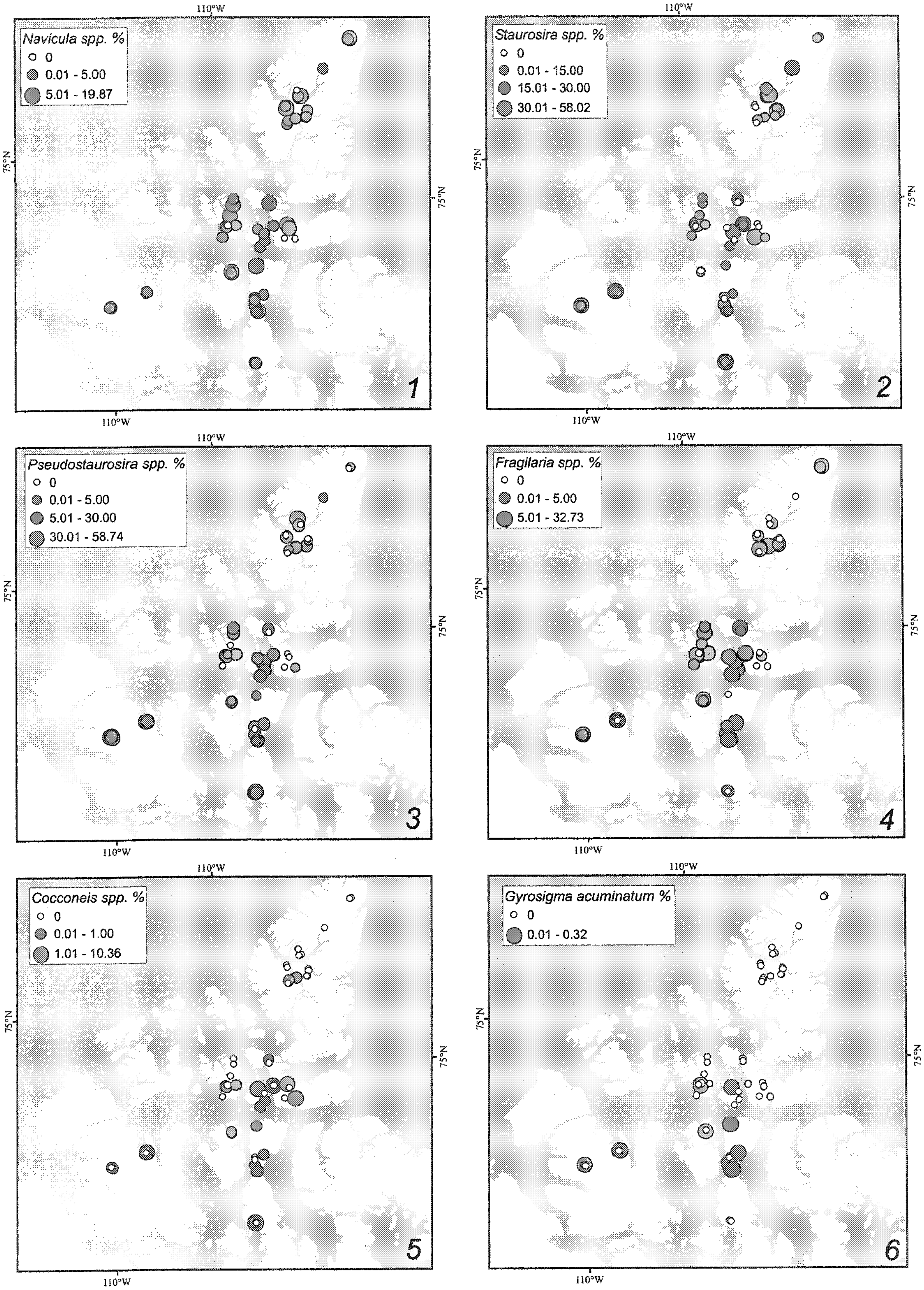

Figure C.2. Distribution of selected diatom genera in lakes of the Canadian Arctic Archipelago. Values are expressed in percent abundance.

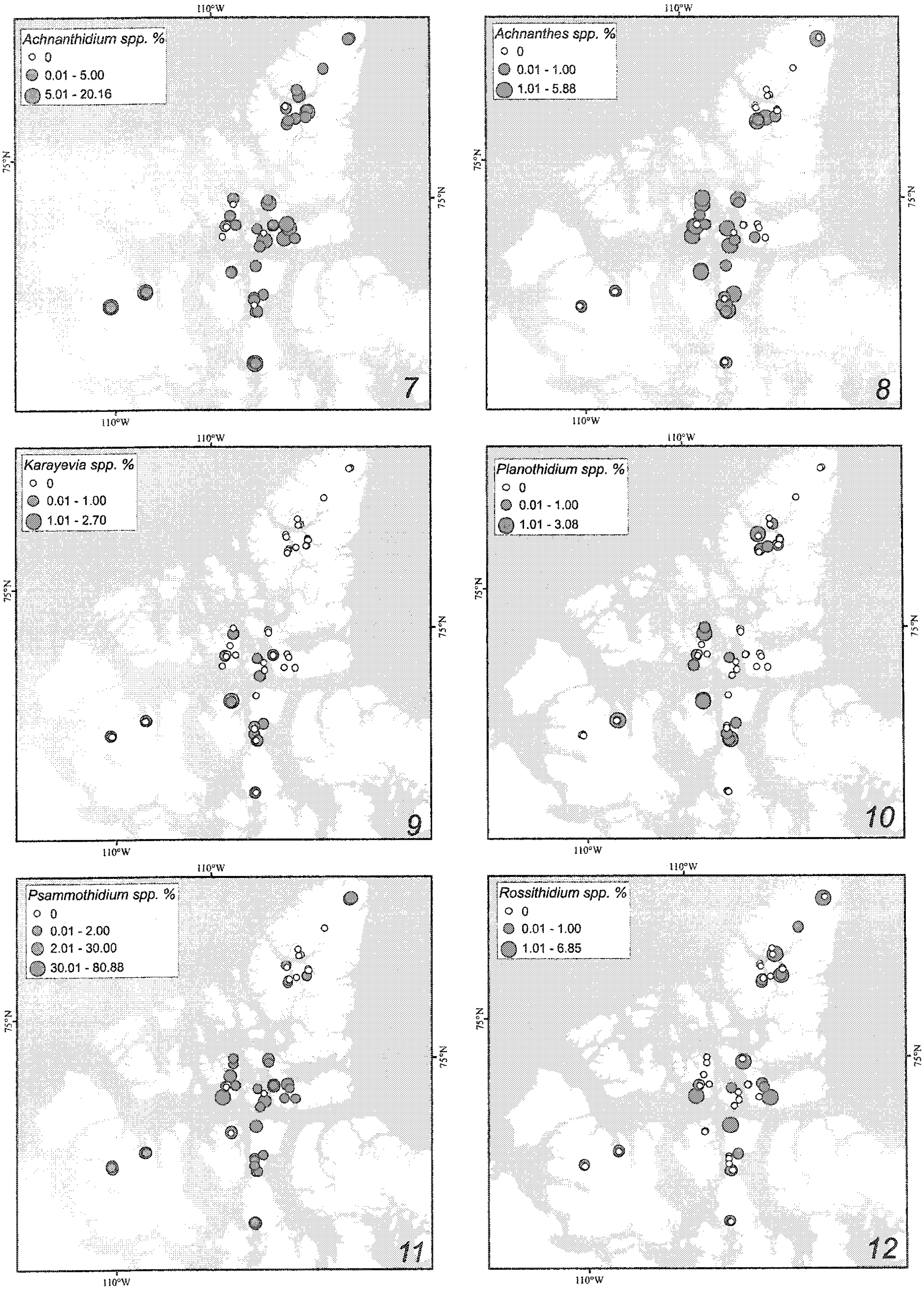

Figure C.2 (continued)

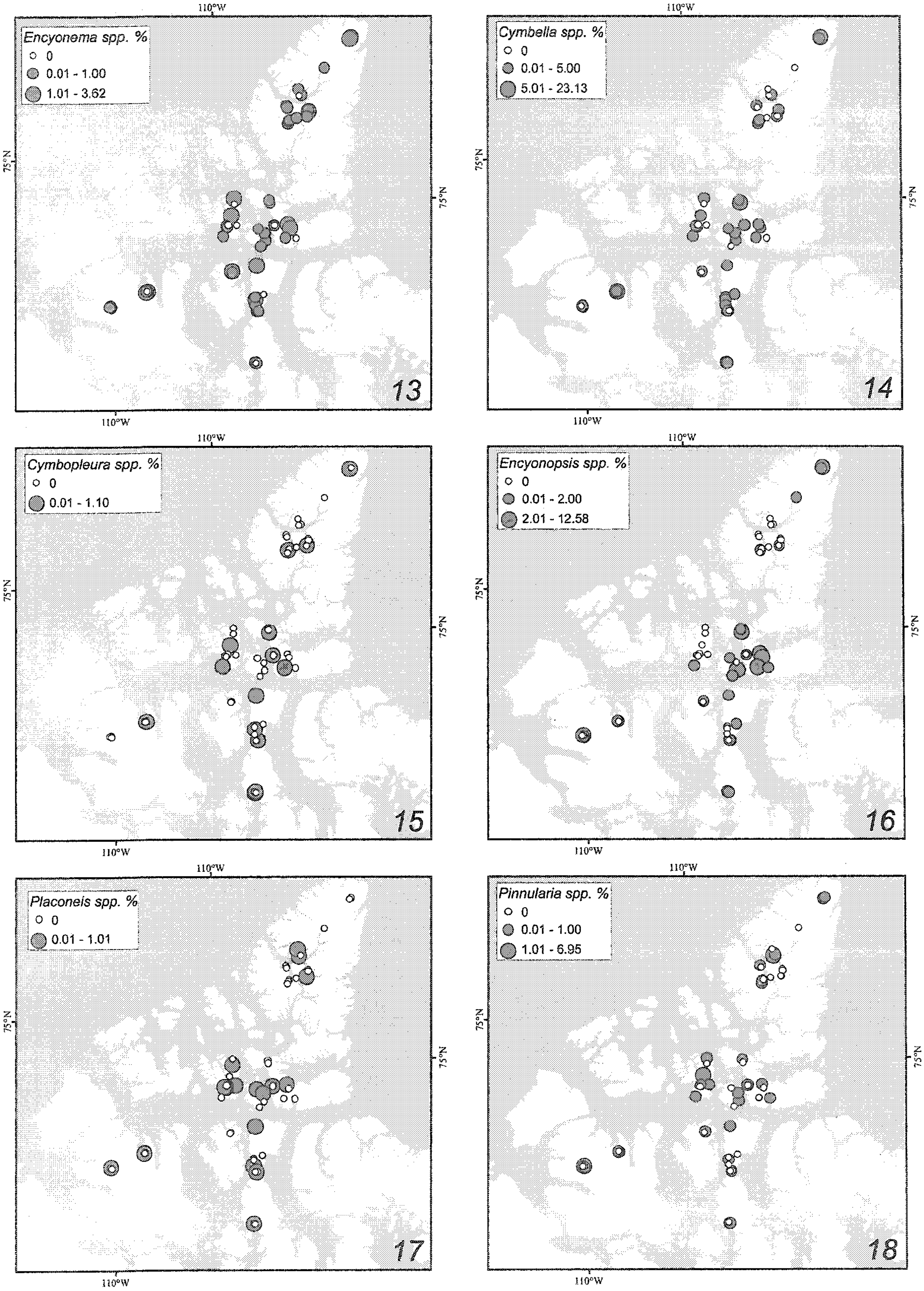

Figure C.2. (continued)

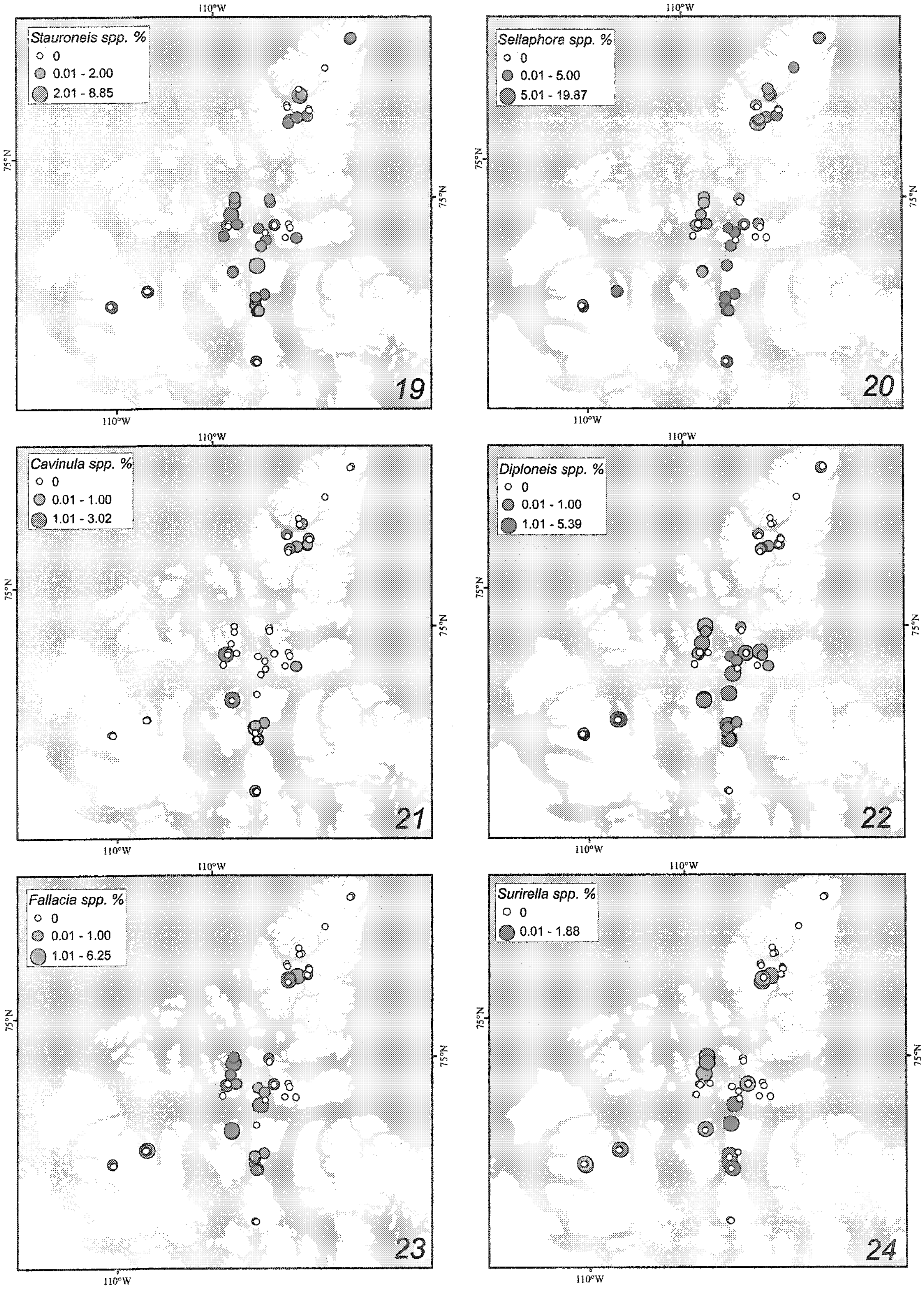

Figure C.2 (continued)

