

CEN TC 230/WG 2/TG 3**Germany****Draft proposal of****"Water quality – phytoplankton biovolume determination by microscopic measurement of cell dimensions"**

1	Scope.....	2
2	Normative references.....	2
3	Terms and definitions.....	2
3.1	biomass.....	2
3.2	biovolume.....	2
3.3	cell volume.....	2
3.4	plasma volume.....	2
3	Biovolume determination.....	3
4	Principle.....	3
5	Procedure.....	3
5.1	Calibration of the eyepiece micrometer.....	4
5.2	Measuring.....	4
5.3	Calculation of biovolume.....	5
5.4	Application of mean cell volumes.....	6
5.5	Measurements of complex cell shapes.....	6
5.6	Biovolumes and size-classes.....	6
5.7	Biovolume biomass relations.....	7
6	Quality Assurance.....	7
	Bibliography.....	8
	Annex A.....	9
	Annex B.....	15
	Annex C.....	63

Foreword

This document is a working document.

This document has been prepared by Germany for the Technical Committee CEN/TC 230 "Water analysis", the secretariat of which is held by DIN.

Introduction

WARNING – Persons using this standard should be familiar with normal laboratory practice. Long periods of microscopic phytoplankton analysis can cause physical fatigue and affect eyesight. Attention should be given to the ergonomics of the microscope and advice from a health and safety practitioner should be sought to ensure that risks are minimized.

This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure compliance with any national regulatory guidelines.

1 Scope

This European standard describes a general procedure for determination of biovolume of marine and freshwater phytoplankton using inverted microscopy (Utermöhl technique). The determination of plasma volume and vacuole volume is not covered by this guidance. The description of technical details of different image analysis software is also not covered by this standard. For this the technical regulations of the software supplier have to be taken into account.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15204, *Water quality – Guidance standard for the routine analysis of phytoplankton abundance and composition using inverted microscopy (Utermöhl technique)*

EN 14996, *Guidance on assuring the quality of biological and ecological assessments in the aquatic environment*

3 Terms and definitions

3.1

biomass

total living organic matter within a system or taxon

3.2

biovolume

total volume of a single taxon per volume unit including the cell wall (if existing) exclusive of lorica and/or mucilaginous envelopes

3.3

cell volume

total volume of a single cell

3.4

plasma volume

volume of cytoplasm of a single cell (total cell volume minus vacuole volume)

3 Biovolume determination

The abundance or number of counting units of individual phytoplankton taxa does not represent the real ratio of single taxa to the complete biomass of a phytoplankton sample. Few big cells/counting units can contribute far more biomass to the system than many small cells. The biovolume is a substantially more accurate basis for assessing hazards from algae and cyanobacteria which contain noxious or toxic metabolites, and is recommended for this purpose in WHO guidelines and a number of national regulations. Moreover, biomass is much more relevant for food chain modelling than abundance. Therefore it is important to determine the biomass of phytoplankton taxa. Depending on the aims of the investigation this can be done via microscopy as biovolume using cell counts and cell volume or plasma volume, or chemically using chlorophyll-a or carbon content.

This guidance describes the microscopic determination of the biovolume of phytoplankton samples in Utermöhl chambers. Although plasma volume has been suggested and used by some authors, this is not promoted here because plasma volume can not be determined with an inverted microscope with the necessary precision. It is therefore proposed to determine the total cell volume independently of the proportions of a vacuole.

The use of some basic geometric shapes does not reflect the variety of all naturally existing shapes and does not match the exact biovolume values of each taxon. It is a compromise between accuracy and justifying the expense. The application of agreed geometric shapes and equations will improve the comparability of phytoplankton data and is an important step forward to implement quality assurance measures in phytoplankton analysis.

4 Principle

For every phytoplankton taxon, a preferably simple (with as few dimensions as possible) and best fitting geometric shape is assigned (for examples of geometrical shapes see informative annex A). If it is not possible in certain cases to describe the actual shape with a simple geometric shape, then composite shapes are also possible (e. g. Cone + half sphere). In most cases the assignment of a geometric shape will be based on a single cell, but for some colony-forming species where individual cells are hard to distinguish or have very complex contours it can be expedient to assign a geometric shape based on the shape of the whole colony.

Lists which describe the preferred geometric shapes have been published for many species. These should be used where available (see e. g. [2], [3], [5]). Annex B contains an alphabetical list of recommended geometrical shapes for genera and selected species.

The dimensions needed for cell volume determination are determined in the sedimentation chamber by measuring the cells or counting units of the relevant phytoplankton taxa, using inverted microscopy and an eyepiece micrometer. The results are given in micrometer [μm]. The biovolume per taxon and sample is calculated by multiplying the average cell volume of the taxon by the number of individuals (cells/ml or cells/l) or counting units (e. g. number of 100- μm filament pieces/ml).

For cells with high size variability it is advised to determine reasonable size classes first and assign the individuals both to the taxon and to the size class. In routine programs, standard size classes should be used (e.g. [5]).

5 Procedure

The required dimensions (e. g. length, width, height and/or diameter) of the relevant geometric shape are measured for each or for dominant taxa present in the sample. At least 20 individuals per taxon should be measured. Depending on cell size variation, the number of measured cells/counting units can be increased to a maximum of 50 individuals ([3], [7]). The required

dimensions for determination of the cell volume are measured with the help of an eyepiece micrometer or with image analysis software. Prior to measurement, both systems have to be calibrated with a calibrated object micrometer for every microscope and the objectives and oculars used.

If counted directly into size classes, all individuals are measured while counted. In this case a separate measurement of dimensions is not necessary (see section 5.6).

NOTE

Because the required number of individuals to be measured is highly dependent on the variability in size for a certain taxon it is recommended to calculate the biovolume after each measurement to perform a statistical analysis. The 95 % confidence interval should be set as a measure for precision. By setting statistical limits to the required precision the number of individuals per taxon to be measured can be optimized reducing the amount of work of the laboratories. If image analysis programmes are used these should be linked directly to a data base or spreadsheet, which automatically calculate the necessary results.

5.1 Calibration of the eyepiece micrometer

The scale of commercially available calibrated object micrometers has a length of mm and is divided into 100 equal parts. The distance between the graduation lines is 10 µm. By putting the scale of the eyepiece micrometer over the scale of the object micrometer, the scale value (S) = calibration factor of the eyepiece micrometer can be determined for each objective magnification, as follows:

$$S \text{ in } \mu\text{m} = \frac{n \text{ graduation lines of the object micrometer} \times 10 \mu\text{m}}{n \text{ graduation lines of the eyepiece micrometer}}$$

The distances of the graduation lines of the scale have to be determined with the calibrated eyepiece micrometer for every objective separately.

The image analysis software also has to be calibrated with the calibrated eyepiece micrometer separately for every level of magnification, following the instructions in the instruction manual of the software.

5.2 Measuring

Measurement of the cells/counting units can be carried out parallel to the counting process or in a separate step. Depending on the cell size of the taxa, the determination of the required dimensions (length, width, diameter) should be carried out at magnifications between 100 and 1000 times to obtain corresponding precision.

By rotating the ocular with the eyepiece micrometer and moving the sedimentation chamber with the microscope stage, the scale of the eyepiece micrometer is put over the required dimension of the cell/counting unit to be measured. The number of covered graduation lines is read and with the help of the calibration factor (see paragraph 5.1) the length of the measured dimension is calculated by multiplication. When image analysis software is used, the corresponding details of the instruction manual have to be followed.

In the case of some taxa it is often not possible to measure all dimensions needed for calculation of the cell volume ("hidden dimensions"). It is then sometimes necessary to estimate the missing dimensions from measured dimensions of other samples or from the literature.

In the case of colony forming taxa (e. g. chains) it is sufficient to measure one cell per colony because cells within a colony usually have roughly the same dimensions. With some filamentous taxa (e.g. cyanobacteria), it is often difficult to distinguish between individual cells, especially when the cells are directly interconnected without any gaps. In such cases filament pieces of a fixed length, e. g. 100 µm, have to be counted and measured (length and diameter). An alternative and more precise method for filamentous forms, particularly those which have no distinct boundaries between cells, is as follows: instead of counting individual filaments, the total length of the fraction of each filament that is within the boundaries of a counting grid is measured, ignoring the fraction outside of the grid boundaries (see Fig. 1). The sum of the total length of all fractions within the grid is calculated when finishing the transect. Then the diameter of at least 20 filaments is measured and the mean filament diameter and the median can be calculated. To obtain the biovolume of the respective taxon, the sum of total filament lengths is multiplied by the median of filament diameter.

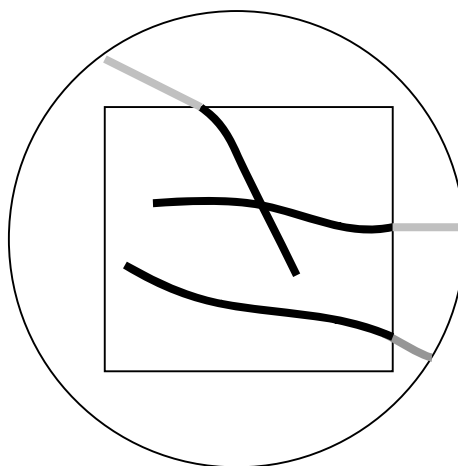


Fig. 1 Determining biovolume for filaments without distinct cell boundaries using a counting grid: measure lengths of all fractions within the counting grid (black), excluding fractions outside of the counting grid boundaries. [6]

5.3 Calculation of biovolume

Average cell volume is calculated on the basis of the species-specific geometric shape and the linear dimensions determined for the individual taxa (height, length, width, diameter). These calculations have to be carried out for every phytoplankton taxon identified.

The cell volumes of the various taxa are calculated as the median of all individual volumes. The median is used because it is more robust to extreme values compared to the arithmetic mean.

A hidden and therefore estimated dimension is assigned only after the medians of all measurable dimensions have been calculated. The average biovolume per taxon is calculated by multiplying the number of cells/l (or cells/ml) or counting units (e. g. number of 100-µm filament pieces/ml) with their determined species-specific average cell volume (µm³):

$$\text{Biovolume}_{\text{taxon}} [\text{mm}^3/\text{l}] = \text{number of cells}^1 [\text{n}/\text{l}] \cdot \text{cell volume} [\mu\text{m}^3] \cdot 10^{-9}$$

(¹ or counting units)

The total biovolume to be determined for each sample results from the sum of the average biovolumes determined for each phytoplankton taxon.

The specific cell volumes are expressed in μm^3 without decimal places. The biovolume of the complete sample is expressed in cubic millimetres per litre [mm^3/l] to not more than three decimal places.

NOTE

Some taxa (e. g. flagellates without solid cell wall) are inclined to shrink during the fixation process. Shrinkage depends on many influencing factors (preservative, life stage, physiological status, species etc., even diatoms can shrink). Often it is difficult to find good correction factors in the literature. One can overcompensate using a general correction factor as much as under compensate with using measurements on preserved material. For monitoring, where trends have to be detected, the compensation by correction factors is not as important.

In those cases where it is actually entitled to have more exact biomass (for example for projects working with toxicity), correction factors should be determined from a comparison between fixated and living organisms. This has to be noted in the protocol.

5.4 Application of mean cell volumes

Measuring a lot of cells of every taxa in every sample is a very time consuming procedure. For routine monitoring programs the use of mean cell volumes, used in the same project and area and calculated from own measurements, as described above, may be indicated. These mean cell volumes have to be checked regularly by measuring of actual cell dimensions (see 5.2) and calculation of actual biovolumes (see 5.3). For taxa with high variability in size and if a taxon shows more than 50 % of total biovolume these checks are compulsory. If taxa with high size variability counted in size classes mean cell volumes per size class should be acquired (see 5.6).

When mean cell volumes are used the biovolume of a taxon will be calculated as follows:

$$\text{Biovolume}_{\text{taxon}} [\text{mm}^3/\text{l}] = \text{number of cells}^1 [n/\text{l}] \cdot \text{mean cell volume} [\mu\text{m}^3] \cdot 10^{-9}$$

(or counting units)

5.5 Measurements of complex cell shapes

Some taxa show very complex cell shapes which would require complicated equations for biovolume calculations. Hidden and therefore estimated dimensions have a great effect on the results of biovolume calculations. In these cases also mean cell volumes from literature should be used and well documented in the protocol.

NOTE

Some taxa have different geometrical shapes depending on their stage of development (e.g. cysts). This has also to be taken into account.

5.6 Biovolumes and size-classes

Taxa with high variability in size should be counted in size classes. The appropriate number of size classes depends on the size variation of each taxon. A mean cell volume for each size class has to be determined.

If regional lists of size classes are available they should be used [5].

5.7 Biovolume biomass relations

Assuming a density of organisms equal to water with 1.0 g/cm^3 [4] makes it possible to calculate the biomass (wet weight) as follows:

$$1 \text{ mm}^3/\text{l} = 1 \text{ cm}^3/\text{m}^3 = 1 \text{ mg/l}$$

$$1 \text{ mm}^3/\text{m}^3 = 1 \cdot 10^6 \text{ } \mu\text{m}^3/\text{l} = 1 \text{ } \mu\text{g/l}$$

6 Quality Assurance

The quality assurance associated with this standard should be in accordance with EN 14996.

Bibliography

- [1] ATT – Arbeitsgemeinschaft Trinkwassertalsperren e.V. Arbeitskreis Biologie (1998): Erfassung und Bewertung von Planktonorganismen. ATT Technische Informationen Nr. 7 Siegburg 1998, Kommissionsverlag R. Oldenbourg München, 151 S.
- [2] HELCOM (2003): Manual for Marine Monitoring in the COMBINE Programme of HELCOM, ANNEX C-6: Phytoplankton Species composition, Abundance and Biomass, – 21.
- [3] Hillebrand, H.; Dürselen, C. D.; Kirschtel, D.; Pollinger, U.; Zohary, T. (1999): Biovolume calculation for pelagic and benthic microalgae. J. Phycol. 35: 403 - 424.
- [4] Lohmann, H. (1908): Untersuchungen zur Feststellung des vollständigen Gehaltes des Meeres an Plankton. Wissenschaftliche Meeresuntersuchungen Abt. Kiel 10: 130 - 370.
- [5] Olenina, I.; Hajdu, S.; Edler, L.; Andersson, A.; Wasmund, N.; Busch, S., Göbel, J.; Gromisz, S.; Huseby, S.; Huttunen, M.; Jaanus, A.; Kokkonen, P.; Ledaine, I.; Niemkiewicz, E. (2006): Biovolumes and size-classes of phytoplankton in the Baltic Sea. HELCOM Baltic Sea Environment Proceedings 106, 144 pp.
- [6] Padisák, J.; Adrian, R. (1999): 5.. Biovolumen und Biomasse. In: W. v. Tümpling & G. Friedrich (Hrsg.): Biologische Gewässeruntersuchung. Methoden der Biologischen Wasseruntersuchung Bd. 2, Gustav-Fischer-Verlag Jena, S. 334-368.
- [7] Smayda, T. J. (1978): From phytoplankton to biomass. In Sournia, A. [Ed.] Phytoplankton Manual. Monographs on Oceanographic Methodology 6. UNESCO, Paris, pp. 273–9.