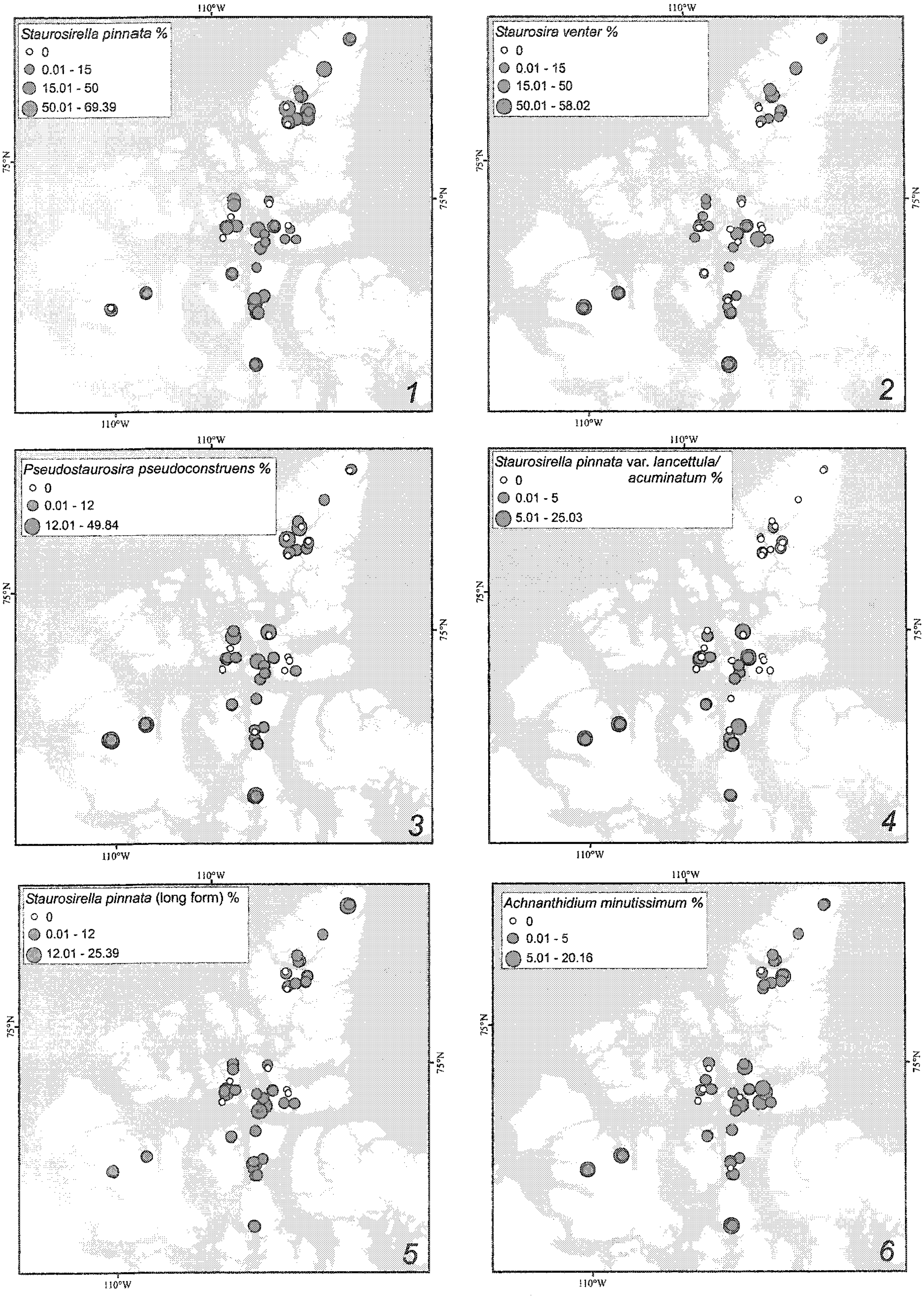

Figure C.3. Distribution of the 30 most common species in 62 lakes of the Canadian Arctic. Values are presented in percent abundance.

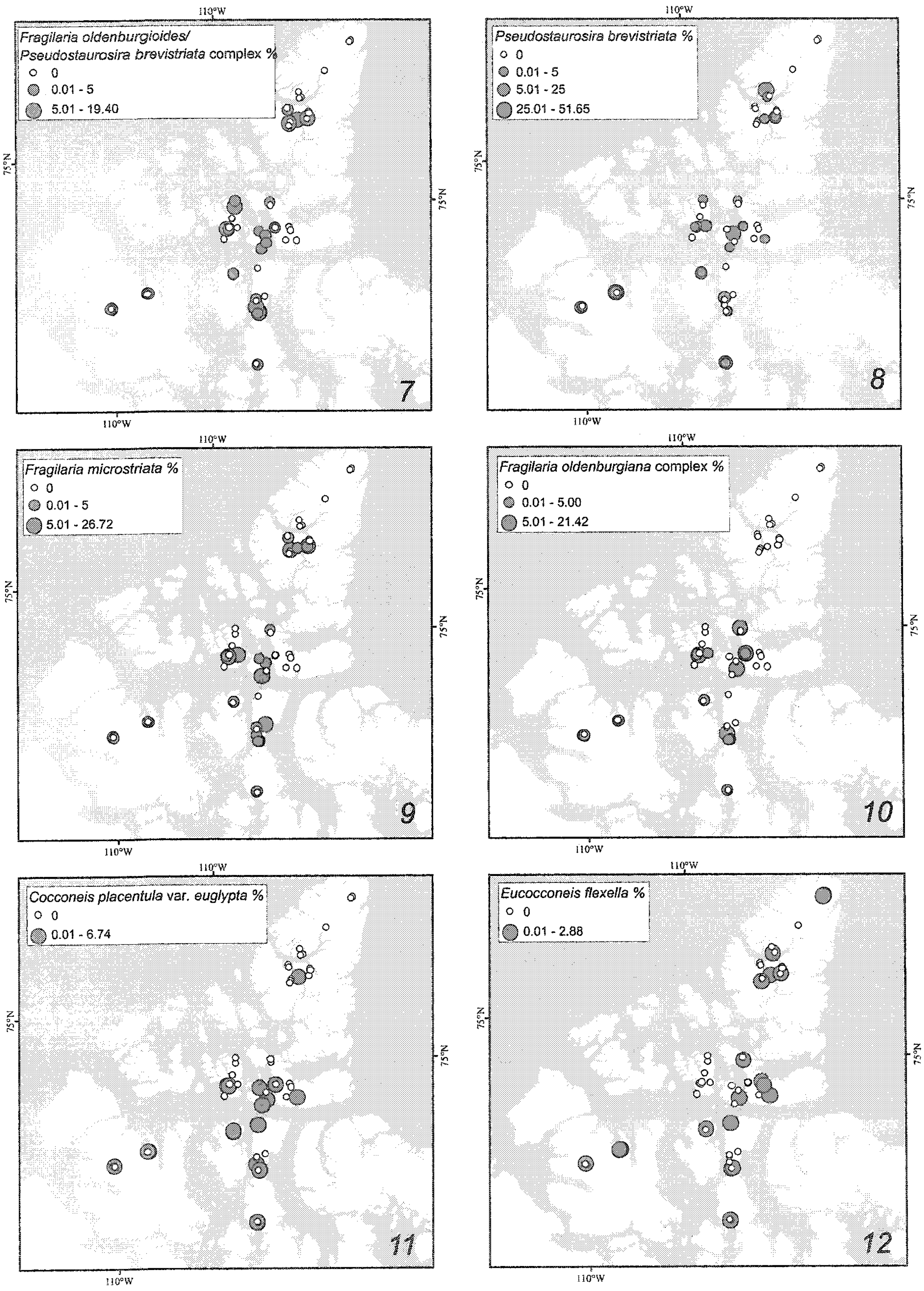

Figure C.3. (continued)

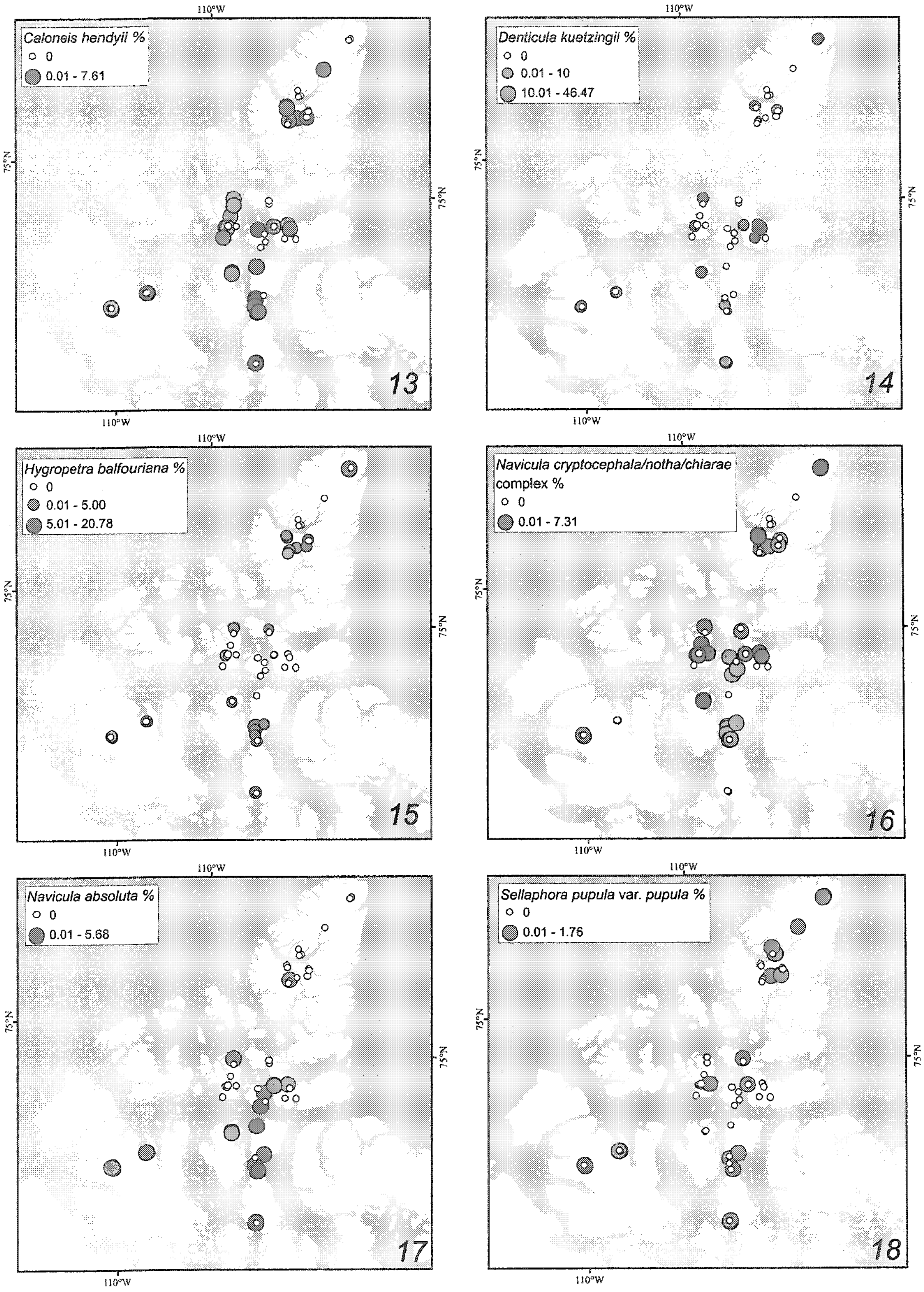

Figure C.3. (continued)