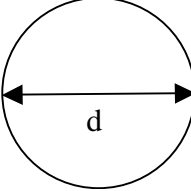
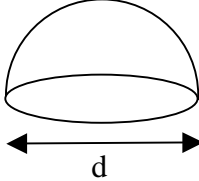
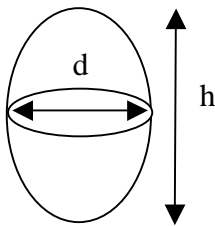
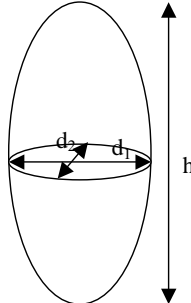
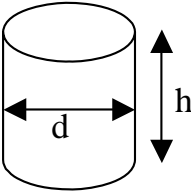
Annex A

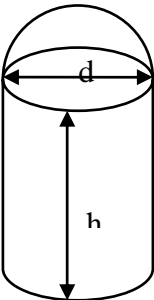
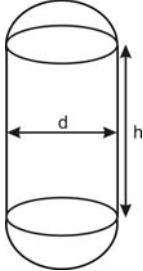
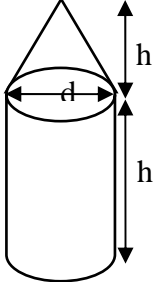
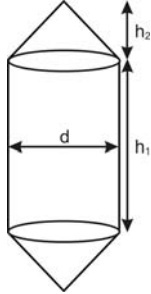
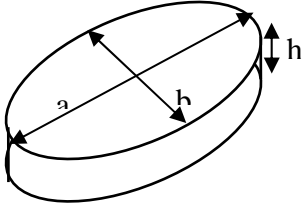
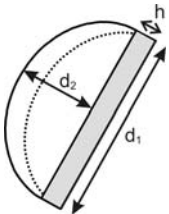
(informative)

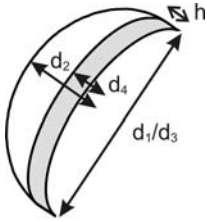
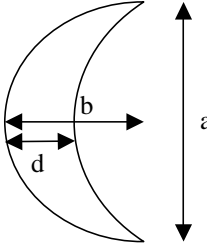
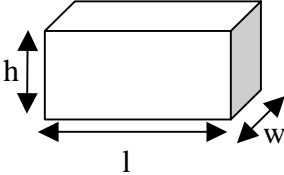
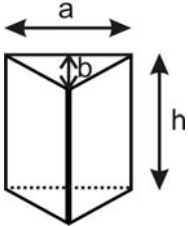
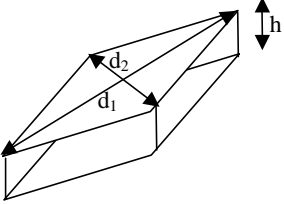
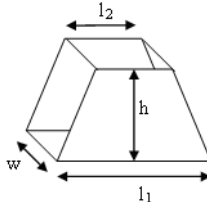
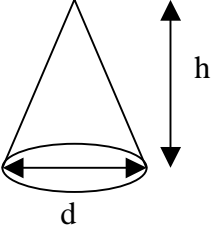
List of geometrical shapes

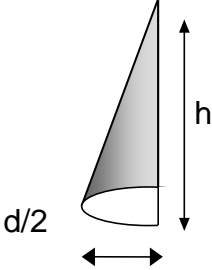
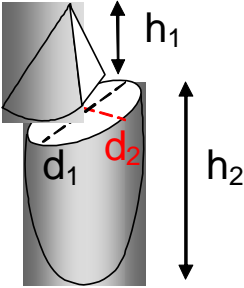
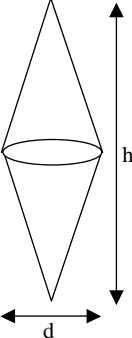
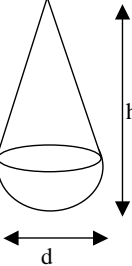
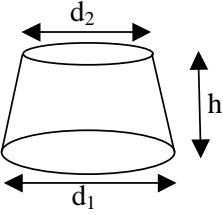
Abbreviations:

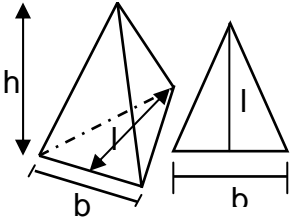
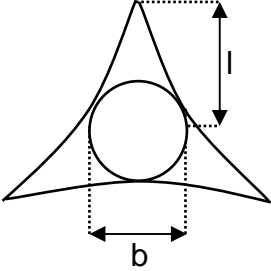
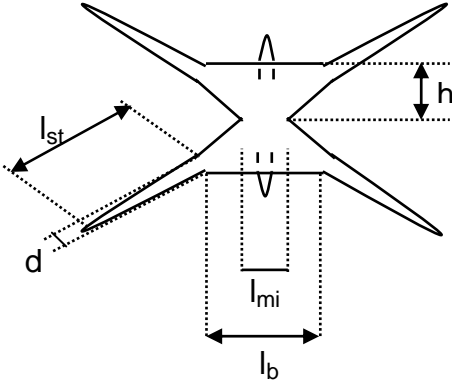
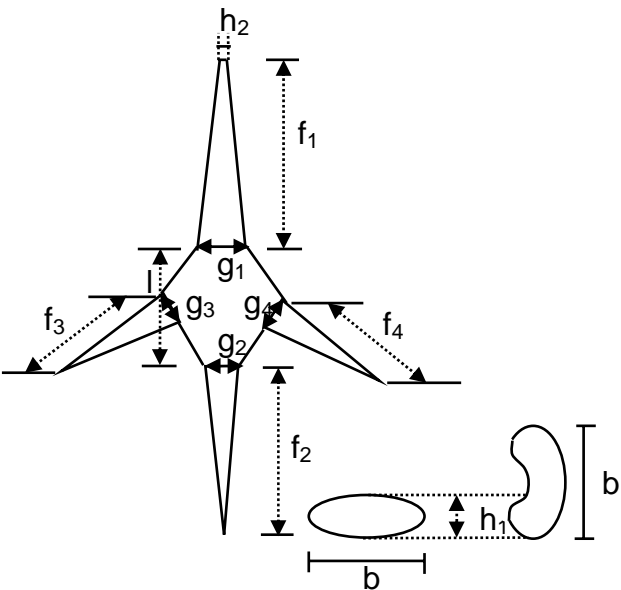
V: volume, w: width, d: diameter, h: height, a or d₁: large diameter of ellipse, b or d₂: small diameter of ellipse

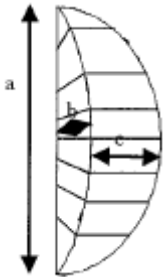
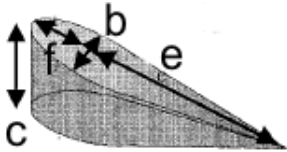
Geometric shape	Illustration	Equation
Sphere		$V = \frac{4}{3} \cdot \pi \cdot d^3$
Half sphere		$V = \frac{2}{3} \cdot \pi \cdot d^3$
Rotational ellipsoid (synonyms: Rotation ellipsoid, Circle based ellipse)		$V = \frac{4}{3} \cdot \pi \cdot d^2 \cdot h$
Triaxial ellipsoid (synonyms: Flattened ellipsoid, Oval based ellipse)		$V = \frac{4}{3} \cdot \pi \cdot d_1 \cdot d_2 \cdot h$
Cylinder (synonyms: Circle based cylinder)		$V = \pi \cdot d^2 \cdot h$

Geometric shape	Illustration	Equation
Cylinder + half sphere (synonyms: Cylinder with half sphere)		$V = /4 \cdot \pi \cdot d^2 \cdot h + /12 \cdot \pi \cdot d^3$
Cylinder + 2 half sphere (synonyms: Cylinder with two half spheres)		$V = /4 \cdot \pi \cdot d^2 \cdot (h + 2/3 d)$
Cylinder + cone (synonyms: Cylinder with cone)		$V = /4 \cdot \pi \cdot d^2 \cdot h_1 + /12 \pi \cdot d^2 h_2$
Cylinder + 2 cone (synonyms: Cylinder with two cones)		$V = /4 \cdot \pi \cdot d^2 \cdot (h_1 + 2/3 h_2)$
Elliptic cylinder (synonyms: Oval cylinder, Cylinder on elliptic base, oval based cylinder)		$V = /4 \cdot \pi \cdot d_1 \cdot d_2 \cdot h$
Half elliptic cylinder (synonyms: Half elliptic prism)		$V = /4 \cdot \pi \cdot d_1 \cdot d_2 \cdot h$

Geometric shape	Illustration	Equation
Sickle shaped cylinder (synonyms: Sickle shaped prism)		$V = /4 \cdot \pi \cdot h \cdot (d_1 \cdot d_2 - d_3 \cdot d_4)$
Mono-raphidioid shape		$V = d^2/8 \cdot (2b - d + a) \cdot (/6 \cdot \pi^2 +)$
Cuboid (synonyms: Rectangular box, Rectangle, Parallelepiped)		$V = l \cdot w \cdot h$
Triangular prism (synonyms: Prism on triangle base, Half Parallel-epiped)		$V = /2 \cdot a \cdot b \cdot h$
Rhomboid prism (synonyms: Prism on parallelogram base)		$V = /2 \cdot d_1 \cdot d_2 \cdot h$ d₁: large distance, d₂: small distance
Trapezoid		$V = /2 \cdot h \cdot w \cdot (l_1 + l_2)$
Cone		$V = /12 \cdot \pi \cdot d^2 \cdot h$

Geometric shape	Illustration	Equation
Half cone		$V = /24 * \pi * d^2 * h$
Half cone + cut flattened ellipsoid		$V = (/24 * \pi * d_1^2 * h_1) + (/6 * d_1 * d_2 * h_2)$ <p> D₁: large diameter d₂: small diameter h₁: 0.3 * total height of cell h₂: 0.7 * total height of cell </p>
2 cones (synonyms: Double cone)		$V = /12 * \pi * d^2 * h$
Cone + half sphere (synonyms: Cone with half sphere)		$V = /12 * \pi * d^2 * (h + d/2)$
Truncated cone		$V = /12 * \pi * h * (d_1^2 + d_2^2 + d_1 * d_2)$

Geometric shape	Illustration	Equation
Tetrahedron		$V = 1/12 \cdot \sqrt{2} \cdot b^3$
Trident (synonyms: Goniocloris shape)		$V = 1/6 \cdot \pi \cdot b^3 + 1/16 \cdot \pi \cdot b^2 \cdot l$
Staurostrum shape		$V = 2/3 \cdot h_m \cdot (1/4 \cdot \sqrt{3} \cdot (l_{mi}^2 + l_b^2) + \sqrt{(3/16 \cdot l_{mi}^2 \cdot l_b^2)}) + 1/2 \cdot \pi \cdot d_s^2 \cdot l_{st}$
Ceratium shape		$V = (\pi/12 \cdot f_1 \cdot (h_2^2 + h_2 \cdot g_1 + g_1^2) + \pi/6 \cdot l \cdot b \cdot h_1) + \pi/12 \cdot (g_2^2 \cdot f_2 + g_3^2 \cdot f_3 + g_4^2 \cdot f_4)$

Geometric shape	Illustration	Equation
Cymbelloid		$V = \frac{2}{3} \cdot \pi \cdot b^2 \cdot a \cdot \beta / 360$ $\sin \beta / 2 = c / (2 \cdot b)$
Gompho-nemoid		$V = b \cdot c \cdot ((\pi \cdot e / 4) + ((f - e) / 3))$

Annex B

(informative)

Alphabetical list of recommended geometric shapes

The following list contains recommended geometrical shapes which should be preferable used for biovolume estimation.

In general genera are listed. Species are only included if the geometric shape of a species differ clearly from the geometric shape of the genus.

Sometimes the geometric shape does not cover the effective volume. In these cases the volume equation has to be multiply by volume correction factors.