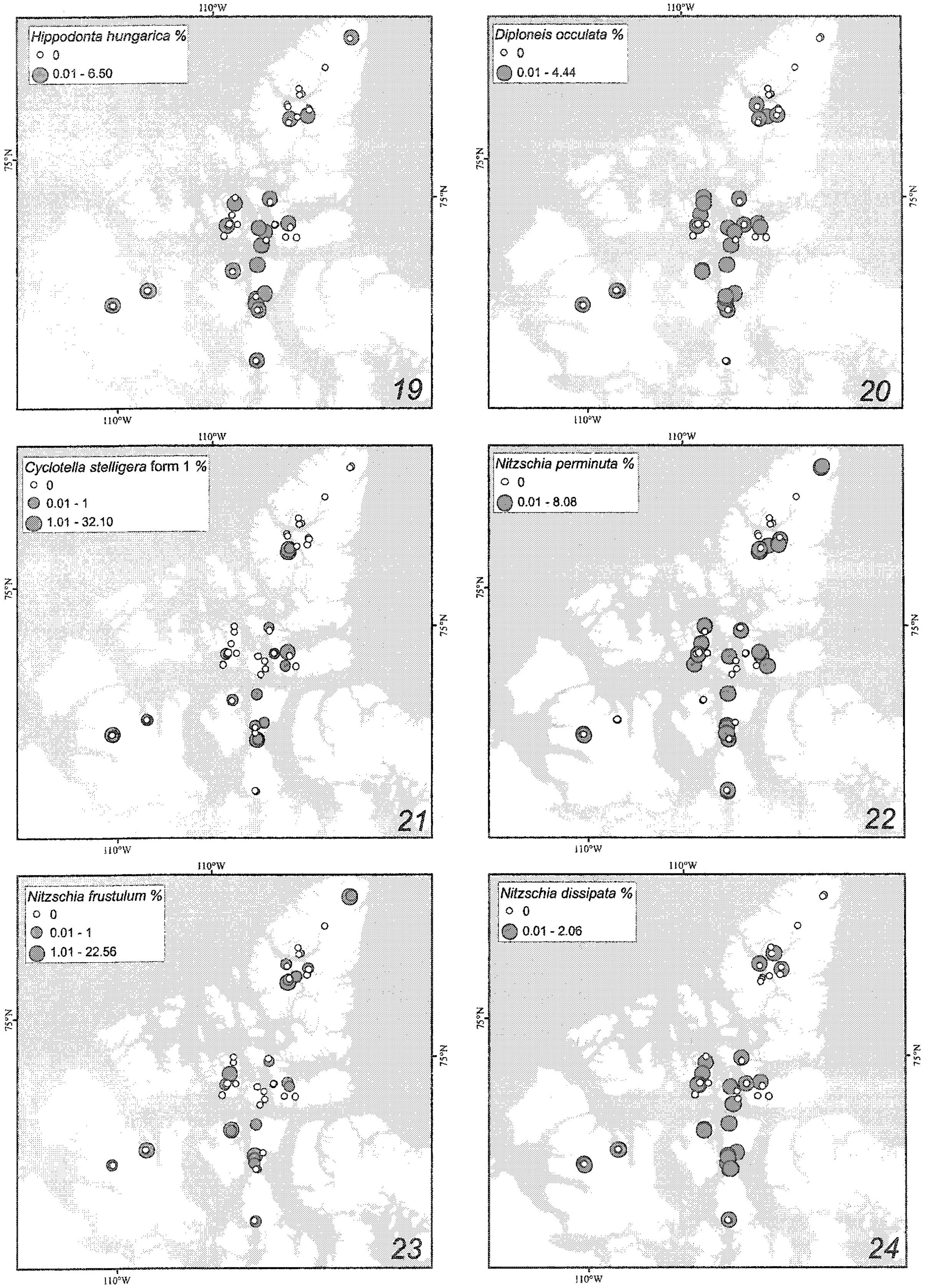

Figure C.3. (continued)

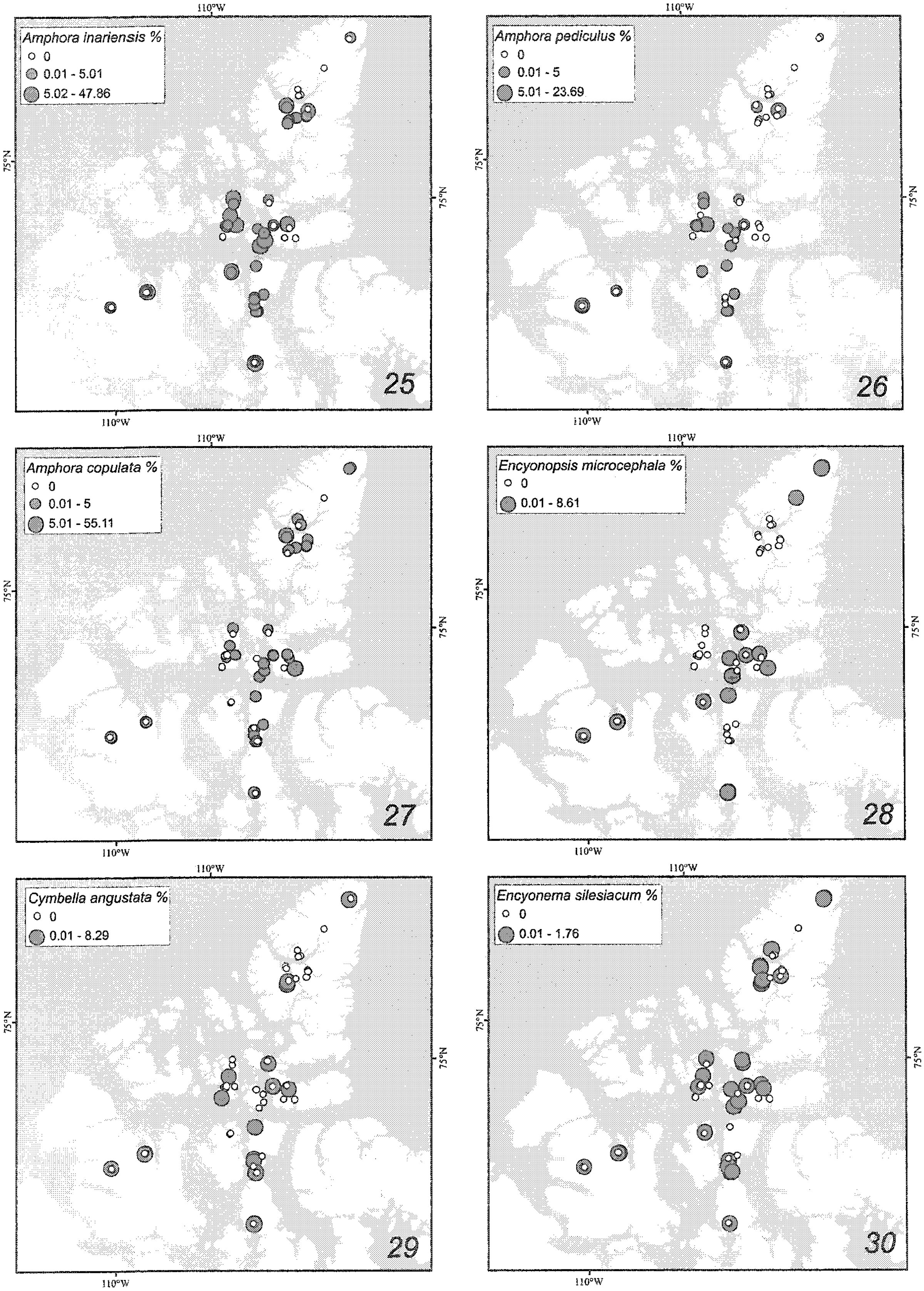

Figure C.3. (continued)

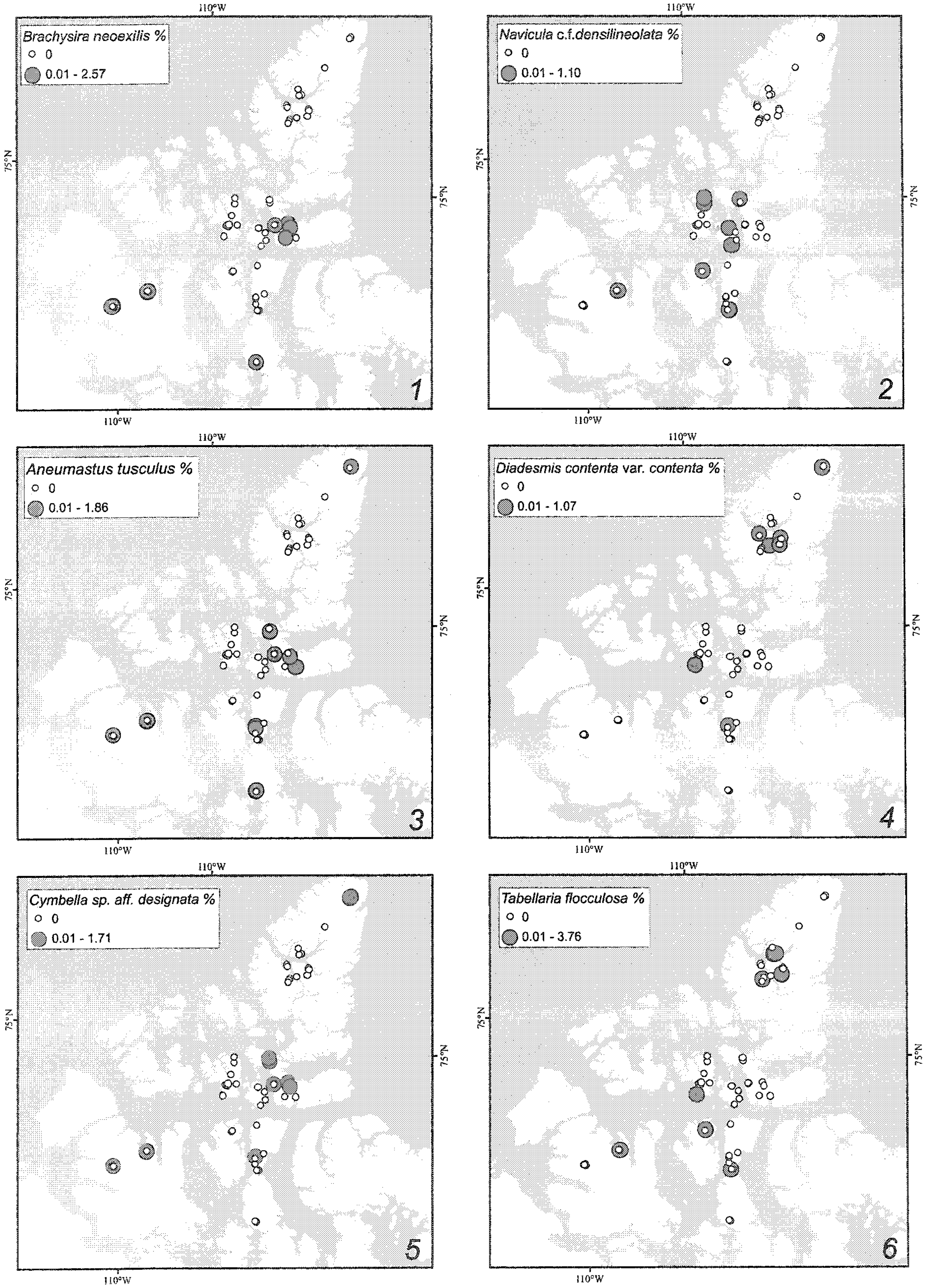

Figure C.4. Distributions of 12 selected taxa in 62 lakes of the Canadian Arctic Values are in percent abundance for each lake. Note proportional circle classes vary between maps.

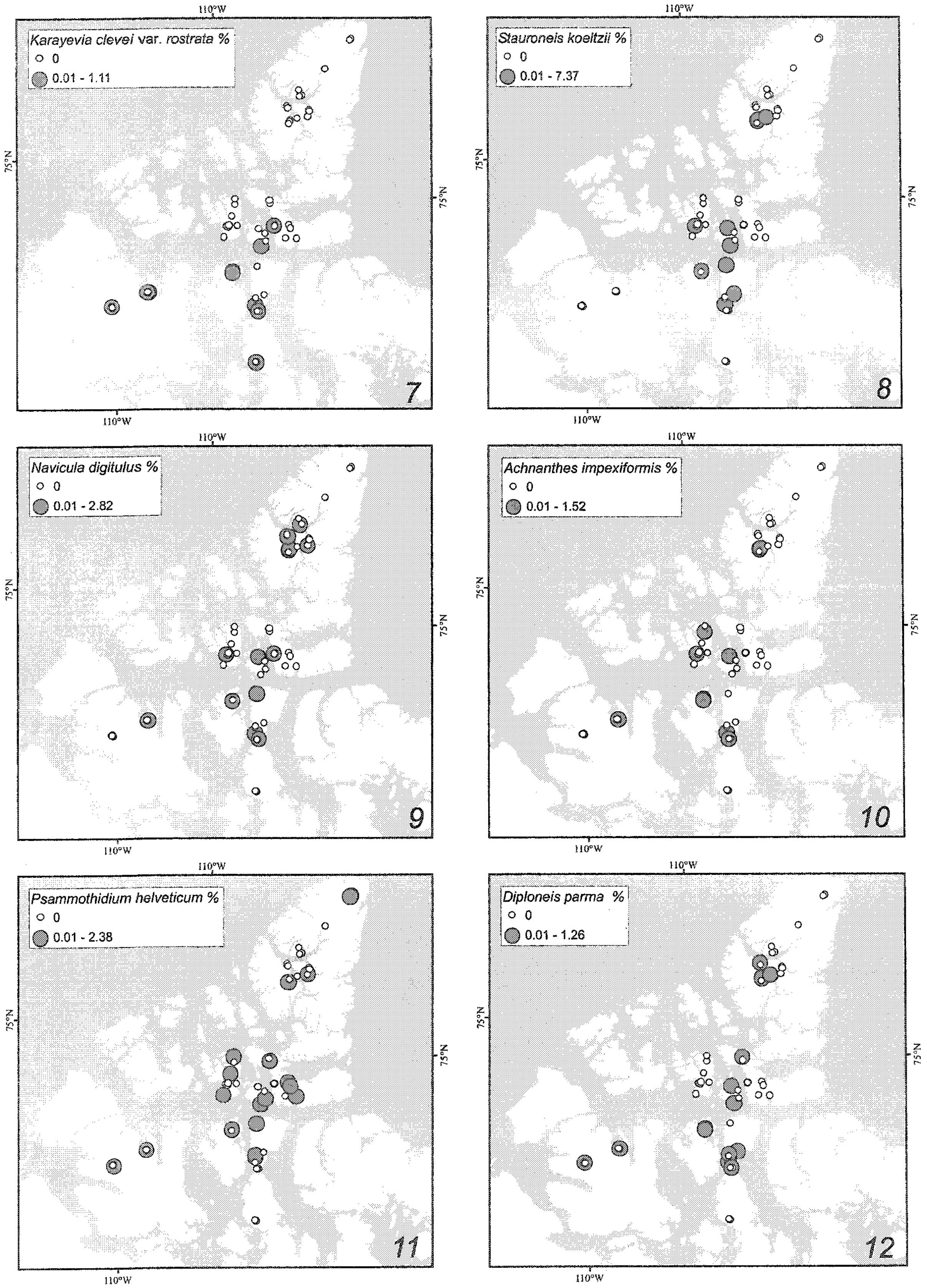

Figure C.4. (continued)