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Acanthoceras</i>	Honigm.	Elliptic cylinder					
<i>Acanthogonyaulax</i>	(Kofoid) Graham	Triaxial ellipsoid					
<i>Acanthoica</i>	Lohmann	Rotational ellipsoid					
<i>Acanthosphaera</i>	Lemmermann 1899	Sphere					
<i>Achnanthes</i>	Bory	Cuboid		<i>brevipes</i>		Elliptic cylinder	
				<i>hungarica</i>		Elliptic cylinder	
				<i>longipes</i>		Elliptic cylinder	
<i>Achnanthidium</i>	Kützing	Elliptic cylinder					
<i>Achroonema</i>	Skuja, 1956	Cylinder					
<i>Actidesmium</i>	Reinsch 1875	Rotational ellipsoid					
<i>Actinastrum</i>	Lagerheim	2 cones		<i>aciculare</i>	Playf.	Cone + half sphere	
<i>Actinella</i>	F.W. Lewis 1864	Cuboid					
<i>Actiniscus</i>	Ehrenberg	Triaxial ellipsoid					
<i>Actinochloris</i>	Kors.	Rotational ellipsoid					
<i>Actinocyclus</i>	Ehrenb.	Cylinder					
<i>Actinomonas</i>	Kent	Sphere					
<i>Actinoptychus</i>	Ehrenb.	Cylinder					
<i>Actinotaenium</i>	(Nägeli) Teiling 1954	Triaxial ellipsoid					
<i>Adenoides</i>	Balech	Elliptic cylinder					
<i>Adoneis</i>	Andrews & Rivera	Rhomboid prism					
<i>Agmenellum</i>	Brébisson, 1839	Sphere					
<i>Akanthochloris</i>	Pascher	Sphere					
<i>Alexandrium</i>	Halim	Rotational ellipsoid					
<i>Algirosphaera</i>	Schlauder	Rotational ellipsoid					
<i>Alisphaera</i>	Heimdal	Sphere					
<i>Ammatoidea</i>	W & GS West	Sphere					
<i>Amphichrysis</i>	Korsikov	Rotational ellipsoid					
<i>Amphidiniopsis</i>	Woloszynska	Elliptic cylinder					
<i>Amphidinium</i>	Claperède & Lachmann, 1859	Triaxial ellipsoid		<i>sphenoides</i>	Wulff 1916	2 cones	
<i>Amphidoma</i>	Stein	2 cones					
<i>Amphikrikos</i>	Kors.	Triaxial ellipsoid					
<i>Amphipleura</i>	Kützing	Elliptic cylinder		<i>pellucida</i>	(Kütz.) Kütz.	Cuboid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Amphiprora</i>	Ehrenberg, 1841	Elliptic cylinder		<i>ornata</i>	Bail.	Cuboid	
<i>Amphisolenia</i>	Stein	Cylinder					
<i>Amphora</i>	Ehrenberg	Elliptic cylinder		<i>ostrearia</i>		Cymbelloid	
				<i>pediculus</i>	Kütz.	Cymbelloid	
				<i>proteus</i>		Cymbelloid	
<i>Amylax</i>	Meunier	Cone + half sphere		<i>triacantha</i>	(E. Jørgensen) Sournia 1984	Cone + half sphere	0.75
<i>Anabaena</i>	Bory de Saint-Vincent ex Bornet & Flahault, 1886	Sphere		<i>cylindrica</i>	Lemmerman 1896	Cylinder	
				<i>elliptica</i>	Lemm.	Rotational ellipsoid	
				<i>fusca</i>	Hill	Rotational ellipsoid	
				<i>mendotea</i>	Trelease	Rotational ellipsoid	
				<i>oscillarioides</i>	Bory ex Bornet & Flahault 1886	Rotational ellipsoid	
				<i>planctonica</i>	Brunnthal 1903	Rotational ellipsoid	
				<i>smithii</i>	(Komárek) M. Watanabe 1991	Rotational ellipsoid	
				<i>utermoehlil</i>	Geitl.	Rotational ellipsoid	
<i>Anabaenopsis</i>	Woloszynska, 1923	Cylinder					
<i>Anacystis</i>	Meneghini	Rotational ellipsoid					
<i>Anaplosolenia</i>	Defl.	2 cones					
<i>Anaulus</i>	Ehrenberg	Elliptic cylinder					
<i>Aneumastus</i>	Mann & Stickle	Elliptic cylinder					
<i>Anisonema</i>		Triaxial ellipsoid		<i>acinus</i>	Duj.	Rotational ellipsoid	
				<i>obliquum</i>	Roskin	Rotational ellipsoid	
<i>Ankistrodesmus</i>	Corda	2 cones					
<i>Ankyra</i>	Fott	2 cones					
<i>Anomoeoneis</i>	Pfitzer	Elliptic cylinder		<i>serians</i>	(Breb.) Cleve	Cuboid	
				<i>vitrea</i>	(Grun.) Ross	Cuboid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Anorthoneis</i>	Grunow	Elliptic cylinder					
<i>Anthosphaera</i>	Kamptner	Sphere					
<i>Apedinella</i>	Thronsdon	Rotational ellipsoid		<i>radians</i>	(Lohmann) Campbell 1973	Sphere	
<i>Aphanizomenon</i>	A. Morren ex Bornet et Flahault, 1888	Cylinder					
<i>Aphanocapsa</i>	Nägeli, 1849	Sphere					
<i>Aphanothece</i>	Nägeli, 1849	Rotational ellipsoid		<i>parallelliformis</i>	Cronberg 2003	Cylinder	
<i>Apodochloris</i>	Komarek	Cone + half sphere					
<i>Arachnochloris</i>	Pascher	Sphere					
<i>Arachnoidiscus</i>	Deane	Cylinder					
<i>Arcocellulus</i>	Hasle, v.Stosch & Syvertsen	Elliptic cylinder					
<i>Arthronema</i>	Komarek & Lukavsky	Cylinder					
<i>Arthrospira</i>	Stizenb.	Cylinder					
<i>Aspalatia</i>	Ercegovic	Rotational ellipsoid					
<i>Astasia</i>		Triaxial ellipsoid					
<i>Asterionella</i>	Hassall	Cuboid					
<i>Asterionellopsis</i>	Round	Triangular prism		<i>glacialis</i>	(Castracane) Round in Round, Crawford & D.G. Mann 1990	Cone + half sphere	0.6
				<i>kariana</i>	(Grunow in Cleve & Grunow) Round in Round, Crawford & D.G. Mann 1990	Cuboid	
<i>Asterococcus</i>		Sphere		<i>superbus</i>	(Cienk.) Scherff.	Rotational ellipsoid	
<i>Asterolampra</i>	Ehrenb.	Cylinder					
<i>Asteromonas</i>	Artari	Cone					
<i>Asteromphalus</i>	Ehrenb.	Cylinder					
<i>Astrosiga</i>	W.S. Kent	Rotational ellipsoid					