# APPENDIX D S-plus programming

Below are the S-Plus commands used to perform the Principal Components Analysis (PCA) of the environmental data. Note that the variables were already transformed as required although this can be done using command functions as well. The command 'cex' changes the size of the defalt text by a specified factor. The term 'olab=island' is used to display sites in the biplot as the symbols given in the 'island' column, set as character type, of the data table. 'princomp' performs the analysis using the selected columns listed and 'cor=T' bases the analysis on a correlation matrix. The term 'c(1,3)' plots the first and third axes.

```
> attach(LIM)
>PCAALL.prc<-
princomp(~LAT+LONG+Erich+AT+Conc+DFC+Elev+SfcA+Dep+Cond+pH+Ca+Mg+Cl+Na+K+SO4+
DOC+DIC+TKN+NN+NH3+PP+TPuf+SIO2+CHLa,cor=T)
> summary(PCAALL.prc,loadings=T)
> PCAALL.prc$scores
> plot(PCAALL.prc)
> plot(loadings(PCAALL.prc))
> biplot(PCAALL.prc,olab=island)
> biplot(PCAALL.prc,c(1,3),olab=island)

>PCALAKE.prc<-
princomp(~AT+SfcA+Dep+Cond+pH+Ca+Mg+Cl+Na+K+SO4+DOC+DIC+TKN+NN+NH3+PP+TPuf+
SIO2+CHLa,cor=T)
> summary(PCALAKE.prc,loadings=T)
>PCALAKE.prc$scores
> plot(PCALAKE.prc)
> plot(loadings(PCALAKE.prc))
> biplot(PCALAKE.prc,olab=island)
> plot(PCALAKE.prc)
> biplot(PCALAKE.prc,olab=island)
> biplot(PCALAKE.prc,c(1,3),olab=island)
```

The following is the S-plus function used to plot the response surfaces. The program was written by Prof. Mike Sawada and modified for this study.

```
function()
{       #this is a list of columns with taxa to be plotted in this order
        taxalist <- c(51, 58, 74, 88, 104, 164)
        thedata <- as.matrix(PERC2LIM[, taxalist])
        theXYvalues <- as.matrix(PERC2LIM[, c(209, 216)])
```

*Above are column numbers of abundance data for six taxa. The program is written to make 18 graphs placed on 3 sheets. "PERC2LIM" contains both the diatom and limnology data. The two numbers in the last line are the column numbers of the two variables selected for the graphs.*

```
        maxy <- max(theXYvalues[, 2], na.rm = T)
        miny <- min(theXYvalues[, 2], na.rm = T)
        maxx <- max(theXYvalues[, 1], na.rm = T)
        minx <- min(theXYvalues[, 1], na.rm = T)
        thelabs <- PERC1LIM
        #unlist(names.f(thedata, F))
        graphsheet(width = 8, height = 10.5, pointsize = 10, color.scheme ="user 1", font = c("Arial", "Arial Italic"),
pages = "every graph")
        par(mfrow = c(3, 2), mar = c(6, 6, 0, 0), err = -1,  )
        for(i in 1:length(taxalist)) {plot(theXYvalues[, 1], theXYvalues[, 2], xlim = c(minx, maxx),ylim = c(miny,
maxy), cex = 0.75, type = "n", xlab = "", ylab = "")
                box(col = 2, fill = F)
                box()
                #(jks - min(jks))/(max(jks) - min(jks))
                axes(xlab = "log (SiO2)(mg L-1)", ylab = "log (TP)(mg L-1)", axes = F, cex = 0.75)
```

*The line above sets the axes labels and 'cex' is the font size.*

```
                thedat <- as.vector(thedata[, i])
                vv <- (max(thedat) - min(thedat))
                mdat <- min(thedat)
                stdss <- (thedat - mdat)/vv
                startsize <- 0.75
                lower <- 0
                upper <- 0.25
                points(theXYvalues[which(stdss == 0), 1], theXYvalues[which(stdss == 0), 2], pch = 3, cex = 0.75,
font = 2, lwd = 0.2)
                for(k in 1:4) {points(theXYvalues[which(stdss > lower & stdss <= upper), 1], theXYvalues[which(stdss
> lower & stdss <= upper), 2], pch = 1, cex = startsize,lwd = 0.2)
                        startsize <- startsize + 0.75
                        lower <- lower + 0.25
                        upper <- upper + 0.25           }
                thesymboltext <- as.character(round(seq(0, max(thedat), length = 5), 2))
                # symbols(theXYvalues[, 1], theXYvalues[, 2], circles = stdss, add = T, inches = 0.1)
                aas <- paste(thesymboltext[1:4], "-", thesymboltext[2:5],sep = "")
                thesymboltext <- c("0", aas)
                par(usr = c(0, 1, 0, 1))
```

*Above sets the circle size categories and symbols sizes.*

```
                key(0.02, 0.9, text = list(thesymboltext, col = 1, font = 1,adj = 1), points = list(pch = c(3, rep(1, 4)), lwd
= rep(0.2, 5), cex = c(0.75, 0.75, 1.5, 2.25, 3)), size = 4, border = T, between = 2, title = "Genera %")
                if(is.element(i, c(5, 6, 7:8, 10, 11, 14, 15, 17:18, c(9,12, 13)))) {          }       else {            }      }}
```

*'key' is the legend with the coordinates for its position on the graph and the symbol sizes.*

## APPENDIX E - Diatom abundance data

| Lake | Island | *Achnanthes acares* | *Achnanthes broenlundensis* | *Achnanthes carissima* | *Achnanthes conspicua* | *Achnanthes sp. aff. conspicua* | *Achnanthes daui* | *Achnanthes exigua* | *Achnanthes gracillima* | *Achnanthes grana* | *Achnanthes impexiformis* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | Axel Heiberg | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | Axel Heiberg | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.82 | 0.00 | 0.00 | 1.43 | 0.00 |
| **HW02** | Ellesmere | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | Ellesmere | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | Axel Heiberg | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 |
| **E515** | Axel Heiberg | 0.00 | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.52 |
| **E511** | Axel Heiberg | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | Bathurst | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | Bathurst | 0.00 | 0.00 | 0.25 | 0.00 | 0.61 | 0.00 | 0.00 | 0.98 | 3.68 | 0.12 |
| **CI22** | Bathurst | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | Bathurst | 0.25 | 0.00 | 0.00 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | Bathurst | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | Bathurst | 0.00 | 0.00 | 0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.00 | 0.16 |
| **CI26** | Bathurst | 0.00 | 0.00 | 0.00 | 1.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | Bathurst | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | Devon | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | Devon | 0.00 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | Devon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | Devon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | Devon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | Devon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | Devon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | Devon | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | Devon | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | Cornwallis | 0.00 | 0.00 | 0.23 | 0.00 | 0.00 | 0.06 | 0.00 | 0.06 | 0.69 | 0.00 |
| **CI33** | Cornwallis | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | Cornwallis | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | Cornwallis | 0.00 | 0.00 | 2.11 | 1.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | Prince of Wales | 0.00 | 0.00 | 1.90 | 0.00 | 0.00 | 0.32 | 0.00 | 0.32 | 0.00 | 0.95 |
| **Wolf** | Prince of Wales | 0.00 | 0.00 | 0.00 | 0.52 | 0.00 | 0.00 | 0.00 | 0.39 | 0.00 | 0.26 |
| **CI01** | Somerset | 0.00 | 0.13 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI14** | Somerset | 0.00 | 0.00 | 0.80 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | Somerset | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | Somerset | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | Somerset | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.89 | 0.00 | 0.22 | 0.00 | 0.11 |
| **CI12** | Somerset | 0.00 | 0.00 | 0.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 |
| **CI11** | Somerset | 0.00 | 0.00 | 0.61 | 1.67 | 0.00 | 0.04 | 0.00 | 0.00 | 0.97 | 0.00 |
| **CI10** | Somerset | 0.00 | 0.00 | 0.33 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | Victoria | 0.14 | 0.00 | 0.07 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | Victoria | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.31 | 0.16 |
| **WB02** | Victoria | 0.00 | 0.00 | 0.00 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 |
| **KR01** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | Victoria | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 |
| **JR02** | Boothia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | Boothia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | Boothia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | Boothia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
|  | **Max. abundance** | **0.25** | **0.64** | 2.11 | 1.67 | **0.61** | 1.82 | **0.13** | **0.98** | 3.68 | 1.52 |

**Dominant taxa (>5%) in bold.**

| Lake | *Achnanthes ingratiformis* | *Achnanthes kriegeri* | *Achnanthes nitidiformis* | *Achnanthes nodosa* | *Achnanthes rupestris* | *Achnanthes ziegleri* | *Achnanthidium exilis* | *Achnanthidium minutissimum* | *Adalfia bryophila* | *Adalfia minuscula* | *Amphipleura cf. kriegeriana* | *Amphipleura pellucida* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 1.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.52 | 0.13 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **6.15** | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.85 | 0.11 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.68 | 0.10 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.06 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.87 | 0.00 | 0.76 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.45 | **6.85** | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 1.54 | 0.00 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.37 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 1.58 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.51 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.94 | 0.16 | 0.08 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 1.14 | 0.00 | 0.00 | 3.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.88 | 0.00 | 0.56 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **9.57** | 0.16 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.54 | **5.55** | 0.68 | 1.76 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.40 | 0.15 | 0.60 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.94 | 0.26 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **7.36** | 0.46 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **20.16** | 0.49 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.11 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.25** | 0.00 | 0.43 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.11 | 0.00 | 1.06 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 1.43 | 0.00 | 0.00 | 0.00 | 0.79 | 3.33 | 0.00 | 1.59 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.80 | 0.00 | 0.26 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 2.28 | 0.13 | 3.35 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.93 | 0.00 | 0.40 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 2.90 | 0.38 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.66 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 2.83 | 0.00 | 0.16 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **7.79** | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.87 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 4.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **9.98** | 0.00 | 0.00 | 0.46 | 0.15 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.36 | 0.16 | 0.00 | 0.00 | 0.08 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.48 | 0.00 | 0.58 | 0.00 | 0.29 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.92 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.36** | 0.00 | 0.00 | 0.00 | 0.83 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 1.99 | 1.14 | 1.43 | **0.76** | 3.10 | **0.14** | **0.79** | 20.16 | 6.85 | 3.35 | **0.46** | **0.83** |

| Lake | *Amphora aequalis* | *Amphora copulata* | *Amphora copulata morph B* | *Amphora dusenii* | *Amphora holsatica* | *Amphora inariensis* | *Amphora neglecta* | *Amphora ovalis* | *Amphora pediculus* | *Amphora thumensis* | *Amphora veneta* | *Aneumastus tusculus* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 1.40 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 1.86 |
| **Long** | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | **8.29** | 1.87 | 0.00 | 0.00 | **47.86** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 | 1.39 | 0.00 | 0.00 | 0.89 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 1.28 | 0.00 | 0.00 | 0.00 | **8.32** | 0.00 | 0.00 | **23.69** | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 2.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.13 | 0.13 | 0.50 | 0.00 | 0.00 | 1.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.77 | 0.62 | 0.00 | 0.00 | **6.47** | 0.31 | 0.00 | 2.77 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.10 | 0.86 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| **CI22** | 1.90 | 1.58 | 3.17 | 0.00 | 0.00 | **6.50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **8.72** | 0.00 | 0.00 | **10.87** | 1.26 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.97 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.94 | 0.00 | 0.00 | 0.71 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.63 | 0.00 | 0.00 | 0.63 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.88 | 0.40 | 0.00 | 0.48 | 1.53 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.12 |
| **DV10** | 0.81 | 0.14 | 0.00 | 0.00 | 0.00 | **6.90** | 0.00 | 0.00 | 0.00 | 0.00 | 0.54 | 0.00 |
| **DV05** | 0.00 | 3.29 | 0.00 | 0.00 | 0.00 | 1.35 | **8.23** | 0.00 | 0.60 | 2.40 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | **55.11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.64 |
| **CI34** | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 3.15 | 0.06 | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.18 | 0.00 | 0.00 | 2.07 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | **8.94** | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 |
| **CI31** | 0.00 | 0.45 | 0.75 | 0.00 | 0.00 | **11.92** | 0.00 | 0.00 | 1.36 | 2.56 | 0.00 | 0.00 |
| **Allen** | 1.59 | 0.00 | 0.00 | 0.00 | 0.95 | **6.35** | 0.00 | 0.00 | 1.75 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.26 | 0.00 | 0.00 | 0.00 | 0.64 | 3.48 | 0.00 | 0.26 | 2.32 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 4.29 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 3.33 | 0.00 | 0.00 | 1.86 | 0.93 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.38 | 0.00 | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 |
| **CI08** | 0.00 | 1.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.45 | 0.45 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 1.27 | 0.00 | 0.11 | 2.75 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.09 | 0.18 | 0.00 | 0.00 | 1.14 | 0.00 | 0.00 | 2.46 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 4.57 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 | 1.88 | 0.00 | 0.00 | 0.56 | 0.21 | 0.00 | 0.00 |
| **WB05** | 0.00 | 1.73 | 0.00 | 0.00 | 0.63 | **10.99** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.18 | 0.00 | 0.15 | 3.97 | 2.94 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.44 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 1.63 | 0.44 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **7.07** | 1.08 | 0.00 | 0.31 |
| **KR02** | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.25 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.13 | 0.32 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.58 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.17 | 1.02 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.76 | 0.14 | 0.00 | 0.07 |
| **JR01** | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 |
| **JR05** | 0.00 | 0.69 | 0.00 | 0.00 | 0.00 | **9.90** | 0.00 | 0.00 | 3.30 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 |
|  | 1.90 | 55.11 | 3.17 | **0.38** | **0.95** | 47.86 | 8.23 | **0.31** | 23.69 | 2.94 | **0.54** | 1.86 |

| Lake | *Aulacoseira distans* | *Bacillaria paradoxa* | *Brachysira brebissonii morph 1* | *Brachysira neoexilis* | *Brachysira styriaca* | *Brachysira zellensis* | *Caloneis (?nov) spec. cf. aemula var. ventricosa* | *Caloneis bacillum* | *Caloneis hendyii complex* | *Caloneis schumanniana* | *Caloneis silicula* | *Caloneis silicula var. alpina* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.20 | 0.53 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.30 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.04 | 0.00 |
| **HW07** | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.46 | 4.16 | 0.31 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.11 | **7.61** | 0.16 | 0.00 | 0.32 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.10 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 2.57 | 0.00 | 0.00 | 0.00 | 0.14 | 0.95 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 2.15 | 0.00 | 0.00 | 0.00 | 2.76 | 0.46 | 0.00 | 0.00 | 2.91 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.56 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.38 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.27 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.14 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 1.57 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.12 | 0.72 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 1.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.61 | 0.00 | 0.15 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.58 | 0.00 | 0.00 | 0.29 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.14 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.16** | **0.13** | **0.12** | 2.57 | **0.13** | **0.48** | **0.31** | 2.76 | 7.61 | **0.31** | **0.30** | 2.91 |

| Lake | *Caloneis tenuis* | *Caloneis thermalis* | *Campylodiscus hibernicus* | *Cavinula cocconeiformis* | *Cavinula jaernefeltii* | *Cavinula pseudoscutiformis* | *Cavinula scutiformis* | *Chamaepinnularia gandrupii (var?)* | *Chamaepinnularia krookii* | *Chamaepinnularia soehrensis* | *Chamaepinnularia sp.1* | *Cocconeis neothumensis* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 1.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | **19.25** | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.04 | 0.00 | 0.07 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.06 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.82 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.22 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 1.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 |
| **DV24** | 3.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.58** | 0.00 | 0.00 |
| **DV10** | 2.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | **5.21** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.00 | 3.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.74 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 |
| **CI07** | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.27 | 0.00 | 0.00 | 0.00 | 0.54 | 0.68 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.11 | 0.00 | 0.00 | 0.21 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 |
| **WB05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.78 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.59 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.41 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 5.21 | **0.11** | **0.65** | 3.02 | **0.54** | **0.68** | **0.25** | **0.10** | 19.25 | 5.58 | 2.82 | **0.59** |

| **Lake** | *Cocconeis pediculus* | *Cocconeis placentula var. euglypta* | *Coscinodiscus sp.* | *Craticula cuspidata* | *Craticula halophiloides* | *Cyclotella antiqua* | *Cyclotella bodanica var. lemanica complex* | *Cyclotella cf. atomus* | *Cyclotella michiganina* | *Cyclotella ocellata* | *Cyclotella rossii* | *Cyclotella stelligera form 1* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.91 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 1.19 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.55 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 |
| **CI26** | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.68 |
| **DV05** | 0.00 | 1.20 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 |
| **DV02** | **5.43** | 2.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.40 | 0.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.23 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 |
| **Wolf** | 0.26 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.54 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 |
| **WB07** | 0.00 | 3.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.07 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.16 | 0.00 | 0.00 |
| **WB05** | **5.65** | 4.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 1.10 | 0.31 | 0.00 |
| **WB02** | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 2.06 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.11 |
| **WB03** | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 | 0.00 | **5.22** | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.51 | 0.00 | 0.00 | 0.00 | 0.13 | 0.38 |
| **KR01** | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.47 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 |
| **KR08** | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 |
| **JR05** | 0.00 | **6.74** | 0.00 | 0.00 | 0.00 | 0.28 | 0.96 | 0.00 | 1.79 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 5.65 | 6.74 | **0.32** | **0.07** | **0.05** | **0.64** | **0.96** | **0.93** | 1.79 | 5.22 | 1.19 | **0.68** |

| Lake | *Cyclotella stelligera form 2* | *Cymatopleura solea* | *Cymbella amphicephala* | *Cymbella amphicephala var. hercynica* | *Cymbella angustata* | *Cymbella arctica* | *Cymbella botellus* | *Cymbella cf. ehrenbergii* | *Cymbella cleve-eulerae* | *Cymbella delicatula* | *Cymbella incerta var. crassipunctata* | *Cymbella incerta* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.13 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 2.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 |
| **E511** | **32.10** | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.63 | 0.63 | 1.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 1.12 | 0.00 | **8.29** | 0.00 | 3.19 | 0.00 | 0.64 | 0.00 | **7.66** | 0.00 |
| **DV10** | 3.65 | 0.00 | 0.95 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.13 | 0.00 | 0.13 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 1.69 | 0.00 | 0.46 | 0.00 | 0.92 | 0.00 | 0.31 | 0.00 |
| **DV01** | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.27 | 0.00 | 0.40 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.67 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.25 | 0.00 | 0.38 | 0.00 | 0.38 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 |
| **CI12** | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.04 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 2.77 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 4.40 | 0.00 | 0.00 |
| **WB01** | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.31 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.15 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.22 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.72 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 1.08 |
| **KR07** | 0.00 | 0.00 | 0.31 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.92 |
| **KR02** | 1.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.31 | 0.23 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.29 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.14 | 0.00 | 0.28 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 |
|  | 32.10 | **0.00** | 1.12 | **0.72** | 8.29 | **0.27** | 3.19 | **0.13** | **0.93** | 4.40 | 7.66 | 1.08 |

| Lake | *Cymbella incerta var. linearis* | *Cymbella lanceolata* | *Cymbella neocistula* | *Cymbella sp. aff. designata* | *Cymbella subaequalis morph B* | *Cymbella subarctica* | *Cymbella subleptoceros* | *Cymbopleura cuspidata* | *Cymbopleura designata* | *Cymbopleura stauroneiformis* | *Denticula (?) tenuis var.* | *Denticula elegans* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S40 | 0.00 | 0.00 | 0.00 | 1.71 | 2.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Long | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kettle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E509 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E507 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E506 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E503 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E516 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E515 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| E511 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 |
| CI23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV24 | 0.00 | 0.00 | 0.00 | 1.28 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | 1.91 | 0.96 |
| DV10 | 0.00 | 0.00 | 0.00 | 1.22 | 0.68 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV05 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV08 | 0.00 | 0.00 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI32 | 0.00 | 0.00 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Allen | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wolf | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 |
| CI14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI07 | 0.00 | 0.00 | 0.00 | 0.38 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| CI11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB07 | 0.24 | 0.00 | 0.00 | 0.24 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 |
| WB01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.78 | 0.00 | 0.00 |
| WB02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB04 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 |
| WB03 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 |
| KR02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR01 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.31 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.21 | 0.00 | 0.00 |
| JR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.55 | 0.00 | 0.00 |
| JR06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.24** | **0.00** | **0.43** | 1.71 | 2.80 | **0.31** | **0.16** | **0.33** | **0.48** | **0.96** | 1.91 | **0.96** |

| Lake | *Denticula kuetzingii* | *Denticula tenuis* | *Diadesmis cf. gallica* | *Diadesmis cf. gallica var. ?* | *Diadesmis contenta* | *Diadesmis perpusilla* | *Diatoma tenuis* | *Diploneis marginestriata* | *Diploneis nov. spec. Nr. 1 Julma Olkky* | *Diploneis oblongella* | *Diploneis occulata* | *Diploneis ovalis* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | **9.47** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.40 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 3.48 | 0.00 | 0.00 | 0.00 | 1.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.22 | 0.00 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.13 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 2.31 | 0.00 | 0.00 | 0.00 | 0.00 | 1.23 | 0.00 | 0.00 | 0.31 | 0.00 | 1.69 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.95 | 0.00 | 0.00 | 4.44 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 |
| **DV24** | 0.00 | 0.00 | **18.34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 1.49 | 0.00 |
| **DV05** | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.75 | 3.14 | 0.60 |
| **DV06** | 0.26 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | **46.47** | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 |
| **DV01** | 0.33 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.29 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.21 | 0.00 |
| **Allen** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.32 | 0.00 | 1.27 | 0.32 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.26 | 0.00 | 0.39 | 0.64 | 0.26 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.88 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 |
| **CI07** | 0.00 | 0.25 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 0.41 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.33 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.14 | 0.00 | 0.49 | 0.00 |
| **WB07** | 0.12 | 0.24 | 3.10 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.63 | 0.31 |
| **WB02** | 0.00 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.29 | 0.00 | 0.44 | 0.00 |
| **WB04** | 0.22 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 1.56 | 1.08 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 1.08 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.08 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.54 | 0.00 |
| **KR04** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.14 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.37 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.28 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.39 | 1.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 46.47 | 1.16 | 18.34 | **0.24** | 1.07 | 1.23 | **0.62** | **0.95** | 1.14 | **0.95** | 4.44 | **0.60** |

| Lake | *Diploneis ovalis cf. ssp. ovalis* | *Diploneis ovalis ssp. ovalis* | *Diploneis parma* | *Encyonema auerswaldii* | *Encyonema elginense* | *Encyonema gaeumannii* | *Encyonema latens* | *Encyonema minutum* | *Encyonema norvegicum* | *Encyonema obscurum* | *Encyonema obscurum var. alpina* | *Encyonema cf. obscurum var. alpina* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.93 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.27 | 0.00 | 0.00 | 0.00 | 0.27 | 0.53 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.27 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.32 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.13 | 0.27 | 0.00 | 0.00 | 2.01 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.63 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.81 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 1.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.63 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | 0.24 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.23 | 0.00 | 0.00 | 0.16 | 0.16 | 0.16 | 0.16 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 0.09 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.27** | **0.63** | 1.26 | **0.14** | **0.61** | **0.93** | **0.81** | **0.96** | **0.63** | **0.27** | 2.01 | **0.32** |

| Lake | *Encyonema silesiacum* | *Encyonema cf. subminutum* | *Encyonema ventricosum* | *Encyonopsis behrei* | *Encyonopsis cesatiformis* | *Encyonopsis cesatii* | *Encyonopsis descripta* | *Encyonopsis microcephala* | *Encyonopsis subminuta* | *Eucocconeis flexella* | *Eucocconeis alpestris* | *Eucocconeis laevis* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.31 | 0.00 | 0.00 | 0.00 | 1.24 | 0.00 | 0.00 | 1.24 | 0.00 | 0.78 | 0.00 | 2.95 |
| **Long** | 0.27 | 0.00 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.13 | 0.00 | 0.53 | 0.00 | 0.93 |
| **Kettle** | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.38 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 |
| **HW06** | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 3.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.07 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.33 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 1.58 | 0.00 | 1.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.24 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 3.83 | 0.00 | **8.61** | 0.00 | 2.07 | 0.00 | 0.64 |
| **DV10** | 1.76 | 0.00 | 0.68 | 0.00 | 1.22 | 0.00 | 4.87 | 0.14 | **6.36** | 1.22 | 0.14 | 1.62 |
| **DV05** | 0.30 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.26 | 0.00 | 0.00 | 0.00 | 0.38 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 |
| **DV08** | 1.07 | 0.00 | 0.61 | 0.00 | 0.00 | 0.00 | 3.68 | 0.00 | 0.77 | 0.77 | 0.00 | 0.15 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.61 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 2.88 | 0.00 | 1.44 |
| **CI34** | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.14 | 0.00 | 0.43 | 0.00 | 0.00 | 0.00 | 0.71 | 0.00 | 3.69 | 1.28 | 0.00 | 1.70 |
| **CI31** | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.16 | 0.00 | 0.63 | 0.00 | 0.00 | 0.00 | 0.32 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 1.21 | 0.00 | 0.27 | 0.00 | 1.61 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| **CI08** | 0.27 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.11 | 0.00 | 0.00 |
| **CI11** | 0.26 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 |
| **WB07** | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 1.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 1.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.88 | 0.29 | 0.00 | 0.88 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.22 | 0.00 | 0.22 |
| **WB03** | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.12 | 0.00 | 0.12 |
| **KR07** | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.38 | 2.46 | 0.00 | 0.15 | 0.31 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.31 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.47 | 1.48 | 0.31 | 0.00 | 0.08 | 0.08 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.28 | 0.35 | 0.28 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.09 | 0.55 | 0.09 | 0.00 | 0.00 | 0.00 | 0.18 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 1.76 | **0.30** | 3.33 | **0.16** | 1.24 | 3.83 | 4.87 | 8.61 | 6.36 | 2.88 | **0.31** | 2.95 |