23.01.2008

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Attheya</i>	T West	Elliptic cylinder					
<i>Aulacodiscus</i>	Ehrenb.	Cylinder					
<i>Aulacomonas</i>	Skuja	Rotational ellipsoid					
<i>Aulacoseira</i>	Thwaites	Cylinder					
<i>Auliscus</i>	Ehrenberg	Elliptic cylinder					
<i>Aulosira</i>	Kirchner	Cylinder					
<i>Aureococcus</i>	Hargrave & Sieburth	Sphere					
<i>Auricula</i>	Castracane	Cymbelloid					
<i>Azpeitia</i>	M Peragallo	Cylinder					
<i>Bacillaria</i>	Gmelin	Elliptic cylinder					
<i>Bacteriastrum</i>	Shadbolt	Cylinder					
<i>Bacterosira</i>	Gran	Cylinder					
<i>Bacularia</i>	Borzi	Rotational ellipsoid					
<i>Balaniger</i>	Thomsen & Oates	Rotational ellipsoid					
<i>Balechina</i>	Loeblich Jr. & Loeblich III	Rotational ellipsoid					
<i>Bambusina</i>	Kützing ex Kützing 1845	Cylinder					
<i>Basicladia</i>		Cylinder					
<i>Bathyococcus</i>	Eikrem & Throndsen	Sphere					
<i>Batrachospermum</i>	Roth 1797	Cylinder					
<i>Beggiatoa</i>		Cylinder					
<i>Bellerochea</i>	Van Heurck	Triangular prism					
<i>Berkeleya</i>	Greville	Elliptic cylinder					
<i>Bernardinium</i>	Chodat	Triaxial ellipsoid					
<i>Bicosoeca</i>		Rotational ellipsoid					
<i>Biddulphia</i>	Gray	Elliptic cylinder					
<i>Biddulphiopsis</i>	Von Stosch & Simonsen	Elliptic cylinder					
<i>Binuclearia</i>		Cylinder					
<i>Biremis</i>	Mann & Cox	Elliptic cylinder					
<i>Bitrichia</i>		Rotational ellipsoid					
<i>Blennothrix</i>	Kützing	Cylinder					
<i>Blepharocysta</i>	Ehrenb.	Sphere					
<i>Bodo</i>		Cone + half sphere					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Boreadinium</i>	Dodge & Hermes	Rotational ellipsoid					
<i>Borzia</i>	Cohn	Cylinder					
<i>Botryochloris</i>	Pascher	Sphere					
<i>Botryococcus</i>	Kützing	Triaxial ellipsoid					
<i>Botryodiopsis</i>	Ettl	Sphere					
<i>Braarudosphaera</i>	Defl.	Sphere					
<i>Brachynema</i>	Alvik	Cylinder					
<i>Brachysira</i>	Kützing	Elliptic cylinder					
<i>Brebissonia</i>	Grunow	Elliptic cylinder					
<i>Brockmanniella</i>	Hasle, v.Stosch & Syvertsen	Elliptic cylinder					
<i>Bulbochaete</i>		Cylinder					
<i>Bumilleria</i>	Borzi	Cylinder					
<i>Bumilleriopsis</i>	Printz	Rotational ellipsoid					
<i>Cachonina</i>		2 cones					
<i>Calcidiscus</i>	Kamptner	Sphere					
<i>Calciopappus</i>	Gaarder & Ramsfjell	Cone					
<i>Calciosolenia</i>	Gran	Cylinder					
<i>Caloneis</i>	Cleve	Elliptic cylinder		<i>alpestris</i>	(Grun.) Cleve	Cuboid	
				<i>bacillum</i>	(Grun.) Cleve	Cuboid	
				<i>molaris</i>	(Grun.) Krammer	Cuboid	
				<i>tenuis</i>	(Greg.) Krammer	Cuboid	
<i>Calothrix</i>	Agardh	Cylinder					
<i>Calycomonas</i>	Lohmann	Cone		<i>vangoorii</i>	(Conr.) Lund.	Rotational ellipsoid	
				<i>wulffii</i>	Conr.&Kuff.	Rotational ellipsoid	
<i>Calyptrolithina</i>	Heimdal	Rotational ellipsoid					
<i>Calyptrolithophora</i>	Heimdal	Rotational ellipsoid					
<i>Calyptrosphaera</i>	Lohm.	Sphere					
<i>Camptothrix</i>	W & GS West	Cylinder					
<i>Camptylonemopsis</i>	Desik.	Cylinder					
<i>Campylodiscus</i>	Ehr.	Elliptic cylinder					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Campyloneis</i>	Grunow	Elliptic cylinder					
<i>Campylopyxis</i>	Medlin	Elliptic cylinder					
<i>Campylosira</i>	Grunow	Half elliptic cylinder					
<i>Caneosphaera</i>	Gaarder	Sphere					
<i>Carteria</i>	Diesing	Sphere					
<i>Catella</i>	Alvik	Rotational ellipsoid					
<i>Catena</i>	Chodat 1900	Cylinder					
<i>Catenula</i>	Mereschk.	Half elliptic cylinder					
<i>Cavinula</i>	Mann & Stickle	Elliptic cylinder					
<i>Centritactus</i>	Lemm.	Rotational ellipsoid					
<i>Centritractus</i>	E. Lemmermann 1900	Cylinder					
<i>Centrodinium</i>	Kofoed	2 cones					
<i>Cerataulina</i>	H Peragallo	Cylinder					
<i>Cerataulus</i>	Ehrenberg	Elliptic cylinder					
<i>Ceratium</i>	Schrank	Cone		<i>fuscus</i>	(Ehrenberg) Dujardin 1841	2 cones	
<i>Ceratocorys</i>	Stein	Half sphere					
<i>Ceratolithus</i>	Kamptner	Sphere					
<i>Ceratoneis</i>	Ehrenberg	Cuboid					
<i>Chaetoceros</i>	Ehrenb.	Elliptic cylinder		<i>minimus</i>	(Levander) Marino, Giuffr�, Montresor & Zingone 1991	Cylinder	
				<i>radicans</i>		Cylinder	
				<i>socialis</i>		Cylinder	
<i>Chaetophora</i>		Cylinder					
<i>Chaetosphaeridium</i>	Klebahn 1892	Sphere					
<i>Chamaecalyx</i>	Komarek & Anagnostidis	Sphere					
<i>Chamaesiphon</i>	A. Braun & Grunow in Rabenhorst 1865	Cylinder					
<i>Characiopsis</i>		Rotational ellipsoid					
<i>Characium</i>	Braun	Monoraphidioid					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Charciopsis</i>	Borzi	Triaxial ellipsoid					
<i>Chattonella</i>	Biecheler	Cone + half sphere					
<i>Chilomonas</i>	Ehrenb.	Triaxial ellipsoid					
<i>Chlamydocapsa</i>	Fott	Rotational ellipsoid		<i>planctonica</i>	(W.&G.S.We st) Fott	Sphere	
<i>Chlamydomonas</i>	Ehr.	Rotational ellipsoid		<i>ehrenbergii</i>	Goroschaen kin	Sphere	
<i>Chlorallantes</i>	Pascher	Triaxial ellipsoid					
<i>Chlorangiella</i>	De Toni	Triaxial ellipsoid					
<i>Chlorangiopsis</i>	Korschikoff	Triaxial ellipsoid					
<i>Chlorella</i>	Beijerinck	Sphere		<i>ellipsoidea</i>	Gern.	Rotational ellipsoid	
<i>Chlorhormidium</i>	B. Fott	Cylinder					
<i>Chlorobion</i>	Kors.	Cylinder + 2 cones					
<i>Chlorobotrys</i>	Bohlin	Rotational ellipsoid					
<i>Chlorochloster</i>	Pascher	2 cones					
<i>Chlorococcum</i>	Men.	Sphere					
<i>Chlorogloea</i>	Wille	Rotational ellipsoid					
<i>Chlorogonium</i>	Ehr.	2 cones		<i>maximum</i>	Skuja 1939	Cone	
				<i>minimum</i>	Skuja 1939	Cone	
<i>Chlorolobion</i>		2 cones					
<i>Chloromonas</i>	Gobi	Rotational ellipsoid					
<i>Chlorothecium</i>	Borzi emend. Pascher	Triaxial ellipsoid					
<i>Chodatella</i>	Lemm.	Triaxial ellipsoid					
<i>Choricystis</i>	(Skuja) Fott	Rotational ellipsoid					
<i>Chromulina</i>	Cienkowski	Rotational ellipsoid					
<i>Chroococcidiopsis</i>	Geitler	Sphere					
<i>Chroococcidium</i>	Geitler	Sphere					
<i>Chroococcopsis</i>	Geitler	Rotational ellipsoid					
<i>Chroococcus</i>	Nägeli, 1849	Sphere					
<i>Chroomonas</i>	Hansgirg, 1885	Triaxial ellipsoid					
<i>Chroostipes</i>	Paascher	Rotational ellipsoid					
<i>Chrysamoeba</i>		Rotational ellipsoid					
<i>Chrysanthemodiscus</i>	A Mann	Cylinder + 2 half spheres					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Chrysapsis</i>	Pascher	Rotational ellipsoid					
<i>Chrysidalis</i>	Schiller	Cylinder					
<i>Chrysidiastrium</i>	Lauterborn in Pascher 1913	Rotational ellipsoid					
<i>Chrysocapsa</i>	Pascher	Sphere					
<i>Chrysochromulina</i>	Lackey	Triaxial ellipsoid		<i>ericina</i>		Rotational ellipsoid	
				<i>hirta</i>	Manton 1978	Sphere	
				<i>kappa</i>		Rotational ellipsoid	
				<i>parkeae</i>		Rotational ellipsoid	
				<i>pringsheimii</i>		Rotational ellipsoid	
				<i>spinifera</i>		Rotational ellipsoid	
<i>Chrysococcus</i>	Klebs	Rotational ellipsoid		<i>biporus</i>	Skuja	Sphere	
				<i>dokidophorus</i>	Pasch.	Sphere	
				<i>furcatus</i>	(Dolg.) Nicholls	Sphere	
				<i>heverlensis</i>	Conr.	Sphere	
				<i>klebsianus</i>	Pasch.	Sphere	
				<i>minutus</i>	(Fritsch) Nyg.	Sphere	
				<i>punctiformis</i>	Pasch.	Sphere	
				<i>radians</i>	Conr.	Sphere	
				<i>triporus</i>	Matv.	Sphere	
<i>Chrysolykos</i>		Rotational ellipsoid		<i>calceatus</i>	Ramb.	Sphere	
<i>Chrysopora</i>	Pascher	Rotational ellipsoid					
<i>Chrysosaccus</i>	Bour.	Rotational ellipsoid					
<i>Chrysosphaera</i>	(Pascher) Bourelly	Sphere					
<i>Chrysosphaerella</i>	Lauterborn	Rotational ellipsoid		<i>coronacircumspina</i>	D.E.&M.G.W ujek	Sphere	
<i>Chrysotilos</i>	Pascher	Rotational ellipsoid					
<i>Ciliophrys</i>	Cienkowski	Sphere					
<i>Citharistes</i>	Stein	Triaxial ellipsoid					
<i>Cladophora</i>		Cylinder					
<i>Cladopyxis</i>	Stein	Sphere					
<i>Clastidium</i>	Kirchner	Cylinder					
<i>Closteriopsis</i>	Lemm.	Cylinder + 2 cones		<i>longissima</i>	(Lemmerma	2 cones	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
					nn) Lemmerman n 1899		
<i>Closterium</i>	Nitzsch	2 cones					
<i>Coccolithus</i>	Schwarz	Sphere					
<i>Coccomonas</i>	Stein 1878	Rotational ellipsoid					
<i>Coccomyxa</i>		Rotational ellipsoid					
<i>Cocconeis</i>	C.G. Ehrenberg, 1837	Elliptic cylinder					
<i>Coccopedia</i>	Troick.	Rotational ellipsoid					
<i>Cochlodinium</i>	Schütt	Rotational ellipsoid					
<i>Codosiga</i>		Rotational ellipsoid					
<i>Codosigopsis</i>		Rotational ellipsoid					
<i>Coelastrum</i>	Nägeli	Sphere					
<i>Coelomoron</i>	Buell, 1938	Rotational ellipsoid					
<i>Coelosphaerium</i>	Nägeli, 1849	Sphere					
<i>Coenochloris</i>	Kors.	Sphere					
<i>Coenocystis</i>		Rotational ellipsoid					
<i>Colacium</i>	Ehrenberg	Rotational ellipsoid					
<i>Coleochaete</i>		Cylinder					
<i>Coleodesmium</i>	Borzi	Cylinder					
<i>Coleodesmiumopsis</i>	Dutt	Cylinder					
<i>Collodictyon</i>	H.J. Carter 1865	Rotational ellipsoid					
<i>Conradiella</i>	Pascher 1925	Rotational ellipsoid					
<i>Conradocystis</i>	A. Hollande in Grassé 1952	Rotational ellipsoid					
<i>Coolia</i>	Meunier	Triaxial ellipsoid					
<i>Corethron</i>	Castracane	Cylinder + 2 half spheres					
<i>Corisphaera</i>	Kamptner	Sphere					
<i>Coronastrum</i>	Thompson	Triaxial ellipsoid					
<i>Coronosphaera</i>	Kamptner	Sphere					
<i>Corymbellus</i>	Green	Rotational ellipsoid					
<i>Corythodinium</i>	Loeblich Jr. & Loeblich III	2 cones					
<i>Coscinodiscus</i>	Ehrenb.	Cylinder					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Cosmarium</i>	Corda	Triaxial ellipsoid					
<i>Cosmioneis</i>	Mann & Stickle	Elliptic cylinder					
<i>Cosmocladium</i>		Triaxial ellipsoid					
<i>Craticula</i>	Grunow	Elliptic cylinder					
<i>Crenalithus</i>	Roth	Sphere					
<i>Cricosphaera</i>	Braarud	Sphere					
<i>Crinalium</i>	Crow	Cylinder					
<i>Crucigenia</i>	Morren	Triaxial ellipsoid		<i>quadrata</i>	Morren 1830	Sphere	
				<i>tetrapedia</i>	(Kirchner) W. & G.S. West 1902	Cuboid	
<i>Crucigeniella</i>	Lemm.	Triaxial ellipsoid		<i>apiculata</i>	(Lemmermann) Komárek 1974	Rotational ellipsoid	
				<i>rectangularis</i>	(Nägeli) Komárek 1974	Rotational ellipsoid	
<i>Cruciplacolithus</i>	Hay & Mohler	Sphere					
<i>Cryptaulax</i>	H.L. Skuja	Rotational ellipsoid					
<i>Crypthecodinium</i>	Biecheler	Rotational ellipsoid					
<i>Cryptomonas</i>	C.G. Ehrenberg, 1832	Triaxial ellipsoid					
<i>Crystallolithus</i>	Gaarder & Markali em Gaarder	Sphere					
<i>Ctenophora</i>	Williams & Round	Elliptic cylinder					
<i>Cyanarcus</i>	Pascher	Cylinder					
<i>Cyanobacterium</i>	Rippka & Cohen-Bazire	Rotational ellipsoid					
<i>Cyanobium</i>	Rippka & Cohen-Bazire	Rotational ellipsoid					
<i>Cyanocatena</i>	Hind.	Rotational ellipsoid					
<i>Cyanodermatium</i>	Geitler	Rotational ellipsoid					
<i>Cyanodictyon</i>	Pascher, 1914	Rotational ellipsoid		<i>balticum</i>	Cronberg 2003	Cylinder	
				<i>imperfectum</i>	Cronberg & Weibull 1981	Sphere	
				<i>reticulatum</i>	(Lemmermann) Geitler 1925	Sphere	
<i>Cyanogranis</i>	Hind.	Rotational ellipsoid					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Cyanokybus</i>	Schill.	Sphere					
<i>Cyanonephron</i>	Hickel, 1985	Rotational ellipsoid					
<i>Cyanophanon</i>	Geitler	Cylinder					
<i>Cyanosaccus</i>	Lukas & Golub.	Rotational ellipsoid					
<i>Cyanostylon</i>	Geitler	Rotational ellipsoid					
<i>Cyanothece</i>	Komarek	Rotational ellipsoid					
<i>Cyathomonas</i>	De Fromentel	Triaxial ellipsoid					
<i>Cyclidiopsis</i>	Korshikov 1917	2 cones					
<i>Cyclophora</i>	Castracane	Elliptic cylinder					
<i>Cyclostephanos</i>	Round	Cylinder					
<i>Cyclotella</i>	(Kützing) De Brebisson	Cylinder					
<i>Cylindrocapsa</i>		Rotational ellipsoid					
<i>Cylindrocystis</i>	Meneghini, 1848	Cylinder					
<i>Cylindrospermopsis</i>	Seenayya & Subba Raju	Cylinder					
<i>Cylindrospermum</i>	Kütz.	Cylinder					
<i>Cylindrotheca</i>	Rabenhorst	Elliptic cylinder		<i>closterium</i>	(Ehrenberg) Reimann & J. Lewin 1958	Rotational ellipsoid	
<i>Cymatoneis</i>	Cleve	Rhomboid prism					
<i>Cymatopleura</i>	W Smith	Elliptic cylinder					
<i>Cymatosira</i>	Grunow	Elliptic cylinder					
<i>Cymbella</i>	CA Agardh	Triangular prism		<i>affinis</i>	Kütz.	Cuboid	
				<i>amphicephala</i>	Näg.	Cuboid	
				<i>amphioxys</i>	(Kütz.) Cleve	Cuboid	
				<i>aspera</i>	(Ehr.) Cleve	Cuboid	
				<i>cesatii</i>	(Rab.) Grun.	Cuboid	
				<i>cymbiformis</i>	Ag.	Cuboid	
				<i>gracilis</i>	(Ehr.) Kütz.	Cuboid	
				<i>helvetica</i>	Kütz.	Cuboid	
				<i>naviculiformis</i>		Cuboid	
				<i>perpusilla</i>	Cleve-Euler	Cuboid	
				<i>prostrata</i>	(Berk.) Grun.	Cymbelloid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>pusilla</i>	Grun.	Cuboid	
				<i>silesiaca</i>		Cymbelloid	
				<i>tumida</i>	(Breb.) Van Heurck	Cuboid	
				<i>ventricosa</i>	C.A.Ag.	Cuboid	
<i>Cymbellonitzschia</i>	Hustedt	Half elliptic cylinder					
<i>Cymbodinium</i>	Cachon & Cachon	Sphere					
<i>Cymbomonas</i>	Schiller	Rotational ellipsoid					
<i>Cynocystis</i>	Borzi	Sphere					
<i>Cystodinedria</i>	Pascher	Triaxial ellipsoid					
<i>Cystodinium</i>	Klebs	Rotational ellipsoid					
<i>Cystomonas</i>	Ettl & Gärtner	Triaxial ellipsoid					
<i>Dactyliosolen</i>	Castr.	Cylinder					
<i>Dactylococcopsis</i>		2 cones					
<i>Dactylosphaerium</i>	Steinecke	Sphere					
<i>Daktylethra</i>	Gartner	Rotational ellipsoid					
<i>Delphineis</i>	Andrews	Elliptic cylinder					
<i>Dendromonas</i>		Rotational ellipsoid					
<i>Denticula</i>	Kützing	Cuboid					
<i>Derepyxis</i>	Stokes	Triaxial ellipsoid					
<i>Dermatractum</i>	W & GS West	2 cones					
<i>Dermocarpella</i>	Lemm.	Sphere					
<i>Desmarella</i>		Rotational ellipsoid					
<i>Desmidium</i>	Ralfs	Cuboid					
<i>Desmodesmus</i>		Rotational ellipsoid					
<i>Desmonastrix</i>	Pascher	Rotational ellipsoid					
<i>Detonula</i>	Schütt	Cylinder					
<i>Deutschlandia</i>	Lohm.	Sphere					
<i>Diachros</i>	Pascher	Sphere					
<i>Diacromena</i>	Prauser	Rotational ellipsoid					
<i>Diadesmis</i>	Kützing	Elliptic cylinder					
<i>Diaphanoeca</i>		Rotational ellipsoid					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Diatoma</i>	De Candolle	Elliptic cylinder		<i>constricta</i>	(Grunow in Van Heurck) Williams 1985	Cuboid	
				<i>hiemalis</i>	(Lyngb.) Heib.	Cuboid	
				<i>tenuis</i>	C.A. Agardh 1812	Cuboid	
				<i>vulgaris</i>	Bory	Cuboid	
<i>Diatomella</i>	Greville	Elliptic cylinder					
<i>Dichothrix</i>	Zanard.	Cylinder					
<i>Dichotomococcus</i>	Korsikoff	Rotational ellipsoid					
<i>Dicrateria</i>	Parke	Sphere					
<i>Dictyocha</i>	Ehrenberg	Sphere		<i>speculum</i>	Ehrenberg 1839	Half sphere	
<i>Dictyococcus</i>	Gerneck	Sphere					
<i>Dictyoneis</i>	Cleve	Elliptic cylinder					
<i>Dictyosphaerium</i>	Nägeli	Rotational ellipsoid		<i>pulchellum</i>	H.C. Wood 1872	Sphere	
				<i>subsolitarium</i>	Van Goor 1924	Sphere	
<i>Didymosphenia</i>	M Schmidt	Elliptic cylinder					
<i>Dimeregramma</i>	Ralfs in Pritchard	Elliptic cylinder					
<i>Dimeregrammopsis</i>	Ricard	Elliptic cylinder					
<i>Dimerogramma</i>		Rhomboid prism					
<i>Dimorphococcus</i>	A. Braun 1855	Rotational ellipsoid					
<i>Dinobryon</i>	Ehrenberg	Rotational ellipsoid					
<i>Dinococcus</i>	(Woloszynska) Fott	Rotational ellipsoid					
<i>Dinophysis</i>	Ehrenberg, 1839	Triaxial ellipsoid					
<i>Dinosphaera</i>	Kofoed & Michener	Triaxial ellipsoid					
<i>Diplochloris</i>	Kors.	2 cones					
<i>Diplomenora</i>	Blazé	Elliptic cylinder					
<i>Diploneis</i>	Ehrenberg	Elliptic cylinder		<i>puella</i>	(Schum.) Cleve	Cuboid	
<i>Diplopelta</i>	Stein	Triaxial ellipsoid					
<i>Diplopsalis</i>	Bergh, 1881	Sphere		<i>acuta</i>		Triaxial ellipsoid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Diplopsalopsis</i>	Meunier	Sphere					
<i>Discolithina</i>	Loeblich & Tappan	Sphere					
<i>Discosphaera</i>	Haeckel	Sphere					
<i>Dissodinium</i>	Klebs in Pascher, 1916	Sphere		<i>pseudolunula</i>	Swift ex Elbrächter & Drebes 1978	Monoraphidioid	
<i>Distigma</i>		Cone + half sphere		<i>gracile</i>	Pringsh.	Rotational ellipsoid	
<i>Ditylum</i>	JW Bailey	Triangular prism					
<i>Docidium</i>		Cylinder					
<i>Donkinia</i>	Ralfs in Pritchard	Rhomboid prism					
<i>Draparnaldia</i>	Bory de Saint-Vincent 1808	Cylinder					
<i>Druridgia</i>	Donkin	Elliptic cylinder					
<i>Dunaliella</i>	Teodoresco	Rotational ellipsoid					
<i>Durinskia</i>	Carty & Cox, 1986	Sphere		<i>baltica</i>	(Levander) Carty & E. R. Cox 1986	Sphere	0.8
<i>Dysmorphococcus</i>	Hisayoshi Takeda 1916	Triaxial ellipsoid					
<i>Dzensia</i>	Voronich.	Rotational ellipsoid					
<i>Ebria</i>	Borgert 1891	Triaxial ellipsoid		<i>tripartita</i>	(Schumann) Lemmerman 1899	Half sphere	0.7
<i>Elakathothrix</i>		Cone					
<i>Elakatothrix</i>		2 cones		<i>gelatinosa</i>	Wille 1898	Cone	
<i>Ellerbeckia</i>	Crawford	Cylinder					
<i>Ellipsoidion</i>	Pascher	Triaxial ellipsoid					
<i>Emergosphaera</i>	Miller	Cone + half sphere					
<i>Emiliana</i>	Hay & Mohler	Sphere					
<i>Emiliana</i>		Sphere					
<i>Encyonema</i>	Kützing	Cymbelloid					
<i>Endictya</i>	Ehrenberg	Cylinder					
<i>Ensiculifera</i>	Balech	Cone + half sphere					
<i>Enthophysalis</i>	Kützing	Rotational ellipsoid					
<i>Entomoneis</i>	Ehrenberg	Elliptic cylinder		<i>paludosa</i>	(W.Smith) Patrick & Reimer	Cuboid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Entosiphon</i>	S.F.N. von Stein 1878	Rotational ellipsoid					
<i>Epicystis</i>	Pascher	Sphere					
<i>Epilithia</i>	Ercegovic	Rotational ellipsoid					
<i>Epipyxis</i>	Ehrenb.	Rotational ellipsoid					
<i>Epithemia</i>	De Breb.	Cymbelloid		<i>zebra</i>	(Ehr.) Kütz.	Elliptic cylinder	
<i>Erballocystis</i>	Bohlin	Rotational ellipsoid					
<i>Ercegovicia</i>	De Toni	Rotational ellipsoid					
<i>Eremosphaera</i>	De-Bary	Rotational ellipsoid		<i>viridis</i>	De Bary	Sphere	
<i>Erythrospidinium</i>	Silva	Triaxial ellipsoid					
<i>Ethmodiscus</i>	Castr.	Cylinder					
<i>Euastrum</i>	Ehrenberg Ex Ralfs, 1848	Triaxial ellipsoid					
<i>Eucampia</i>	Ehrenberg	Elliptic cylinder					
<i>Eucapsa</i>	Clem.&Shantz	Rotational ellipsoid					
<i>Eucapsis</i>	Clements & Shantz, 1909	Sphere					
<i>Eucocconeis</i>	Cleve	Elliptic cylinder					
<i>Eudorina</i>	Ehrenb.	Sphere					
<i>Euglena</i>	Ehrenberg	Cone		<i>allorgei</i>	Defl.	Elliptic cylinder	
				<i>bivittata</i>	Conr.	Triaxial ellipsoid	
				<i>charkowiensis</i>	Svir.	Elliptic cylinder	
				<i>clara</i>	Skuja	Triaxial ellipsoid	
				<i>clavata</i>	Skuja	Cone + half sphere	
				<i>ehrenbergii</i>	Klebs	Triaxial ellipsoid	
				<i>fenestrata</i>	El.	Cylinder	
				<i>fusca</i>	(Klebs) Lemm.	Triaxial ellipsoid	
				<i>gasterosteus</i>	Skuja	Triaxial ellipsoid	
				<i>gaumei</i>	All.&Lef.	Rotational ellipsoid	
				<i>gigas</i>	Drez.	Triaxial ellipsoid	
				<i>grisoli</i>	Defl.	Rotational ellipsoid	
				<i>guentherii</i>	(Günther) Gojdics	Triaxial ellipsoid	
				<i>hemichromata</i>	Skuja	Rotational ellipsoid	
				<i>intermedia</i>	(Klebs) Schmitz	Cylinder	

23.01.2008

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>klebsii</i>	(Lemm.) Mainx	Elliptic cylinder	
				<i>limnophila</i>	Lemm.	Rotational ellipsoid	
				<i>megalithus</i>	Skuja	Triaxial ellipsoid	
				<i>minima</i>	Francé	Cone + half sphere	
				<i>mutabilis</i>	Schmitz	Rotational ellipsoid	
				<i>nana</i>	L.P.Johns.	Rotational ellipsoid	
				<i>oblonga</i>	Schmitz	Triaxial ellipsoid	
				<i>pascheri</i>	Svir.	Rotational ellipsoid	
				<i>pisciformis</i>	Klebs	Rotational ellipsoid	
				<i>proxima</i>	Dang.	Rotational ellipsoid	
				<i>pusilla</i>	Playf.	Cylinder	
				<i>retronata</i>	Johns.	Triaxial ellipsoid	
				<i>sanguinea</i>	Ehr.	Triaxial ellipsoid	
				<i>satelles</i>	Brasl.-Spect.	Triaxial ellipsoid	
				<i>sociabilis</i>	Dang.	Triaxial ellipsoid	
				<i>spirogyra</i>	Ehr.	Rotational ellipsoid	
				<i>spiroides</i>	Lemm.	Triaxial ellipsoid	
				<i>splendens</i>	Dang.	Triaxial ellipsoid	
				<i>subehrenbergii</i>	Skuja	Triaxial ellipsoid	
				<i>tripteris</i>	(Duj.) Klebs	Rotational ellipsoid	
				<i>tuberculata</i>	Svir.	Triaxial ellipsoid	
				<i>vagans</i>	Defl.	Triaxial ellipsoid	
				<i>variabilis</i>	Klebs	Cylinder	
				<i>viridis</i>	(O.F. Müller) Ehrenberg 1830	Rotational ellipsoid	
<i>Eunotia</i>	Ehrenberg	Cuboid		<i>arcus</i>	Ehr.	Elliptic cylinder	
				<i>bigibba</i>	Kütz.	Elliptic cylinder	
				<i>diodon</i>	Ehr.	Elliptic cylinder	
				<i>elegans</i>	Östrup	Elliptic cylinder	
				<i>exigua</i>	(Bréb.) Rab.	Elliptic cylinder	
				<i>faba</i>	(Ehr.) Grun.	Elliptic cylinder	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>fallax</i>	A.Cleve	Elliptic cylinder	
				<i>formica</i>	Ehr.	Elliptic cylinder	
				<i>gracilis</i>	(Ehr.) Rab.	Elliptic cylinder	
				<i>lunaris</i>	(Ehr.) Grun.	Elliptic cylinder	
				<i>monodon</i>	Ehr.	Elliptic cylinder	
				<i>pectinalis</i>	(Kütz.) Rab.	Elliptic cylinder	
				<i>polyglyphis</i>	Grun.	Elliptic cylinder	
				<i>praerupta</i>	Ehr.	Sickle shaped cylinder	
				<i>pseudopectinalis</i>	Hust.	Elliptic cylinder	
				<i>robusta</i>	Ralfs	Elliptic cylinder	
				<i>septentrionalis</i>	Östrup	Elliptic cylinder	
				<i>sibirica</i>	Cleve	Elliptic cylinder	
				<i>suecica</i>	A.Cleve	Elliptic cylinder	
				<i>tenella</i>	(Grun.) Hust.	Elliptic cylinder	
				<i>triodon</i>	Ehr.	Elliptic cylinder	
				<i>valida</i>		Elliptic cylinder	
				<i>veneris</i>	(Kütz.) O.Müll.	Elliptic cylinder	
				<i>zasuminensis</i>	(Cab.) Körn.	Elliptic cylinder	
<i>Eunotogramma</i>	Weisee	Half elliptic cylinder					
<i>Eupodiscus</i>	Ehrenberg	Cylinder					
<i>Eutetramorus</i>	Walton 1918	Sphere					
<i>Eutreptia</i>	Perty	Rotational ellipsoid					
<i>Eutreptiella</i>	De Cunha	Rotational ellipsoid		<i>gymnastica</i>	Thronds.	Triaxial ellipsoid	
<i>Extubocellus</i>	Hasle, v.Stosch & Syvertsen	Elliptic cylinder					
<i>Falcula</i>	Voigt	Sickle shaped cylinder					
<i>Fallacia</i>	Stickle & Mann	Elliptic cylinder					
<i>Fibrocapsa</i>	Toriumi & Takano	Rotational ellipsoid					
<i>Florisphaera</i>	Okada & Honjo	Rotational ellipsoid					
<i>Fortiea</i>	De Toni	Cylinder					
<i>Fortiella</i>	Pascher	Triaxial ellipsoid					
<i>Fragilaria</i>	Lyngbye	Triangular prism		<i>atomus</i>	Hust.	Cuboid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>brevistriata</i>	Grun.	Elliptic cylinder	
				<i>capucina</i>	Desmaz.	Elliptic cylinder	
				<i>construens</i>	(Ehr.) Grun.	Elliptic cylinder	
				<i>cylindrus</i>	Grun.	Cuboid	
				<i>inflata</i>	(Heid.) Hust.	Cuboid	
				<i>islandica</i>		Elliptic cylinder	
				<i>lapponica</i>	Grun.	Cuboid	
				<i>leptostauron</i>		Elliptic cylinder	
				<i>pinnata</i>	Ehr.	Elliptic cylinder	
				<i>pulchella</i>		Elliptic cylinder	
				<i>subsilicea</i>		Elliptic cylinder	
				<i>virescens</i>	Ralfs	Cuboid	
<i>Fragilariforma</i>	Williams & Round	Triangular prism					
<i>Fragilariopsis</i>	Hustedt	Triangular prism					
<i>Fragilidium</i>	Balech	Sphere					
<i>Franceia</i>	Lemmermann	Rotational ellipsoid					
<i>Frustulia</i>	Rabenhorst	Cuboid					
<i>Fusola</i>	Snow 1902	2 cones					
<i>Gambierdiscus</i>	Adachi & Fukuyo	Triaxial ellipsoid					
<i>Gardnerula</i>	De Toni	Cylinder					
<i>Geitleribactron</i>	Komar.	Cylinder					
<i>Geminella</i>		Cylinder					
<i>Geminigera</i>	Hill	Rotational ellipsoid					
<i>Genicularia</i>	de Bary 1858	Cylinder					
<i>Gephyria</i>	Arnott	Elliptic cylinder					
<i>Gephyrocapsa</i>	Kamp.	Sphere					
<i>Glaucospira</i>		Cylinder					
<i>Glenodiniopsis</i>	Woloszynska	Triaxial ellipsoid					
<i>Glenodinium</i>	C.G. Ehrenberg ex Ralfs, 1837	Triaxial ellipsoid					
<i>Gliscolithus</i>	Norris	Sphere					
<i>Gloeobacter</i>	Rippka	Rotational ellipsoid					
<i>Gloeobotrys</i>	Pascher	Rotational ellipsoid					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Gloeocapsa</i>	Kützing	Sphere					
<i>Gloeocapsopsis</i>	Geitler	Sphere					
<i>Gloeochaete</i>		Sphere					
<i>Gloeochloris</i>		Cylinder					
<i>Gloeochrysis</i>	Pascher	Rotational ellipsoid					
<i>Gloeococcus</i>	Braun	Sphere					
<i>Gloeocystis</i>	Nägeli	Rotational ellipsoid					
<i>Gloeomonas</i>	Klebs	Sphere					
<i>Gloeopodium</i>	Pascher	Triaxial ellipsoid					
<i>Gloeotheca</i>	Nägeli	Rotational ellipsoid		<i>confluens</i>	Näg.	Cylinder	
				<i>linearis</i>	Näg.	Cylinder	
				<i>subtilis</i>	Skuja	Cylinder	
<i>Gloeotila</i>		Cylinder					
<i>Gloeotrichia</i>	J. Agardh, 1886	Cylinder					
<i>Glyphodesmis</i>	Greville	Elliptic cylinder					
<i>Golenkinia</i>	Chodat	Sphere					
<i>Golenkiniopsis</i>	Kors.	Sphere					
<i>Gomontiella</i>	Teodor.	Cylinder					
<i>Gomphocymbella</i>	O Müller	Cymbelloid					
<i>Gomphoneis</i>	Cleve	Elliptic cylinder					
<i>Gomphonema</i>	CA Agardh	Gomphonemoid		<i>angustum</i>	Ag.	Cuboid	
				<i>gracile</i>	Ehr.	Cuboid	
				<i>olivaceum</i>	(Lyngb.) Kütz.	Cuboid	
				<i>parvulum</i>	(Kütz.) Kütz.	Cuboid	
<i>Gomphonemopsis</i>	Medlin	Gomphonemoid					
<i>Gomphonitzschia</i>	Grunow	Gomphonemoid					
<i>Gomphoseptatum</i>	Medlin	Gomphonemoid					
<i>Gomphosphaeria</i>	Kützing, 1836	Rotational ellipsoid		<i>lacustris</i>		Sphere	
				<i>naegeliana</i>		Sphere	
<i>Gonatozygon</i>		Cylinder					
<i>Goniochloris</i>	Geitler	Trident		<i>mutica</i>	(A. Braun) Fott 1960	Triangular prism	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Goniodoma</i>	Stein	Sphere					
<i>Goniomonas</i>	Stein	Cone + half sphere					
<i>Gonium</i>	OF Müller	Sphere					
<i>Gonoiceros</i>	H Peragallo	Elliptic cylinder					
<i>Gonyaulax</i>	Diesing	Sphere	0.75	<i>digitale</i>	(Pouchet) Kofoid 1911	Cone + half sphere	
				<i>grindleyi</i>		Triaxial ellipsoid	
				<i>polygramma</i>	Stein 1883	Cone + half sphere	
				<i>spinifera</i>	(Claparède & Lachmann) Diesing 1866	Cone + half sphere	
				<i>verior</i>	Sournia 1973	Cone + half sphere	0.75
<i>Gonyostomum</i>		Triaxial ellipsoid		<i>latum</i>	Iwan.	Cone	
				<i>semen</i>	(Ehr.) Dies.	Cone	
<i>Gossleriella</i>	Schütt	Cylinder					
<i>Gotoius</i>	Abe	Rotational ellipsoid					
<i>Grammatophora</i>	Ehr.	Elliptic cylinder					
<i>Granulocystis</i>	Hindak	Rotational ellipsoid					
<i>Granulocystopsis</i>	Hindák, 1977	Rotational ellipsoid					
<i>Guinardia</i>	H Peragallo	Cylinder					
<i>Gymnodinium</i>	Stein, 1878	Triaxial ellipsoid		<i>galatheanum</i>	Braarud 1957	Rotational ellipsoid	
				<i>vestificii</i>	Schütt 1895	2 cones	
<i>Gyrodinium</i>	Kofoid & Swezy, 1921	Triaxial ellipsoid		<i>spirale</i>	(Bergh) Kofoid & Swezy 1921	2 cones	
<i>Gyrosigma</i>	Hassall	Rhomboid prism		<i>acuminatum</i>	(Kützing) Rabenhorst 1853	Cuboid	0.7
				<i>attenuatum</i>	(Kützing) Rabenhorst 1853	Cuboid	0.7
				<i>balticum</i>	(Ehrenberg) Rabenhorst 1853	Cuboid	0.9
				<i>eximium</i>	(Thwaites) Boyer 1927	Cuboid	0.9