| Lake | *Eucocconeis leptostriata* | *Eunotia arcus* | *Eunotia bilunaris var. mucophila* | *Eunotia faba* | *Eunotia inflata* | *Eunotia praerupta* | *Fallacia lenzii* | *Fallacia pygmaea* | *Fallacia sublamatula* | *Fallacia sublucidula* | *Fragilaria capucina var. vaucheria complex* | *Fragilaria cyclopum* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 4.81 | **7.30** | 0.00 | 0.00 | 0.00 | 2.64 | 0.00 | 0.00 | 0.00 | 0.00 | **22.05** | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.79 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.53 | 0.00 |
| **E506** | 0.00 | 0.87 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.08** | 0.00 | 0.00 | 1.17 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.07 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 1.74 | 0.00 | 0.00 | 0.65 | 0.65 | 0.00 |
| **E511** | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.72 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 |
| **CI22** | 2.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.16 | 0.00 | 0.00 | 0.63 | 0.16 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.49 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.63 | 0.00 |
| **DV23** | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 1.44 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 |
| **DV10** | 1.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.75 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.63 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 1.49 | 0.00 |
| **CI09** | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 4.81 | 7.30 | **0.49** | **0.32** | **0.49** | 2.64 | 5.08 | **0.13** | **0.95** | 1.17 | 22.05 | **0.00** |

| Lake | *Fragilaria microstriata* | *Fragilaria oldenburgiana complex* | *Fragilaria oldenburgioides/ P. brevistriata complex* | *Fragilaria tenera* | *Frustulia rhomboides var. saxonica* | *Geissleria cummerowi* | *Geissleria declivis* | *Geissleria schoenfeldii* | *Geissleria similis* | *Gomphonema gracile* | *Gomphonema acuminatum* | *Gomphonema angustatum* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 2.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.62 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.87 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 |
| **HW05** | 1.19 | 0.00 | 1.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.94 | 0.00 | 0.00 |
| **HW03** | 4.43 | 0.00 | **19.40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | **26.72** | 0.00 | 5.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.07 |
| **HW07** | 3.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.05 | 0.00 | 0.00 |
| **E516** | **13.63** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | **8.68** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 6.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | **11.63** | 1.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 4.16 | 0.47 | **7.86** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 |
| **CI26** | **5.23** | **17.12** | 2.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.48 | **9.73** | 2.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.60 | 4.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | **9.58** | 1.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | **5.50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.29 | 0.00 | 4.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 4.29 | 0.00 | 2.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | **21.42** | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | **5.43** | 0.00 | 1.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 1.90 | 1.11 | 2.22 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 3.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI14** | **7.99** | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.76 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 |
| **CI09** | 1.12 | **8.59** | **6.03** | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 4.23 | 4.33 | **14.59** | 0.00 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 1.23 | 1.40 | **6.19** | 0.00 | 0.00 | 0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.65 | 1.14 | 3.26 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 4.40 | 0.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 4.24 | 0.00 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 1.26 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 1.44 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 2.92 | 0.00 | 3.23 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.51 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.16 | 0.62 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 1.29 | 0.16 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.15 | 0.58 | 1.17 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.09 | 1.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 26.72 | 21.42 | 19.40 | 2.80 | **0.16** | **0.79** | **0.32** | **0.81** | **0.27** | 2.94 | **0.62** | **0.07** |

| Lake | *Gomphonema angustum* | *Gomphonema cf. clavatulum* | *Gomphonema cf. leptoproductum* | *Gomphonema cf. micropus* | *Gomphonema lacus-vulcani* | *Gomphonema "parvulum var. undulatum"* | *Gomphonema pumilum var. elegans* | *Gomphonema sp.* | *Gomphonema sp.1* | *Gomphonema sp.2* | *Gomphonema sp.3* | *Gyrosigma acuminatum* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Long | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kettle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E509 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E507 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E506 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW06 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E503 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E516 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E515 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E511 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 |
| CI26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 |
| CI29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV08 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV01 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 0.00 | 0.34 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 |
| CI33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Allen | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wolf | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 |
| CI14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| CI07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 |
| CI10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 |
| WB07 | 2.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 |
| WB01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB05 | 0.00 | 0.00 | 0.00 | 1.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 |
| WB02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB03 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR07 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR02 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 2.74 | **0.53** | **0.27** | 1.57 | **0.23** | **0.35** | **0.34** | **0.33** | **0.24** | **0.29** | **0.08** | **0.32** |

| Lake | *Hannaea arcus* | *Hippodonta costulata* | *Hippodonta hungarica* | *Hygropetra balfouriana* | *Hygropetra cf. balfouriana* | *Karayevia clevei var. rostrata* | *Karayevia laterostrata* | *Kobayasiella jaajii* | *Kolbesia suchlandtii* | *Licmophora cf. gracilis var. anglica* | *Meridian circulare* | *Microcostatus krasskei* | *Navicula absoluta* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 1.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | **8.10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 1.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.13 | 0.00 | 4.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.14 | 0.14 | 1.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.05 | 0.82 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.13 | 0.06 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| **E515** | 0.00 | 2.06 | 0.00 | 1.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.22 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 |
| **CI20** | 0.00 | 0.00 | 0.86 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.08 | 0.63 | 4.24 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.16 | 0.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 | 0.16 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | **6.50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.68** |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.54 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.25 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 | 0.00 | 0.30 | 0.15 |
| **Allen** | 0.16 | 0.00 | 1.11 | 0.00 | 0.00 | 1.11 | 1.59 | 0.00 | 0.00 | 0.00 | 0.00 | 2.22 | 1.43 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 2.71 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 |
| **CI01** | 0.00 | 0.00 | 3.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 1.21 |
| **CI14** | 0.00 | 0.00 | 0.80 | 0.13 | 0.00 | 0.00 | 0.27 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 1.07 |
| **CI07** | 0.00 | 0.00 | 0.00 | **20.78** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.81 | 2.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.33 | 0.22 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.89 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 1.16 | 0.00 | 0.00 | 0.00 | 0.21 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 0.61 | 0.00 | 0.70 | 0.00 | 0.00 | 0.26 | 0.92 |
| **CI10** | 0.00 | 0.16 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 |
| **WB05** | 0.00 | 0.16 | 1.26 | 0.16 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.31 |
| **WB02** | 0.00 | 0.00 | 1.32 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.62 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.36 | 0.00 | 0.00 | 0.00 | 0.36 | 2.16 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.61 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.53 |
| **KR01** | 0.00 | 0.00 | 0.16 | 1.17 | 0.93 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.47 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 |
| **JR02** | 0.00 | 0.00 | 0.14 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.11 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.19 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.83 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.22** | 2.06 | 6.50 | 20.78 | **0.93** | 1.11 | 1.59 | **0.36** | 1.16 | **0.13** | **0.27** | 2.22 | 5.68 |

| Lake | *Navicula aff. phylepta* | *Navicula cf. trophicatrix* | *Navicula aurora (incl. aurora var?)* | *Navicula cf. arvensis* | *Navicula cf. fluens* | *Navicula cincta* | *Navicula concentrica* | *Navicula cryptocephala/notha/ chiarae complex* | *Navicula cryptotenella* | *Navicula cryptotenelloides* | *Navicula dealpina* | *Navicula difficillima* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.12** | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.27 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | **7.64** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.77 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.10 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.50 | 0.00 | 0.06 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.00 | 2.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 2.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.90 |
| **CI17** | 0.00 | 0.31 | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 1.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.00 | **7.29** | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.51 | 0.00 | 0.00 | 0.38 | 0.00 | 0.38 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.79 | 0.00 | 0.16 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.16 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.94 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 | 0.00 | 0.00 | **7.31** | 0.00 | 0.41 | 1.89 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.60 | 0.30 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.13 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.11 | 0.11 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.06 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.99 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.06 | 0.00 | 0.75 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.86 | 0.00 | 0.32 | 0.00 | 1.27 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 3.89 | 0.00 | 0.00 | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.54 |
| **CI14** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.13 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.13 | 0.00 | 0.25 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.33 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.85 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.04 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.13 | 0.09 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.16 | 0.16 | 0.00 | 0.00 | 0.33 | 0.33 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.63 | 0.00 | 0.00 | 0.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 1.44 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.62 | 0.39 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.37 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 7.64 | 1.10 | **0.25** | **0.46** | 2.93 | 2.27 | **0.12** | 7.31 | 1.44 | **0.75** | 1.89 | 1.27 |

| Lake | *Navicula digituloides* | *Navicula digitulus* | *Navicula gastrum var. signata* | *Navicula interglacialis* | *Navicula libonensis* | *Navicula lucinensis* | *Navicula meniscus* | *Navicula modica* | *Navicula muraloides* | *Navicula oblonga* | *Navicula pseudosilicula* | *Navicula radiosa* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 |
| **E506** | 0.00 | 1.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 |
| **HW07** | 0.00 | 0.24 | 0.72 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 1.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 1.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.57 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.79 | 0.00 | 0.00 | 0.00 | 0.26 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | **5.37** | 0.00 | 0.00 | 1.23 | 0.00 | 0.00 | 0.00 | 0.46 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 2.82 | 0.00 | 0.00 | 0.00 | 0.00 | **6.43** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.94 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.31 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 1.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.41 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 1.12 | 2.82 | **0.72** | **0.22** | 5.37 | **0.31** | 6.43 | 2.57 | **0.22** | **0.15** | **0.35** | **0.46** |

| Lake | *Navicula reinhardtii* | *Navicula rhynchotella* | *Navicula rhyncocephala* | *Navicula schmassmannii* | *Navicula seminulum* | *Navicula sp.* | *Navicula vitiosa* | *Navicula vulpina* | *Navicula(dicta) cf. ruedieriae* | *Navicula(dicta) raederiae* | *Neidiopsis wulffii* | *Neidium affine var. longiceps* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 |
| **Kettle** | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | **18.63** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 1.74 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.04 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.27** | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **5.07** | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.16 | 0.24 | 0.00 | 0.00 | 2.20 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.82 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 |
| **CI07** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.45 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | **17.86** | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.38** | **0.10** | **0.45** | 1.74 | 18.63 | **0.22** | 2.20 | 5.07 | **0.24** | 17.86 | **0.40** | **0.49** |

| Lake | *Neidium ampliatum* | *Neidium bergii* | *Neidium bisulcatum* | *Neidium distinctepunctatum* | *Neidium dubium* | *Neidium dubium fo.constrictum* | *Neidium kozlowii var.ellipticum* | *Neidium ladogensis* | *Neidium sp.aff. alpinum* | *Neidium sp.nov.* | *Neidium sp.nov. Lange-Bertalot* | *Nitzschia aff. draveillensis* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S40 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Long | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kettle | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E509 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E507 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E506 | 5.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW06 | 0.00 | 0.40 | 0.00 | 1.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E503 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW02 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E516 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E515 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E511 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI17 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI22 | 0.00 | 3.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.38 | 0.48 | 0.00 |
| CI23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV23 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 |
| DV10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV08 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI32 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Allen | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wolf | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI01 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.94 |
| CI14 | 0.13 | 0.00 | 0.27 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.68 |
| CI09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB07 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB04 | 0.22 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB03 | 0.12 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR07 | 0.15 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR02 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR08 | 0.15 | 0.00 | 0.15 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 5.93 | 3.01 | **0.31** | 1.60 | **0.27** | **0.00** | **0.32** | **0.65** | **0.32** | 2.38 | **0.48** | **0.94** |

| Lake | *Nitzschia amphibia f. frauenfeldii* | *Nitzschia amphibia f. rostrata* | *Nitzschia angustata* | *Nitzschia angustiforaminata* | *Nitzschia bryophila* | *Nitzschia cf. amphibia* | *Nitzschia commutata* | *Nitzschia sp.2 cf. dealpina* | *Nitzschia debilis* | *Nitzschia dissipata* | *Nitzschia dissipata var. media* | *Nitzschia fonticola* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Long | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kettle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 |
| E509 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E507 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 |
| E506 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 |
| HW05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E503 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 |
| HW03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| HW02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E516 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 |
| E515 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E511 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.25 |
| CI22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.43 | 0.00 | 0.00 | 0.00 | 0.79 | 0.00 | 0.00 |
| CI23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.24 | 0.00 | 0.00 |
| CI26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 |
| CI29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.40 |
| DV24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.47 | 0.00 | 0.95 | 0.00 | 0.00 |
| DV05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 0.00 | 0.60 |
| DV06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.26 |
| DV07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **11.97** | 0.00 | 0.00 | 0.00 | 0.00 |
| DV02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 0.00 | 0.00 |
| CI33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.57 | 0.57 |
| CI31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.45 |
| Allen | 0.00 | 0.00 | 0.32 | 0.16 | 0.63 | 0.95 | 0.00 | 0.00 | 0.00 | 2.06 | 0.00 | 0.95 |
| Wolf | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.64 | 0.00 | 0.00 |
| CI01 | 0.00 | 0.00 | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.07 | 0.00 | **6.30** |
| CI14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 |
| CI07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.00 | 0.00 |
| CI08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 |
| CI09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.22 |
| CI12 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.21 |
| CI11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.13 | 0.00 | 0.00 |
| CI10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.65 |
| WB07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 | 0.36 |
| WB01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 |
| WB05 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 1.10 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 |
| WB02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.21 |
| WB04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.11 | 0.00 | 0.00 |
| WB03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.68 | 0.00 | 0.00 | 0.00 | 1.32 |
| KR07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| KR02 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR01 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 2.88 |
| KR04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 |
| KR08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.15 | 0.29 | 0.00 |
| JR02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.32 | 0.00 | 0.14 | 0.00 | 0.00 |
| JR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.24 |
| JR06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.32** | **0.26** | **0.32** | **0.54** | **0.63** | 1.43 | **0.80** | 11.97 | **0.13** | 2.06 | **0.57** | 6.30 |

| Lake | *Nitzschia sp.1 cf. fonticola* | *Nitzschia frustulum* | *Nitzschia frustulum var. inconspicua* | *Nitzschia gracillus* | *Nitzscia inconspicua* | *Nitzschia palea* | *Nitzschia palea var. tenuirostris* | *Nitzschia perminuta* | *Nitzschia pura* | *Nitzschia recta* | *Nitzschia sinuata var. 1* | *Nitzschia sinuata var. delognei* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.27 | 3.19 | 2.12 | 0.00 | 0.27 | 0.00 | 0.53 | 3.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.33 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.65 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.34 | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | **22.56** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **7.63** | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.62 | 0.92 | 0.00 | 0.00 | 2.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | **6.66** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **8.08** | 1.74 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.47 | 0.16 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.16 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.64 | 0.00 | 0.80 | 0.00 | 0.00 | 0.00 | 2.87 | 0.00 | 0.00 | 0.00 | 0.16 |
| **DV10** | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.92 | 0.00 | **5.83** | 0.31 | 0.00 | 0.92 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 0.00 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.48 | 3.02 | 0.00 | 0.00 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.80 | 0.00 | 0.00 | 0.54 | **12.87** | 0.94 | 3.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 1.01 | 0.00 | 0.25 | 0.76 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.81 | 0.00 | 0.00 | 0.14 | 0.00 | 0.27 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.22 | 0.22 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 |
| **CI10** | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 2.51 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.12 | **10.10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | **5.53** | 0.00 | 0.00 | 0.31 | 0.31 | 0.77 | 0.00 | 1.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.47 | 0.00 | 0.47 | 0.78 | 0.00 | 0.00 | 1.17 | 0.00 | 0.62 | 0.00 | 0.00 |
| **KR04** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.44 | 0.00 | 0.00 |
| **JR02** | 0.97 | 0.00 | 0.00 | 0.28 | 1.53 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 2.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.96 | 0.00 | 1.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.78 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 5.53 | 22.56 | 2.12 | **0.80** | 10.10 | 12.87 | **0.94** | 8.08 | 1.74 | **0.62** | **0.92** | **0.16** |

| Lake | *Nitzschia sinuata var. sinuata* | *Nitzschia sinuata var. tabellaria* | *Nitzschia sp.* | *Nitzschia sp. 3 aff. dealpina* | *Nitzschia sp. 4* | *Pinnularia biceps* | *Pinnularia birnirkiana* | *Pinnularia borealis var. lanceolata* | *Pinnularia brebissonii* | *Pinnularia cf. brebissonii* | *Pinnularia nodosa morph 1* | *Pinnularia nodosiformis* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **6.95** | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 3.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 4.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | 0.00 | 4.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 2.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 1.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 1.79 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.32** | **0.48** | **0.25** | 4.45 | 4.29 | **0.63** | 2.54 | **0.00** | **0.40** | **0.16** | 6.95 | **0.18** |

| Lake | *Pinnularia rhombarea* | *Pinnularia sp.* | *Pinnularia sp. 1* | *Placoneis elginensis* | *Placoneis explanata* | *Placoneis placentula* | *Placoneis pseudanglica* | *Planothidium calcar* | *Planothidium frequentissimum* | *Planothidium lanceolatum (ssp.oder aff.ssp. lanceolatoides?)* | *Planothidium oestrupii* | *Planothidium peragallii* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S40 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Long | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kettle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E509 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E507 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 |
| E506 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.67 |
| HW05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E503 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| HW02 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HW07 | 0.00 | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.19 |
| E516 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.13 |
| E515 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.43 | 0.00 | 0.00 | 0.00 |
| E511 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 |
| CI20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.25 | 0.00 | 0.37 | 0.00 | 1.72 | 0.00 |
| CI22 | 0.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI23 | 0.00 | 0.00 | 0.00 | 0.00 | 1.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI27 | 0.00 | 0.00 | 0.00 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 |
| CI26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI29 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 | 0.00 |
| DV23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV10 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DV02 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 |
| CI33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Allen | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.06 | 0.00 | 0.00 | 0.00 |
| Wolf | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.03 | 0.00 | 0.00 | 0.00 |
| CI01 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.13 | 0.00 |
| CI07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CI09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 |
| CI12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.85 | 0.00 |
| CI11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.22 | 0.00 | 0.00 | 0.04 | 0.00 |
| CI10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 |
| WB07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB01 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB05 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.88 | 0.00 | 0.00 | 0.00 |
| WB02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB04 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WB03 | 0.12 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR07 | 1.54 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KR08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JR06 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | 1.54 | **0.32** | **0.27** | **0.47** | 1.01 | **0.32** | **0.45** | **0.27** | 2.06 | **0.49** | 1.72 | 2.67 |

| Lake | *Planothidium rostatum* | *Psammothidium abundans f. rosenstockii* | *Psammothidium bioretii* | *Psammothidium didymum* | *Psammothidium grischunum f. duonensis* | *Psammothidium helveticum* | *Psammothidium levanderi* | *Psammothidium marginulatum* | *Psammothidium sacculum* | *Psammothidium subatomoides* | *Psammothidium ventralis* | *Pseudostaurosira brevistriata* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.62 | 0.00 | 1.24 | 1.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.66 | 0.00 | 1.46 | 1.06 | 0.00 | 0.00 | 0.00 | 0.27 | 0.66 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **51.65** |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.16 |
| **HW06** | 0.40 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.73 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.02 |
| **HW07** | 0.00 | 0.00 | 0.05 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **12.32** |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.16 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.84 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.79 | 2.38 | 0.00 | 1.74 | 0.00 | 0.00 | 1.27 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.00 | **6.70** |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 2.12 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.80 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | **42.16** | 1.96 | 0.00 | **33.17** | 0.00 | 0.00 | 3.59 | 0.00 |
| **DV23** | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 3.14 | 0.00 | 0.24 | 0.64 | 0.00 | 3.70 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 1.35 | 0.00 | 3.25 | 0.81 | 0.00 | 0.00 | 0.68 | 0.00 | 0.54 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.50 |
| **DV06** | 0.00 | **5.11** | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.00 | 0.00 | 0.51 |
| **DV07** | 0.00 | **16.50** | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 3.38 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.16 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **27.22** |
| **CI32** | 0.00 | 2.70 | 0.00 | 0.00 | 0.00 | 0.14 | 3.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.75 | 0.00 | 0.30 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 2.87 |
| **Allen** | 0.16 | 0.00 | 0.32 | 0.00 | 0.00 | 1.11 | 0.00 | 0.00 | 0.63 | 0.00 | 0.63 | 0.63 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **10.31** |
| **CI01** | 0.00 | 0.00 | 0.27 | 0.00 | 0.94 | 1.34 | 0.00 | 0.00 | 1.07 | 0.00 | 0.40 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.88 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **11.08** |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 |
| **CI09** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.21 | 0.00 | 4.55 |
| **CI11** | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.48 | 0.00 | 2.50 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **13.81** |
| **WB01** | 0.00 | 0.28 | 0.00 | 0.00 | 0.14 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | **13.92** |
| **WB05** | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB02** | 0.00 | 1.91 | 0.00 | 0.00 | 0.00 | 0.00 | 3.24 | 0.00 | 0.29 | 0.00 | 0.00 | **9.56** |
| **WB04** | 0.00 | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.22 | 0.00 | 0.00 | **30.90** |
| **WB03** | 0.00 | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **15.26** |
| **KR07** | 0.00 | 2.92 | 0.00 | 0.00 | 0.15 | 0.00 | 0.31 | 0.00 | 1.23 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 1.27 | 0.25 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 |
| **KR01** | 0.00 | 0.16 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 1.79 |
| **KR04** | 0.00 | 1.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | **8.90** |
| **KR08** | 0.00 | 0.58 | 0.44 | 0.00 | 0.00 | 0.15 | 0.58 | 0.44 | 0.00 | 0.00 | 0.00 | 2.48 |
| **JR02** | 0.00 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | **11.32** |
| **JR01** | 0.00 | 0.55 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **7.67** |
| **JR05** | 0.00 | 1.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.83 | 0.00 | 0.69 | 0.00 | 0.00 | 3.44 |
| **JR06** | 0.00 | 0.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **7.11** |
|  | **0.40** | 16.50 | 1.35 | **0.75** | 42.16 | 2.38 | 3.40 | 33.17 | 1.84 | **0.64** | 3.59 | 51.65 |

| **Lake** | ***Pseudostaurosira brevistriata (form 1)*** | ***Pseudostaurosira pseudoconstruens*** | ***Reimeria sinuata*** | ***Rhopalodia aff. gibba*** | ***Rossithidium petersenii*** | ***Rossithidium pusillum*** | ***Sellaphora bacillum*** | ***Fallacia (Sellaphora?) helensis*** | ***Sellaphora laevissima*** | ***Sellaphora mutata*** | ***Sellaphora pupula morph 4*** | ***Sellaphora pupula var. pupula*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 |
| **Long** | 0.00 | 0.00 | 0.13 | 0.00 | 0.80 | 0.53 | 0.40 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 1.88 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 |
| **E509** | 0.00 | 2.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **6.85** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.76 |
| **E506** | 0.00 | **15.20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.01 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | **25.40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 4.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 |
| **HW02** | 0.00 | 4.66 | 0.00 | 0.00 | 0.00 | 0.39 | 0.14 | 0.00 | 0.00 | 0.00 | 0.18 | 0.07 |
| **HW07** | 0.00 | 1.45 | 0.00 | 0.00 | 0.05 | 1.26 | 0.14 | 0.00 | 0.00 | 0.05 | 0.00 | 0.05 |
| **E516** | 0.00 | 2.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 4.88 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 2.06 | 0.22 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **19.87** | 0.00 |
| **CI17** | 0.00 | **11.40** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | **24.88** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.37 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.88 |
| **CI25** | 0.00 | 1.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | **10.84** | 0.24 | 0.00 | 0.16 | 0.63 | 0.00 | 0.00 | 0.00 | 0.31 | 0.71 | 0.00 |
| **CI26** | 0.00 | **5.39** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.11 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.82 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 2.25 | **13.67** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 4.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 |
| **DV05** | 0.00 | **5.54** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 |
| **DV06** | 0.38 | **6.64** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | **8.75** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.96 | 0.00 | 0.00 | 0.00 | 3.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | **13.91** | 0.00 | 0.00 | 0.06 | 0.06 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 |
| **CI33** | 0.00 | **5.33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.59 | 0.00 | 0.00 |
| **CI32** | **7.23** | 3.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | **7.54** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 2.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.43 | 0.00 | 0.00 |
| **Wolf** | 0.00 | **7.60** | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.52 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 1.07 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 |
| **CI14** | 0.00 | **6.92** | 0.00 | 0.00 | 0.13 | 0.13 | 0.27 | 0.00 | 0.00 | 0.67 | 0.00 | 0.13 |
| **CI07** | 0.00 | **5.04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 |
| **CI09** | 0.00 | **9.04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 |
| **CI12** | 0.00 | **8.99** | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 3.82 | 0.00 | 0.00 | 0.00 | 0.09 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 4.57 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 1.96 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | **15.24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | **5.29** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | **7.06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.16 |
| **WB02** | 0.00 | **10.00** | 0.00 | 0.00 | 0.00 | 0.15 | 0.15 | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 |
| **WB04** | 0.76 | **9.79** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 |
| **WB03** | 0.00 | **6.97** | 0.00 | 0.00 | 0.00 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 |
| **KR07** | 0.00 | **18.13** | 0.00 | 0.00 | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 |
| **KR02** | 0.00 | **6.87** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | **49.42** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | **49.84** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | **37.03** | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.73 |
| **JR02** | 0.00 | **20.00** | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 |
| **JR01** | 0.00 | **25.84** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | **11.00** | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 |
| **JR06** | 0.00 | 4.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.78 |
|  | 7.23 | 49.84 | **0.69** | **0.29** | 4.15 | 6.85 | **0.44** | 2.06 | 1.96 | 2.06 | 19.87 | 1.76 |

| **Lake** | *Sellaphora verecundiae* | *Simonsenia delognei* | *Stauroneis (?nov) spec. cf. amphicephala* | *Stauroneis anceps* | *Stauroneis cf. gracilima* | *Stauroneis cf. undata* | *Stauroneis koeltzii* | *Stauroneis neohyalina* | *Stauroneis phoenicentron* | *Stauroneis smithii* | *Stauroneis smithii var. borgei* | *Stauroneis sp.1* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 |
| **E506** | 0.00 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 | 1.16 | 1.16 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.25 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.05 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| **CI17** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.00 | 2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.74 | 0.00 | 0.00 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.51 | 0.00 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 |
| **CI26** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.95 | 0.00 |
| **DV06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.56 | 0.00 |
| **CI31** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 |
| **Allen** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.27 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.00 | 0.27 | 0.13 | 0.00 | **7.37** | 0.00 | 0.00 | 1.07 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 |
| **CI11** | 0.09 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 0.00 |
| **CI10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.82 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.00 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.32** | **0.46** | **0.04** | 2.06 | **0.13** | **0.16** | 7.37 | 1.16 | 1.16 | 1.74 | 1.95 | **0.35** |