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>macrum</i>	(W. Smith) Griffith & Henfrey 1856	Triangular prism	
				<i>strigilis</i>	(W. Smith) P.T. Cleve 1894	Cuboid	0.7
<i>Haematococcus</i>	CA Agardh	Sphere		<i>pluvialis</i>	Flot.	Rotational ellipsoid	
<i>Hafniomonas</i>	Ettl & Moestrup	Rotational ellipsoid					
<i>Halopappus</i>	Lohmann	Rotational ellipsoid					
<i>Halosphaera</i>	Schmitz	Sphere					
<i>Hannaea</i>	Patrick	Sickle shaped cylinder					
<i>Hantzschia</i>	Grunow	Cuboid					
<i>Hapalosiphon</i>	Nägeli ex Bornet et Flahault 1887	Cylinder					
<i>Haslea</i>	Simonsen	Elliptic cylinder					
<i>Hassallia</i>	Berk.	Cylinder					
<i>Helicosphaera</i>	Kamp.	Sphere					
<i>Helicotheca</i>	Ricard	Cuboid					
<i>Helladosphaera</i>	Kamp.	Sphere					
<i>Hemiaulus</i>	Heiberg	Elliptic cylinder					
<i>Hemidinium</i>	Stein	Triaxial ellipsoid					
<i>Hemidiscus</i>	Wallich	Cymbelloid					
<i>Hemiselmis</i>	Parke, 1949	Cone + half sphere					
<i>Hemitoma</i>	Skuja 1939	Rotational ellipsoid					
<i>Herdmania</i>	Dodge	Rotational ellipsoid					
<i>Heterocapsa</i>	Stein, 1883	2 cones		<i>rotundata</i>	(Lohmann) Hansen 1995	Cone + half sphere	
<i>Heterochromonas</i>		Rotational ellipsoid					
<i>Heterodinium</i>	Kofoed	2 cones					
<i>Heteroleibleinia</i>	(Geitler) Hoffmann	Cylinder					
<i>Heteronema</i>	Dujardin 1841	Elliptic cylinder		<i>hexagonum</i>	(Playf.) Skuja	Triaxial ellipsoid	
<i>Heterosigma</i>	Hada	Rotational ellipsoid		<i>akashiwo</i>	(Hada) Hada 1987	Sphere	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Heterothrix</i>	Pascher	Cylinder					
<i>Heterotrichella</i>	Reisigl	Cylinder					
<i>Hexamitus</i>	Dujardin	Triaxial ellipsoid					
<i>Hillea</i>	Schiller	Rotational ellipsoid					
<i>Histioneis</i>	Stein	Triaxial ellipsoid					
<i>Homoeothrix</i>	(Thuret) Kirchner	Cylinder					
<i>Homozygosphaera</i>	Deflandre	Sphere					
<i>Hormathonema</i>	Erceg.	Rotational ellipsoid					
<i>Hormidium</i>		Cylinder					
<i>Hormoscilla</i>	Anagn. & Kom.	Cylinder					
<i>Hormotila</i>	Borzi	Sphere					
<i>Hustedtiella</i>	Simonsen	Elliptic cylinder					
<i>Hyalodiscus</i>	Ehrenberg	Cylinder + 2 half spheres					
<i>Hyalogonium</i>	Pascher	2 cones					
<i>Hyalotheca</i>	Kützing	Cylinder					
<i>Hydrianum</i>	Rabenhorst	Triaxial ellipsoid					
<i>Hydrococcus</i>	Kützing	Rotational ellipsoid					
<i>Hydrocoleum</i>	Kützing	Cylinder					
<i>Hydrocoryne</i>	Schwabe	Cylinder					
<i>Hydrodictyon</i>	Roth	Cylinder					
<i>Hydrosera</i>	Wallich	Triangular prism					
<i>Hydrurus</i>	Agardh	Triaxial ellipsoid					
<i>Hyella</i>	Bornet & Flahault	Cylinder					
<i>Hymenomonas</i>	Stein	Rotational ellipsoid					
<i>Imantonia</i>	Reynolds	Sphere					
<i>Isactis</i>	Thuret	Cylinder					
<i>Isochrysis</i>	Parke	Rotational ellipsoid					
<i>Isocystis</i>	Borzi	Cylinder					
<i>Isoselmis</i>	Butcher	Cone + half sphere					
<i>Isthmia</i>	CA Agardh	Elliptic cylinder					
<i>Isthmochloron</i>	H. Skuja 1948	Cuboid		<i>trispinatum</i>	(W.&G.S.We st) Skuja	Elliptic cylinder	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Jaaginema</i>	Anagn. & Kom.	Cylinder					
<i>Johannesbaptistia</i>	De Toni	Rotational ellipsoid					
<i>Katablepharis</i>		Rotational ellipsoid					
<i>Katagnymene</i>	Lemm.	Cylinder					
<i>Katodinium</i>	Fott, 1857	Half cone + cut flattened ellipsoid					
<i>Kentrosphaera</i>	Borzi	Triaxial ellipsoid					
<i>Kephyrion</i>	Pascher	Rotational ellipsoid		<i>boreale</i>	Skuja	Triaxial ellipsoid	
				<i>hemisphaericum</i>	(Lack.) Conr.	Sphere	
				<i>petasatum</i>	Conr.	Sphere	
				<i>sitta</i>	Pasch.	Sphere	
<i>Kephyriopsis</i>		Rotational ellipsoid					
<i>Keratococcus</i>	Pascher	2 cones		<i>suecicus</i>	Hind. 1977	Rotational ellipsoid	
<i>Kirchneriella</i>	(Schmidle)	2 cones		<i>irregularis</i>	(G.M.Sm.) Korsh.	Rotational ellipsoid	
				<i>microscopia</i>	Nyg. 1945	Rotational ellipsoid	
				<i>subcapitata</i>	Korsh.	Rotational ellipsoid	
<i>Kofoidinium</i>	Pavillard	Sphere					
<i>Koliella</i>	Hindák 1963	2 cones					
<i>Komma</i>	Hill, 1991	Cone + half sphere					
<i>Komvophoron</i>	Anagn. & Kom.	Cylinder					
<i>Korshikoviella</i>	Silva	2 cones					
<i>Kryptoperidinium</i>	Lindemann, 1924	Sphere		<i>foliaceum</i>	(Stein) Lindemann 1924	Sphere	0.75
<i>Kyrtuthrix</i>	Ercegovic	Cylinder					
<i>Lagerheimia</i>	Chodat	Triaxial ellipsoid		<i>chodatii</i>	Bern.	Sphere	
				<i>ciliata</i>	(Lagerheim) R. Chodat 1895	Rotational ellipsoid	
				<i>citriiformis</i>	(Snow) Collins 1909	Rotational ellipsoid	
				<i>genevensis</i>	(R. Chodat) R. Chodat 1895	Rotational ellipsoid	
				<i>quadriseta</i>	(Lemm.) G.M.Sm.	Rotational ellipsoid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>subsalsa</i>	Lemmerman 1898	Rotational ellipsoid	
				<i>tetraedriensis</i>	Roll	Sphere	
				<i>wratislaviensis</i>	Schröder 1897	Rotational ellipsoid	
<i>Lagynion</i>		Sphere					
<i>Lampriscus</i>	A Schmidt	Triangular prism					
<i>Lauderia</i>	Cleve	Cylinder					
<i>Leibleinia</i>	L. Hoffmann	Cylinder					
<i>Lemmermanniella</i>	Geitler, 1942	Cylinder					
<i>Lennoxia</i>	Thomsen & Buck	Elliptic cylinder					
<i>Lepochromulina</i>	Scherffel 1911	Rotational ellipsoid					
<i>Lepocinclis</i>	Perty, 1849	Rotational ellipsoid		<i>ovum</i>	(Ehrenberg) Lemmerman 1901	Cone	
<i>Leptocylindrus</i>	Cleve	Cylinder					
<i>Leptodiscus</i>	Hertwig	Cylinder					
<i>Leptolyngbya</i>	Anagn. & Kom.	Cylinder					
<i>Leucocryptos</i>	Butcher	Cone + half sphere					
<i>Leyanella</i>	Hasle, von Stosch & Syvertsen	Elliptic cylinder					
<i>Licmophora</i>	CA Agardh	Triangular prism		<i>gracilis</i>		Gomphonemoid	
<i>Limnothrix</i>	Meffert, 1987	Cylinder					
<i>Lingulodinium</i>	D. Wall, 1967	Rotational ellipsoid					
<i>Lissodinium</i>	Matzenauer emend Carbonell-Moore	Triaxial ellipsoid					
<i>Lithocapsa</i>	Ercegovic	Rotational ellipsoid					
<i>Lithodesmium</i>	Ehrenb.	Triangular prism					
<i>Lithodiscus</i>	Ercegovic	Cylinder					
<i>Lobomonas</i>	Dangeard	Sphere		<i>ampla</i>	Pasch.	Rotational ellipsoid	
<i>Lophodinium</i>	Lemm.	2 cones					
<i>Lunella</i>	Snøeijis	Half elliptic cylinder					
<i>Lutherella</i>	Pascher	Sphere					
<i>Luticola</i>	Mann	Elliptic cylinder					
<i>Lyngbya</i>	C. Agardh ex Gomont, 1892	Cylinder					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Lyngbyopsis</i>	Gardner	Cylinder					
<i>Lyrella</i>	Karajeva	Elliptic cylinder					
<i>Mallomonas</i>	Perty	Rotational ellipsoid		<i>acaroides</i>	Ruttner in Pascher 1913	Triaxial ellipsoid	
				<i>akrokomos</i>	Ruttner in Pascher 1913	Cone	
				<i>caudata</i>	Iwanoff 1899 emend. W. Krieger 1930	Cone + half sphere	
				<i>globosa</i>	Schill.	Sphere	
				<i>hirsuta</i>	Conr.	2 cones	
<i>Mallomonopsis</i>	Matvienko	Rotational ellipsoid					
<i>Mamiella</i>	Moestrup	Rotational ellipsoid					
<i>Mantoniella</i>	Desik.	Triaxial ellipsoid		<i>squamata</i>	(Manton & Parke) Desikachary 1972	Rotational ellipsoid	
<i>Martyana</i>	Round	Elliptic cylinder					
<i>Mastigocoeleus</i>		Cylinder					
<i>Mastogloia</i>	Thwaites	Elliptic cylinder					
<i>Melosira</i>	CA Agardh	Cylinder					
<i>Membraneis</i>	Paddock	Elliptic cylinder					
<i>Menoidium</i>		Triaxial ellipsoid					
<i>Meridion</i>	CA Agardh	Gomphonemoid					
<i>Meringosphaera</i>	Lohmann	Sphere					
<i>Merismopedia</i>	Meyen, 1839	Sphere		<i>elegans</i>	A. Braun in Kützing 1849	Rotational ellipsoid	
<i>Merotrichia</i>		Triaxial ellipsoid					
<i>Mesocena</i>	Ehrenberg	Sphere					
<i>Mesodinium</i>		Sphere					
<i>Mesoporos</i>	Lillick	Triaxial ellipsoid					
<i>Mesotaenium</i>	Naegeli, 1849	Cylinder					
<i>Meuniera</i>		Elliptic cylinder					
<i>Michaelsarsia</i>	Gran	Sphere					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Micracantha</i>	Kors.	Triaxial ellipsoid					
<i>Micractinium</i>	Fresenius	Sphere					
<i>Micranthodinium</i>		Sphere					
<i>Micrasterias</i>	C. A. Agardh Ex Ralfs, 1848	Triaxial ellipsoid		<i>furcata</i>	Ralfs	Cylinder	
<i>Microchaete</i>	Thuret	Cylinder					
<i>Microcoleus</i>	Desmaz.	Cylinder					
<i>Microcrocis</i>	P. Richter	Rotational ellipsoid					
<i>Microcystis</i>	Kützing ex Lemmermann, 1907	Sphere					
<i>Microglena</i>	Ehrenb.	Rotational ellipsoid		<i>subglobosa</i>	(Playf.) Conr.	Triaxial ellipsoid	
<i>Micromonas</i>	Manton & Parke	Rotational ellipsoid					
<i>Microspora</i>		Cylinder					
<i>Microtabella</i>	Round	Elliptic cylinder					
<i>Minidiscus</i>	Hasle	Cylinder					
<i>Minutocellus</i>	Hasle, v.Stosch & Syvertsen	Elliptic cylinder					
<i>Mischococcus</i>		Sphere					
<i>Monallantus</i>	Pascher	Rotational ellipsoid					
<i>Monas</i>		Sphere					
<i>Monochrysis</i>	Skuja	Rotational ellipsoid					
<i>Monodus</i>	Chodat	Cone + half sphere					
<i>Monomastix</i>	Scheffel	Triaxial ellipsoid					
<i>Monoraphidium</i>	Komarkova-Legnerova	2 cones		<i>circinale</i>	(Nyg) Nyg.1979	Rotational ellipsoid	
				<i>dybowskii</i>	(Wolosz.) Hind.&Kom.- Legn.	Rotational ellipsoid	
<i>Monosiga</i>		Rotational ellipsoid					
<i>Mougeotia</i>	C. Agardh, 1824	Cylinder					
<i>Muriella</i>	Boye-Peters.	Sphere					
<i>Myxobaktron</i>	Schmidle	Rotational ellipsoid					
<i>Myxohyella</i>	Geitler	Rotational ellipsoid					
<i>Myxosarcina</i>	Printz	Rotational ellipsoid					
<i>Nannochloropsis</i>		Sphere					
<i>Navicula</i>	Bory	Cuboid	0.6	<i>abrupta</i>		Elliptic cylinder	

23.01.2008

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>amphibola</i>		Rhomboid prism	
				<i>anglica</i>		Cuboid	
				<i>atomus</i>	(Kütz.) Grun.	Cuboid	
				<i>bacillum</i>	Ehr.	Cuboid	
				<i>cocconeiformis</i>	Greg.	Cuboid	
				<i>crucigera</i>		Rhomboid prism	
				<i>cryptotenella</i>	Lange-Bert.	Cuboid	
				<i>cuspidata</i>		Rhomboid prism	
				<i>digitoradiata</i>	(Gregory) Ralfs in Pritchard 1861	Elliptic cylinder	
				<i>elegans</i>		Elliptic cylinder	
				<i>exigua</i>	(Greg.) Grun.	Cuboid	
				<i>flanatica</i>		Rhomboid prism	
				<i>humerosa</i>		Elliptic cylinder	
				<i>hustedtii</i>	Krasske	Cuboid	
				<i>kotschyi</i>	Grun.	Cuboid	
				<i>lanceolata</i>		Elliptic cylinder	
				<i>lesmonensis</i>	Hustedt 1957	Cuboid	0.7
				<i>lucidula</i>	Grun.	Cuboid	
				<i>lyra</i>		Elliptic cylinder	
				<i>menisculus</i>	Schum.	Elliptic cylinder	
				<i>meniscus</i>	Schumann 1867	Cuboid	0.8
				<i>minuscula</i>	Grun.	Cuboid	
				<i>pelagica</i>	Cleve	Cuboid	
				<i>peregrina</i>		Rhomboid prism	
				<i>placentula</i>	(Ehr.) Kütz.	Rhomboid prism	
				<i>platystoma</i>	Ehrenberg 1838	Cuboid	0.8
				<i>pseudo-anglica</i>		Rhomboid prism	
				<i>pseudoscutiformis</i>	Hust.	Cuboid	

23.01.2008

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>pupula</i>		Cuboid	
				<i>pygmaea</i>		Elliptic cylinder	
				<i>radiosa</i>	Kütz.	Rhomboid prism	
				<i>reinhardtii</i>	(Grunow) Grunow in Cleve & Möller 1877	Elliptic cylinder	
				<i>rhynchocephala</i>	Kützing 1844	Triangular prism	
				<i>scutelloides</i>		Elliptic cylinder	
				<i>septentrionalis</i>		Cuboid	
				<i>spicula</i>	(Hickie) Cleve	Cuboid	
				<i>subtilissima</i>	Cleve	Cuboid	
				<i>transitans</i>		Rhomboid prism	
				<i>tripunctata</i>	(O.F. Müller) Bory 1822	Cuboid	0.8
				<i>tuscula</i>	(Ehr.) Kütz.	Cuboid	
				<i>vanhoeffeni</i>	Gran, 1897	Cuboid	0.8
				<i>vanhoeffenii</i>	Gran 1897	Cuboid	0.8
				<i>variostrata</i>	Krasske	Cuboid	
				<i>viridula</i>	Kütz.	Elliptic cylinder	
<i>Neidium</i>	Pfitzer	Elliptic cylinder		<i>affine</i>	(Ehr.) Pfitzer	Cuboid	
				<i>bisulcatum</i>	(Lagerstedt) Cleve	Cuboid	
				<i>hitchcockii</i>	(Ehr.) Cleve	Cuboid	
<i>Nematodinium</i>	kofoed & Swezy	Triaxial ellipsoid					
<i>Nematoradaisia</i>	Geitler	Rotational ellipsoid					
<i>Neochloris</i>	Starr	Sphere					
<i>Neodenticula</i>	Akiba & Yanagisawa	Elliptic cylinder					
<i>Neonema</i>	Pascher	Cylinder					
<i>Nephrochlamys</i>	Kors.	Rotational ellipsoid					
<i>Nephrodiella</i>	Pascher	Rotational ellipsoid					
<i>Nephroselmis</i>	Stein	Rotational ellipsoid		<i>olivacea</i>	Stein Em.Moestrup & Ettl	Elliptic cylinder	
				<i>pelagica</i>		Sphere	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
Netrium	(Naegeli) Itzigsohn and Rothe	Rotational ellipsoid					
Nitzschia	Hassall	Triangular prism		<i>acicularis</i>		Rhomboid prism	
				<i>actinastroides</i>	(Lemm.) Van Goor	Cuboid	
				<i>acula</i>	Hantzsch	Cuboid	
				<i>acuminata</i>		Rhomboid prism	
				<i>angusta</i>	Grun.	Cuboid	
				<i>brevissima</i>		Elliptic cylinder	
				<i>circumsuta</i>		Rhomboid prism	
				<i>cylindrus</i>	(Grun.) Hasle	Cuboid	
				<i>dissipata</i>	(Kütz.) Grun.	Rhomboid prism	
				<i>distans</i>		Rhomboid prism	
				<i>filliformis</i>	(W.Sm.) Hust.	Cuboid	
				<i>frigida</i>	Grunow in Cleve & Grunow 1880	Rotational ellipsoid	
				<i>gracilis</i>	Hantzsch	Cuboid	
				<i>hantzschiana</i>	Rab.	Cuboid	
				<i>intermedia</i>	Hantzsch	Rhomboid prism	
				<i>kuetzingiana</i>	Hilse	Cuboid	
				<i>levidensis</i>		Rhomboid prism	
				<i>linearis</i>		Cuboid	
				<i>longissima</i>	(Brébisson in Kützing) Ralfs in Pritchard 1861	2 cones	
				<i>lorenziana</i>	Grun.	Cuboid	
				<i>navicularis</i>		Rhomboid prism	
				<i>obtusa</i>		Rhomboid prism	
				<i>palea</i>	(Kütz.) W.Sm.	Rhomboid prism	
				<i>paleacea</i>	(Grunow) Grunow in Van Heurck	Rotational ellipsoid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
					1881		
				<i>punctata</i>		Rhomboid prism	
				<i>sigma</i>	(Kütz.) W.Sm.	Rhomboid prism	
				<i>sigmoidea</i>	(Nitzsch) W. Smith 1853	Cuboid	
				<i>spathulata</i>		Rhomboid prism	
				<i>subcapitellata</i>		Rhomboid prism	
				<i>tryblionella</i>		Rhomboid prism	
				<i>vermicularis</i>	(Kütz.) Grun.	Cuboid	
				<i>vitrea</i>	Norman 1861	Cuboid	0.9
<i>Noctiluca</i>	Suriray, 1836	Sphere					
<i>Nodularia</i>	Mertens ex Bornet et Flahault, 1886	Cylinder					
<i>Nostoc</i>	Vaucher	Cylinder					
<i>Notosolenus</i>		Triaxial ellipsoid					
<i>Oblea</i>	Balech ex Loeblich Jr. & Loeblich III, 1966	Sphere		<i>rotunda</i>	(Lebour) Balech ex Sournia 1973	Sphere	0.9
<i>Ochromonas</i>	Wyssotski	Sphere		<i>aspera</i>	Playf.	Rotational ellipsoid	
				<i>coronifera</i>	Matv.	Rotational ellipsoid	
				<i>crenata</i>	Klebs	Rotational ellipsoid	
				<i>minuscule</i>	Conr.	Rotational ellipsoid	
				<i>pallida</i>	Korsh.	Rotational ellipsoid	
<i>Octatis</i>	Schiller	Sphere					
<i>Odontella</i>	CA Agardh	Elliptic cylinder		<i>rhombus</i>		Rhomboid prism	
<i>Oedogonium</i>		Cylinder					
<i>Olisthidiscus</i>	Carter	Rotational ellipsoid					
<i>Oltmannsia</i>	Schiller	Rotational ellipsoid					
<i>Oltmannsiella</i>	Zimmermann	Rotational ellipsoid					
<i>Oltmannsiellopsis</i>	Chihara & inouye	Rotational ellipsoid					
<i>Onkonema</i>	Geitler	Rotational ellipsoid					
<i>Oocystis</i>	Braun	Rotational ellipsoid					

23.01.2008

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Oodinium</i>	Chatton	Triaxial ellipsoid					
<i>Oolithotus</i>	Reinhardt	Sphere					
<i>Opephora</i>	Petit	Elliptic cylinder					
<i>Ophiaster</i>	Gran emend Manton & Oakes	Rotational ellipsoid					
<i>Ophiocytium</i>	Naegeli	Cylinder					
<i>Ornithocercus</i>	Stein	Half sphere					
<i>Orthoseira</i>	Thwaites	Cylinder					
<i>Oscillatoria</i>	Vaucher ex Gomont, 1892	Cylinder					
<i>Ostreopsis</i>	Schmidt	Triaxial ellipsoid					
<i>Oxophysis</i>	Kofoed	2 cones					
<i>Oxyneis</i>	Round	Elliptic cylinder					
<i>Oxyrrhis</i>	Dujardin, 1841	Triaxial ellipsoid					
<i>Oxytoxum</i>	Stein	Rotational ellipsoid					
<i>Pachysphaera</i>	Ostenf.	Rotational ellipsoid					
<i>Palaeophalacroma</i>	Schiller	Rotational ellipsoid					
<i>Palikiella</i>	Claus	Cylinder					
<i>Palmella</i>	Lyngbye	Sphere					
<i>Palmellopsis</i>	Korschikoff	Sphere					
<i>Palmeria</i>	Greville	Cymbelloid					
<i>Palmodictyon</i>	Kützing	Sphere					
<i>Palusphaera</i>	Lecal emend Norris	Sphere					
<i>Pandorina</i>	Bory	Rotational ellipsoid		<i>morum</i>	(O.F. Müller) Bory 1824	Sphere	
<i>Pannus</i>	Hickel 1991	Sphere					
<i>Papiliocellulus</i>	Hasle, v.Stosch & Syvertsen	Elliptic cylinder					
<i>Pappomonas</i>	Manton & Oakes	Sphere					
<i>Papposphaera</i>	Tangen	Sphere					
<i>Paracapsa</i>	Naum.	Rotational ellipsoid					
<i>Parachrysidalis</i>	Hulburt	Rotational ellipsoid					
<i>Paralia</i>	Heiberg	Cylinder					
<i>Paramastix</i>	Skuja 1948	Rotational ellipsoid					
<i>Parapedinella</i>	Pedersen & Thomsen	Sphere					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Paraphysomonas</i>	de Saedeleer	Sphere					
<i>Parlibellus</i>	Cox	Elliptic cylinder					
<i>Pascherina</i>	Silva	Rotational ellipsoid					
<i>Pascherinema</i>	De Toni	Cylinder					
<i>Paulschulzia</i>		Sphere					
<i>Pavlova</i>	Butcher	Triaxial ellipsoid					
<i>Pediastrum</i>	Meyen	Cylinder					
<i>Pedinella</i>	Wyssotzky	Sphere					
<i>Pedinomonas</i>	Korschikoff	Triaxial ellipsoid					
<i>Pelagococcus</i>	Norris	Sphere					
<i>Penium</i>	De Breb.	Rotational ellipsoid					
<i>Pentapharsodinium</i>	Indelicato & Loeblich III, 1986	Cone + half sphere					
<i>Peranema</i>	F. Dujardin 1841	Triaxial ellipsoid					
<i>Peridiniella</i>	Kofoed & Michener em. Balech	Triaxial ellipsoid		<i>catenata</i>	(Levander) Balech 1977	Half sphere	
<i>Peridiniopsis</i>	Lemmermann 1904	Triaxial ellipsoid					
<i>Peridinium</i>	C.G. Ehrenberg, 1832	Cone + half sphere		<i>aciculiferum</i>	(Lemm.) Lemm.	Triaxial ellipsoid	
				<i>africanum</i>	Lemm.	Triaxial ellipsoid	
				<i>balticum</i>	(Lev.) Lemm.	Triaxial ellipsoid	
				<i>bipes</i>	Stein	Triaxial ellipsoid	
				<i>cinctum</i>	(O.F. Müller) Ehrenberg 1838	Sphere	0.8
				<i>goslaviense</i>	Wolosz.	Triaxial ellipsoid	
				<i>inconspicuum</i>	Lemmermann 1899	Triaxial ellipsoid	
				<i>lomnickii</i>	Wol.	Triaxial ellipsoid	
				<i>palatinum</i>	Laut.	Triaxial ellipsoid	
				<i>pusillum</i>	(Pen.) Lemm.	Triaxial ellipsoid	
				<i>umbonatum</i>	Stein	Triaxial ellipsoid	
				<i>volzii</i>	Lemm.	Triaxial ellipsoid	
<i>Peridiniopsis</i>	Lemm.	Triaxial ellipsoid		<i>willei</i>	Huitf.-Kaas	Triaxial ellipsoid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Periphyllophora</i>	Kamp.	Rotational ellipsoid					
<i>Perone</i>	Pascher 1932	Rotational ellipsoid					
<i>Peronia</i>	De Brebisson & Arnott	Gomphonemoid					
<i>Peroniella</i>		Sphere		<i>hyalothecae</i>	Gobi	Rotational ellipsoid	
				<i>planctonica</i>	G.M.Sm.	Rotational ellipsoid	
<i>Petalomonas</i>		Triaxial ellipsoid					
<i>Petalonema</i>	Berk.	Cylinder					
<i>Petrodyction</i>	Mann	Elliptic cylinder					
<i>Phacotus</i>	Perty	Triaxial ellipsoid		<i>glaber</i>	Playf.	Rotational ellipsoid	
<i>Phacus</i>	Dujardin	Triaxial ellipsoid					
<i>Phaeaster</i>	(Scheffel) Bourelly	Triaxial ellipsoid					
<i>Phaeobotrys</i>	Ettl	Sphere					
<i>Phaeocystis</i>	Lagerheim	Sphere		<i>globosa</i>	Scherffel 1899	Sphere	0.9
<i>Phaeodactylum</i>	Bohlin	Half elliptic cylinder					
<i>Phalacroma</i>	Stein	Triaxial ellipsoid					
<i>Pheopolykrikos</i>	Chatton em. Mats. & Fuk.	Triaxial ellipsoid					
<i>Phormidium</i>	Kützing ex Gomont, 1892	Cylinder					
<i>Pilgeria</i>	Schmidle	Rotational ellipsoid					
<i>Pinnularia</i>	Ehrenberg	Cuboid					
<i>Placoma</i>	Schousboe	Rotational ellipsoid					
<i>Placoneis</i>	Mereschk.	Elliptic cylinder					
<i>Plagiodiscus</i>	Jurilj	Half elliptic cylinder					
<i>Plagiogramma</i>	Greville	Elliptic cylinder					
<i>Plagiogrammopsis</i>	Hasle, von Stosch & Syvertsen	Rhomboid prism					
<i>Plagioselmis</i>	Hill, 1990	Cone + half sphere					
<i>Plagiotropis</i>	Pfitzer	Elliptic cylinder					
<i>Planctococcus</i>	O. Korshikov 1953	Sphere					
<i>Planctonema</i>	W. Schmidle, 1903	Rotational ellipsoid		<i>lauterbornii</i>	Schmidle	Cylinder	
<i>Planktolyngbya</i>	Anagnostidis & Komárek, 1988	Cylinder					
<i>Planktoniella</i>	Schütt	Cylinder					
<i>Planktosphaeria</i>	GM Smith	Sphere					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Planktothrix</i>	Anagnostidis & Komárek, 1988	Cylinder					
<i>Planophila</i>	Gerneck	Cone + half sphere					
<i>Platychrysis</i>	Geitler	Cylinder					
<i>Platymonas</i>		Triaxial ellipsoid					
<i>Plectonema</i>	Thuret	Cylinder					
<i>Pleodorina</i>	Shaw	Sphere					
<i>Pleromonas</i>	Pascher	Rotational ellipsoid					
<i>Pleurocapsa</i>	Thuret	Cylinder					
<i>Pleurochloris</i>	Pascher	Sphere					
<i>Pleurochrysis</i>	Pringsh. emend Gayral & Fresnel	Sphere					
<i>Pleurosigma</i>	W Smith	Rhomboid prism					
<i>Pleurosira</i>	Trevisan	Elliptic cylinder					
<i>Pleurotaenium</i>	(Naegeli) Kützing	Cylinder					
<i>Podocapsa</i>	Ercegovic	Rotational ellipsoid					
<i>Podocystis</i>	JW Bailey	Elliptic cylinder					
<i>Podohedra</i>	Düringer	2 cones					
<i>Podolampas</i>	Stein	Cone					
<i>Podosira</i>	Ehrenberg	Cylinder + 2 half spheres					
<i>Polyblepharides</i>	Dang.	Cone					
<i>Polyedriopsis</i>	Schmidle 1899	Elliptic cylinder					
<i>Polykrikos</i>	Bütschli, 1873	Triaxial ellipsoid		<i>schwartzii</i>	Bütschli 1873	Cylinder	
<i>Polytoma</i>		Rotational ellipsoid					
<i>Pontosphaera</i>	Lohm.	Sphere					
<i>Porosira</i>	E Jörgensen	Cylinder					
<i>Porphyrosiphon</i>	Kütz.	Cylinder					
<i>Prasinocladus</i>	Kuck.	Rotational ellipsoid					
<i>Preperidinium</i>	Mangin, 1913	Triaxial ellipsoid					
<i>Proboscia</i>	Sundström	Cylinder					
<i>Prochlorotrix</i>		Cylinder					
<i>Progonia</i>	Schrader	Elliptic cylinder					
<i>Promatodinium</i>	Cachon & Cachon-Enjumet	Sphere					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Pronoctiluca</i>	Fabre-Domergue, 1889	Rotational ellipsoid		<i>pelagica</i>	Fabre-Domergue 1889	Triaxial ellipsoid	
<i>Prorocentrum</i>	C.G. Ehrenberg, 1834	Triaxial ellipsoid		<i>balticum</i>	(Lohmann) Loeblich III 1970	Sphere	0.9
				<i>minimum</i>	(Pavillard) Schiller 1933	Cone	0.9
<i>Proschkinia</i>	Karayeva	Elliptic cylinder					
<i>Protaspis</i>	Skuja	Triaxial ellipsoid					
<i>Proterendothrix</i>	W & GS West	Cylinder					
<i>Proterothropsis</i>	Kofoed et Swezy 1920	Rotational ellipsoid		<i>vigilans</i>	Marshall 1926	Triaxial ellipsoid	
<i>Protoceratium</i>	Bergh, 1881	Sphere		<i>reticulatum</i>	(Claparède & Lachmann) Bütschli 1885	Sphere	0.9
<i>Protoperdinium</i>	Bergh, 1882	Cone + half sphere	0.75	<i>achromaticum</i>	(Levander) Balech 1974	Sphere	0.9
				<i>bipes</i>	(Paulsen) Balech 1974	Half cone	
				<i>breve</i>	(Paulsen) Balech 1974	Sphere	0.9
				<i>brevipes</i>	(Paulsen) Balech 1974	Cone + half sphere	
				<i>cerasus</i>		Sphere	
				<i>claudicans</i>	(Paulsen) Balech 1974	Cone + half sphere	
				<i>conicoides</i>	(Paulsen) Balech 1973	Cone + half sphere	
				<i>conicum</i>	(Gran) Balech 1974	Cone + half sphere	
				<i>curtipes</i>		Cone + half sphere	
				<i>curvipes</i>	(Ostenfeld) Balech 1974	Cone + half sphere	
				<i>denticulatum</i>	(Gran & Braarud) Balech 1974	Triaxial ellipsoid	0.8
				<i>depressum</i>	(J.W. Bailey) Balech 1974	Cone + half sphere	0.8
				<i>divergens</i>	(Ehrenberg) Balech 1974	Cone + half sphere	0.8