| Lake | *Stauroneis sp.2* | *Staurosira construens f. subsalina* | *Staurosira venter* | *Staurosira construens f. exigua* | *Staurosirella pinnata* | *Staurosirella pinnata (long form)* | *Staurosirella pinnata var. lancettula/acuminatum* | *Stephanodiscus medius* | *Surirella bifrons* | *Surirella brebissonii* | *Surirella linearis* | *Surirella linearis var. constricta* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 3.57 | 0.00 | 2.33 | 1.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Long** | 0.00 | 0.00 | 0.80 | 0.00 | **43.29** | **13.81** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Kettle** | 0.00 | 0.00 | **38.99** | 0.00 | **56.61** | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E509** | 0.00 | 0.00 | **29.75** | 0.00 | **14.16** | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E507** | 0.00 | 0.00 | **32.86** | 0.00 | **33.74** | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E506** | 0.00 | 3.18 | **38.49** | 0.00 | **10.85** | 0.14 | 2.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | **58.04** | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E505** | 0.00 | 2.72 | **8.82** | 0.00 | **69.39** | **9.69** | 2.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E503** | 0.00 | 0.00 | **39.18** | 0.00 | **7.55** | 3.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW03** | 0.00 | 0.00 | 2.73 | 0.00 | **39.45** | 2.60 | 0.00 | 0.13 | 0.00 | 0.13 | 0.00 | 0.00 |
| **HW02** | 0.00 | 0.00 | **7.78** | 0.00 | **44.63** | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **HW07** | 0.00 | 0.10 | 4.35 | 0.00 | **66.47** | 2.51 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E516** | 0.00 | 0.00 | 0.19 | 0.00 | **67.73** | **9.26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **E515** | 0.00 | 0.00 | 2.39 | 0.00 | **39.05** | **10.52** | 3.04 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.12 | 0.00 | 0.11 |
| **CI17** | 0.15 | 0.00 | 3.85 | 0.00 | **30.05** | **9.71** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI20** | 0.00 | 0.74 | **9.93** | 0.00 | **21.32** | 2.45 | 3.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI22** | 0.00 | 0.00 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI23** | 0.00 | 4.30 | **9.10** | 0.00 | **26.68** | **5.06** | 3.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI25** | 0.00 | 0.00 | **36.20** | 0.00 | **36.04** | **20.45** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI27** | 0.00 | 4.01 | **6.36** | 0.00 | **35.27** | 3.85 | 1.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | **25.99** | **13.95** | **16.96** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI29** | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV23** | 0.00 | 4.26 | **11.09** | 0.00 | **12.54** | **9.81** | **11.33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV05** | 0.00 | 0.30 | **17.07** | 0.00 | **16.77** | **11.23** | 4.04 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 |
| **DV06** | 0.00 | 0.00 | **14.43** | 0.00 | **17.62** | **6.90** | **25.03** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV07** | 0.00 | **5.13** | **26.75** | 0.00 | **7.63** | **8.00** | **8.75** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV01** | 0.00 | 0.00 | **55.90** | 0.00 | 1.64 | 4.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **DV02** | 0.00 | 0.00 | 3.99 | 0.00 | 1.76 | **11.82** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.00 | **65.31** | 2.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI33** | 0.00 | 0.00 | **30.62** | 0.00 | **14.79** | **8.28** | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 1.56 | **25.39** | 2.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI31** | 0.00 | 0.00 | **5.13** | 0.00 | **24.89** | **15.23** | 1.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Allen** | 0.00 | 0.00 | 0.00 | 0.00 | **12.06** | 4.44 | 4.76 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Wolf** | 0.00 | 0.00 | **5.28** | 0.00 | **33.63** | **11.34** | 3.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI01** | 0.00 | 0.00 | 0.27 | 0.00 | 0.94 | 0.54 | 0.00 | 0.00 | 0.94 | 0.27 | 0.00 | 0.00 |
| **CI14** | 0.00 | 0.00 | 2.26 | 0.00 | **43.81** | **5.73** | **11.19** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI07** | 0.00 | 0.00 | 2.14 | 0.00 | **32.87** | 2.27 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.00 | **64.18** | **15.60** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI09** | 0.00 | 3.46 | **12.05** | 0.00 | **34.49** | **6.36** | 4.69 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 |
| **CI12** | 0.00 | 1.37 | **5.29** | 0.00 | **16.38** | 3.07 | 4.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI11** | 0.00 | 3.82 | **18.60** | 0.00 | **32.16** | **9.83** | 4.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **CI10** | 0.00 | 0.00 | **13.21** | 0.33 | **36.70** | **5.87** | **7.18** | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB07** | 0.00 | 0.00 | **37.74** | 0.00 | 2.74 | 1.31 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB01** | 0.00 | 0.00 | **32.57** | 0.00 | **22.62** | 3.06 | 4.11 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB05** | 0.00 | 0.00 | 7.54 | 0.00 | **7.54** | **8.63** | 3.77 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 |
| **WB02** | 0.00 | 0.00 | **18.97** | 0.00 | **10.59** | 2.65 | **7.94** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB04** | 0.00 | **11.21** | **24.48** | 0.00 | 7.73 | 2.07 | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **WB03** | 0.00 | 4.57 | **24.28** | 0.00 | **5.89** | 1.56 | 3.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR07** | 0.00 | 0.00 | **10.29** | 0.00 | 0.00 | 1.08 | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 |
| **KR02** | 0.00 | 0.00 | **58.02** | 0.00 | **13.49** | 3.18 | **8.02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR01** | 0.00 | 0.00 | 4.36 | 0.00 | **10.27** | 4.51 | 4.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR04** | 0.00 | 0.16 | **21.04** | 0.00 | **6.96** | 2.10 | 0.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KR08** | 0.00 | 0.87 | **12.97** | 0.00 | **20.85** | 2.33 | 0.87 | 0.00 | 0.00 | 0.00 | 0.58 | 0.00 |
| **JR02** | 0.00 | 0.00 | **19.44** | 0.00 | **25.56** | **5.42** | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR01** | 0.00 | **7.21** | **31.51** | 0.00 | **9.86** | 3.56 | 1.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR05** | 0.00 | 0.00 | **12.24** | 0.00 | **19.26** | 2.20 | 0.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **JR06** | 0.00 | 0.00 | **51.03** | 0.00 | **22.22** | **8.27** | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  | **0.15** | 11.21 | 58.02 | **0.33** | 69.39 | 25.39 | 25.03 | **0.16** | **0.94** | 1.12 | **0.58** | **0.15** |

| Lake | *Surirella minuta* | *Surirella turgida* | *Tabellaria flocculosa* | *unidentifiable Fragilaria sensu lato* | *unidentifiable valves* | *Maximum %* | *# taxa per lake* | *# genera* | *Total Concentration (valves/cc)* | *Diatom sums (valves)* |
|---|---|---|---|---|---|---|---|---|---|---|
| **S40** | 0.00 | 0.00 | 0.00 | 0.00 | 3.73 | 22.05 | 48 | 26 | 4,426,036 | 644 |
| **Long** | 0.00 | 0.00 | 0.00 | 0.00 | 0.53 | 43.29 | 51 | 29 | 14,231,700 | 753 |
| **Kettle** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 56.61 | 18 | 13 | 1,548,439,200 | 1,862 |
| **E509** | 0.00 | 0.00 | 0.00 | 1.51 | 0.00 | 51.65 | 12 | 9 | 1,681,268,400 | 1,059 |
| **E507** | 0.00 | 0.00 | 1.05 | 0.00 | 0.00 | 33.74 | 20 | 18 | 236,590,200 | 669 |
| **E506** | 0.00 | 0.00 | 3.76 | 0.00 | 2.32 | 38.49 | 22 | 14 | 62,687,520 | 691 |
| **HW06** | 0.00 | 0.00 | 0.00 | 0.00 | 3.48 | 47.86 | 34 | 22 | 296,881,200 | 748 |
| **HW05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 58.04 | 21 | 13 | 1,600,300,800 | 1,008 |
| **E505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 69.39 | 20 | 13 | 728,708,400 | 918 |
| **E503** | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 39.18 | 20 | 10 | 151,299,225 | 781 |
| **HW03** | 0.00 | 0.00 | 0.00 | 1.04 | 1.56 | 39.45 | 37 | 24 | 406,425,600 | 768 |
| **HW02** | 0.00 | 0.00 | 0.07 | 0.00 | 0.04 | 44.63 | 55 | 32 | 4,467,506,400 | 2,814 |
| **HW07** | 0.00 | 0.00 | 0.10 | 0.00 | 0.05 | 66.47 | 52 | 32 | 3,286,332,000 | 2,070 |
| **E516** | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 67.73 | 41 | 25 | 2,538,572,400 | 1,599 |
| **E515** | 0.00 | 0.00 | 0.00 | 0.33 | 1.95 | 39.05 | 50 | 32 | 1,460,862,900 | 922 |
| **E511** | 0.00 | 0.00 | 0.00 | 0.00 | 0.90 | 32.10 | 29 | 19 | 673,996,950 | 891 |
| **CI17** | 0.31 | 0.00 | 0.00 | 0.00 | 2.00 | 30.05 | 47 | 27 | 3,606,233,400 | 649 |
| **CI20** | 0.00 | 0.25 | 0.00 | 0.00 | 2.45 | 24.88 | 44 | 24 | 226,195,200 | 816 |
| **CI22** | 0.32 | 0.00 | 0.00 | 0.00 | 1.74 | 8.08 | 50 | 24 | 1,618,252,892 | 631 |
| **CI23** | 0.00 | 0.00 | 0.00 | 0.76 | 2.02 | 26.68 | 32 | 19 | 13,185,811,800 | 791 |
| **CI25** | 0.00 | 0.00 | 0.00 | 0.00 | 0.97 | 36.20 | 8 | 5 | 10,268,596,800 | 616 |
| **CI27** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 35.27 | 69 | 35 | 42,441,310,800 | 1,273 |
| **CI26** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25.99 | 28 | 16 | 2,337,476,400 | 631 |
| **CI29** | 0.00 | 0.00 | 0.16 | 0.00 | 0.33 | 42.16 | 34 | 22 | 15,422,400 | 612 |
| **DV23** | 0.00 | 0.00 | 0.00 | 0.00 | 0.64 | 13.67 | 58 | 27 | 517,255,200 | 1,244 |
| **DV24** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.34 | 38 | 22 | 6,221,408 | 627 |
| **DV10** | 0.00 | 0.00 | 0.00 | 0.00 | 2.03 | 7.31 | 58 | 22 | 97,769,700 | 739 |
| **DV05** | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 17.07 | 51 | 29 | 185,169,600 | 668 |
| **DV06** | 0.00 | 0.00 | 0.00 | 1.15 | 0.89 | 25.03 | 40 | 21 | 310,772,700 | 783 |
| **DV07** | 0.00 | 0.00 | 0.00 | 0.25 | 0.50 | 26.75 | 26 | 16 | 221,760,000 | 800 |
| **DV08** | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 46.47 | 44 | 22 | 207,023,040 | 652 |
| **DV01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 55.90 | 19 | 15 | 242,109,000 | 610 |
| **DV02** | 0.00 | 0.00 | 0.00 | 0.00 | 1.44 | 55.11 | 23 | 18 | 43,381,800 | 626 |
| **CI34** | 0.00 | 0.00 | 0.00 | 0.63 | 0.34 | 65.31 | 61 | 31 | 2,773,537,200 | 1,747 |
| **CI33** | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 30.62 | 21 | 14 | 562,161,600 | 676 |
| **CI32** | 0.00 | 0.00 | 0.00 | 0.00 | 1.28 | 25.39 | 38 | 22 | 117,255,600 | 705 |
| **CI31** | 0.15 | 0.15 | 0.00 | 0.00 | 1.51 | 24.89 | 48 | 25 | 263,144,700 | 663 |
| **Allen** | 0.00 | 0.32 | 0.00 | 0.32 | 1.27 | 12.06 | 86 | 37 | 500,094,000 | 630 |
| **Wolf** | 0.00 | 0.00 | 0.00 | 0.77 | 0.77 | 33.63 | 51 | 27 | 42,253,200 | 776 |
| **CI01** | 0.13 | 0.54 | 0.00 | 0.00 | 3.22 | 12.87 | 74 | 32 | 98,695,800 | 746 |
| **CI14** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 43.81 | 52 | 28 | 25,038,039,600 | 751 |
| **CI07** | 0.00 | 0.00 | 0.00 | 0.00 | 3.27 | 32.87 | 56 | 28 | 165,072,600 | 794 |
| **CI08** | 0.00 | 0.00 | 0.00 | 0.54 | 0.27 | 64.18 | 48 | 28 | 299,148,300 | 737 |
| **CI09** | 0.00 | 0.00 | 0.00 | 1.90 | 0.00 | 34.49 | 65 | 30 | 1,422,489,600 | 896 |
| **CI12** | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 17.86 | 65 | 31 | 750,934,800 | 946 |
| **CI11** | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 32.16 | 69 | 35 | 7,236,280,800 | 2,279 |
| **CI10** | 0.00 | 0.00 | 0.33 | 0.00 | 1.47 | 36.70 | 53 | 27 | 254,885,400 | 613 |
| **WB07** | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 37.74 | 41 | 24 | 63,504,000 | 840 |
| **WB01** | 0.00 | 0.00 | 0.00 | 2.44 | 1.46 | 32.57 | 43 | 22 | 2,281,381,200 | 1,437 |
| **WB05** | 0.00 | 0.63 | 1.57 | 0.00 | **5.02** | 10.99 | 70 | 35 | 105,945,840 | 637 |
| **WB02** | 0.00 | 0.00 | 0.00 | 0.29 | 0.15 | 18.97 | 48 | 27 | 359,856,000 | 680 |
| **WB04** | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 30.90 | 46 | 23 | 382,120,200 | 919 |
| **WB03** | 0.00 | 0.00 | 0.00 | 0.00 | 1.44 | 24.28 | 57 | 31 | 62,899,200 | 832 |
| **KR07** | 0.00 | 0.00 | 0.00 | 0.00 | 1.54 | 18.13 | 62 | 30 | 147,646,800 | 651 |
| **KR02** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 58.02 | 31 | 16 | 12,478,536 | 786 |
| **KR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 49.42 | 70 | 28 | 680,022,000 | 1,285 |
| **KR04** | 0.00 | 0.00 | 0.00 | 1.46 | 0.16 | 49.84 | 26 | 13 | 327,045,600 | 618 |
| **KR08** | 0.00 | 0.00 | 0.00 | 0.00 | 1.75 | 37.03 | 51 | 26 | 544,546,800 | 686 |
| **JR02** | 0.00 | 0.00 | 0.00 | 0.90 | 0.14 | 25.56 | 48 | 24 | 299,376,000 | 1,440 |
| **JR01** | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 31.51 | 39 | 22 | 910,602,000 | 1,095 |
| **JR05** | 0.00 | 0.00 | 0.00 | 1.93 | 2.61 | 19.26 | 40 | 23 | 120,914,640 | 727 |
| **JR06** | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 51.03 | 23 | 16 | 160,914,600 | 774 |
|  | **0.32** | **0.63** | 3.76 | 2.44 | 5.02 | 69.39 | 86 | 37 | 42,441,310,800 | 2,814 |
|  |  |  |  |  |  | 7.31 | 8 | 5 | 4,426,036 | 610 |