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>excentricum</i>		Triaxial ellipsoid	
				<i>granii</i>	(Ostenfeld) Balech 1974	Cone + half sphere	0.8
				<i>leonis</i>	(Pavillard) Balech 1974	2 cones	0.7
				<i>longispinum</i>	(Kofoid) Balech 1974	Cone + half sphere	0.8
				<i>marielebourae</i>		Cone + half sphere	
				<i>minutum</i>	(Kofoid) Loeblich III 1969	Sphere	0.8
				<i>nudum</i>		Cone + half sphere	
				<i>oblongum</i>	(Aurivillius) Parke & Dodge in Parke & Dixon 1976	Cone + half sphere	0.8
				<i>ovatum</i>		Triaxial ellipsoid	
				<i>pallidum</i>	(Ostenfeld) Balech 1973	Cone + half sphere	0.8
				<i>pentagonum</i>	(Gran) Balech 1974	2 cones	0.7
				<i>punctulatum</i>		Cone + half sphere	
				<i>pyriforme</i>	(Paulsen) Balech 1974	Cone + half sphere	
				<i>thorianum</i>	(Paulsen) Balech 1973	Rotational ellipsoid	0.8
<i>Provasoliella</i>	Loeblich	Rotational ellipsoid					
<i>Prymnesium</i>	Massard ex Conrad	Rotational ellipsoid		<i>parvum</i>		Cone + half sphere	
<i>Psammodictyon</i>	Mann	Elliptic cylinder					
<i>Psammodiscus</i>	Round & Mann	Cylinder					
<i>Pseudactiniscus</i>	Bursa	Sphere					
<i>Pseudanabaena</i>	Lauterborn, 1915	Cylinder					
<i>Pseudocapsa</i>	Erceg.	Sphere					
<i>Pseudocarteria</i>	Ettl	Rotational ellipsoid					
<i>Pseudocharatium</i>	Korsikoff	Triaxial ellipsoid					
<i>Pseudogomphonema</i>	Medlin	Gomphonemoid					
<i>Pseudoguinaridia</i>	Von Stosch	Cylinder					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Pseudohimantidium</i>	Hustedt & Krasske	Cymbelloid					
<i>Pseudokephyrion</i>	(Pascher) Schmid	Rotational ellipsoid					
<i>Pseudoncobyrsa</i>	Geitler	Rotational ellipsoid					
<i>Pseudo-nitzschia</i>	H. Peragallo in H. & M. Peragallo, 1900	Cuboid	0.8	<i>delicatissima</i>	(P.T. Cleve) Heiden in Heiden & Kolbe 1928	Cuboid	0.9
				<i>fraudulenta</i>		Rhomboid prism	
				<i>multiseries</i>		Rhomboid prism	
				<i>pseudodelicatissima</i>	(Hasle) Hasle 1993	Cuboid	0.9
				<i>seriata</i>		Rhomboid prism	
<i>Pseudopedinella</i>	Carter	Sphere					
<i>Pseudophormidium</i>	(Forti) Anagnostidis & Komarek	Cylinder					
<i>Pseudopolyedriopsis</i>	Gollerbach 1962	Elliptic cylinder					
<i>Pseudoscourfielda</i>	Manton	Triaxial ellipsoid					
<i>Pseudoscourfieldia</i>		Triaxial ellipsoid					
<i>Pseudoscytonema</i>	Elenk.	Cylinder					
<i>Pseudosolenia</i>	Sundström	Cylinder					
<i>Pseudostaurastrum</i>	Chodat	2 tetrahedrons		<i>enorme</i>	(Ralfs) Chod.	Trident	
				<i>hastatum</i>	(Reinsch) Chod.	Trident	
				<i>planctonicum</i>	(G.M.Sm.) Chod.	Trident	
<i>Pseudotriceratium</i>	Grunow	Triangular prism					
<i>Pteromonas</i>	Seligo	Triaxial ellipsoid					
<i>Pteroncola</i>	Holmes & Croll	Elliptic cylinder					
<i>Pterosperma</i>	Pouchet	Sphere					
<i>Ptychodiscus</i>	Stein	Rotational ellipsoid					
<i>Punctastriata</i>	Williams & Round	Elliptic cylinder					
<i>Pycnococcus</i>	Guillard	Sphere					
<i>Pyramichlamys</i>	Ettl	Triaxial ellipsoid					
<i>Pyramidochrysis</i>	Pascher	Cone					
<i>Pyramidomonas</i>		Rotational ellipsoid					
<i>Pyramimonas</i>	Schm.	Cone		<i>orientalis</i>	Butch.	Rotational ellipsoid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>virginica</i>	Pennick 1977	Rotational ellipsoid	
<i>Pyrobotrys</i>	Arnoldi	Rotational ellipsoid					
<i>Pyrocystis</i>	Murray	Monoraphidioid					
<i>Pyrodinium</i>	Plate	Triaxial ellipsoid					
<i>Pyrophacus</i>	Stein	Triaxial ellipsoid		<i>horologicum</i>	Stein 1883	Triaxial ellipsoid	0.8
<i>Quadrichloris</i>	Fott	Rotational ellipsoid					
<i>Quadricoccus</i>	Fott	Rotational ellipsoid					
<i>Quadrigula</i>	Printz	Cylinder + cone					
<i>Raciborskiella</i>	Wisl.	Cone + half sphere					
<i>Radaisia</i>	Sauv.	Cylinder					
<i>Radaisiella</i>	Geitler	Cylinder					
<i>Radiocystis</i>	H. Skuja, 1948	Rotational ellipsoid					
<i>Radiosphaera</i>	Snow	Sphere					
<i>Raphidiopsis</i>	Fritsch & Rich	Cylinder					
<i>Raphidocelis</i>	Hindak	2 cones		<i>arcuata</i>	(G.M.Sm.) Marvan,Kom &Comas	Rotational ellipsoid	
				<i>danubiana</i>	(Hind.) Marvan,Kom &Comas	Rotational ellipsoid	
<i>Reimeria</i>	Kociolek & Stoermer	Elliptic cylinder					
<i>Resultor</i>	Moestrup	Sphere					
<i>Rhabdoderma</i>	Schmidle & Lauterborn, 1900	Cylinder					
<i>Rhabdogloea</i>	Schröder	2 cones		<i>linearis</i>	(Geitl.) Kom.	Rotational ellipsoid	
<i>Rhabdomonas</i>		Triaxial ellipsoid					
<i>Rhabdosphaera</i>	Haeckel	Sphere					
<i>Rhaphoneis</i>	Ehrenberg	Elliptic cylinder					
<i>Rhinomonas</i>	Hill & Wetherbee	Cone + half sphere					
<i>Rhizochrysis</i>	Pascher 1913	Rotational ellipsoid					
<i>Rhizosolenia</i>	Ehrenb.	Cylinder		<i>delicatula</i>	Cleve	Elliptic cylinder	
				<i>eriensis</i>	H.L.Sm.	Elliptic cylinder	
				<i>fragillissima</i>	Berg	Elliptic cylinder	
				<i>longiseta</i>	Zach.	Elliptic cylinder	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Rhodomonas</i>	Karston, 1898	Cone + half sphere					
<i>Rhodostichon</i>	Geitler & Pascher	Rotational ellipsoid					
<i>Rhoicosphenia</i>	Grunow	Gomphonemoid		<i>abbreviata</i>	(C.A. Agardh) Lange-Bertalot 1980	Triangular prism	
<i>Rhoikoneis</i>	Grunow	Elliptic cylinder					
<i>Rhopalodia</i>	O Müller	Cymbelloid		<i>gibba</i>	(Ehr.) O.Müll.	Cuboid	
<i>Rhynchomonas</i>	Klebs 1892	Rotational ellipsoid					
<i>Richelia</i>	Schmidt	Cylinder					
<i>Rivularia</i>	(Roth) Ag.	Cylinder					
<i>Romeria</i>	Koczwara in Geitler, 1932	Cylinder					
<i>Roperia</i>	Grunow	Cylinder					
<i>Roscoffia</i>	Balech	Triaxial ellipsoid					
<i>Roya</i>	West & G.S. West 1896	Cylinder					
<i>Rutilaria</i>	Greville	Elliptic cylinder					
<i>Saccochrysis</i>	Korsikov	Rotational ellipsoid					
<i>Sacconema</i>	Borzi	Cylinder					
<i>Salpingoeca</i>		Rotational ellipsoid					
<i>Sarcinochrysis</i>	Geitler	Rotational ellipsoid					
<i>Scenedesmus</i>	Meyen	Rotational ellipsoid		<i>acuminatus</i>	(Lagerheim) R. Chodat 1902	2 cones	
				<i>acutiformis</i>	Schröder 1897	2 cones	
				<i>apiculatus</i>	(W. & G.S. West) R. Chodat 1926 nom. illeg.	2 cones	
				<i>obliquus</i>	(Turpin) Kützing 1833	2 cones	
<i>Scherffelia</i>	Pascher	Rotational ellipsoid					
<i>Schilleriella</i>	Pascher	Cylinder + half sphere					
<i>Schizothrix</i>	Kützing	Cylinder					
<i>Schroederia</i>	Lemm.	2 cones					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Schroederiella</i>	Woloszynska	Triaxial ellipsoid					
<i>Schuetiella</i>	Balech	2 cones					
<i>Scotiella</i>	Fritsch	Rotational ellipsoid					
<i>Scotiellopsis</i>	Vinatzer	Rotational ellipsoid					
<i>Scourfieldia</i>	G.S. West	Triaxial ellipsoid					
<i>Scrippsiella</i>	Balech ex A.R. Loeblich III, 1965	Cone + half sphere		<i>hangoei</i>	(Schiller) Larsen in Larsen et al. 1995	Rotational ellipsoid	
<i>Scyphosphaera</i>	Lohm.	Sphere					
<i>Scytonema</i>	Agardh	Cylinder					
<i>Scytonemopsis</i>	Kisel.	Cylinder					
<i>Selenastrum</i>	Reinsch, 1867	2 cones					
<i>Selenochloris</i>	Pascher	2 cones					
<i>Seminavis</i>	Mann	Cymbelloid					
<i>Semiorbis</i>	Patrick	Sickle shaped cylinder					
<i>Sheshukovia</i>	Glezer	Triangular prism					
<i>Siderocelis</i>	(Naumann) Fott	Rotational ellipsoid					
<i>Siderocoelis</i>		Rotational ellipsoid					
<i>Siderocystopsis</i>		Rotational ellipsoid					
<i>Sinaiella</i>	Gruia	Cylinder					
<i>Sinophysys</i>	Nie & Wang	Triaxial ellipsoid					
<i>Siphonema</i>	Geitler	Cylinder					
<i>Sirocoleum</i>	Kützing	Cylinder					
<i>Skeletonema</i>	Greville	Cylinder					
<i>Snowella</i>	Elenkin 1938	Sphere		<i>fennica</i>	J. Komárek & J. Komárková- Legnerová 1992	Rotational ellipsoid	
				<i>lacustris</i>	(Chodat) Komárek & Hindák 1988	Rotational ellipsoid	
<i>Sokolovia</i>	Elenk.	Cylinder					
<i>Solentia</i>	Erceg.	Rotational ellipsoid					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Sorastrum</i>	Kützing	Cylinder + cone					
<i>Spatulodinium</i>	Cachon & Cachon	Triaxial ellipsoid					
<i>Spermatozopsis</i>	Korshikov 1913	Triaxial ellipsoid					
<i>Sphaerapsis</i>	Schiller	Sphere					
<i>Sphaerellopsis</i>	Korschikoff	Sphere		<i>gloeocystiformis</i>		Rotational ellipsoid	
<i>Sphaerocalyptra</i>	Defl.	Sphere					
<i>Sphaerocystis</i>	Chodat	Sphere					
<i>Sphaerodinium</i>	Woloszynska	Triaxial ellipsoid					
<i>Sphaleromantis</i>	Pascher	Cone					
<i>Spiniferomonas</i>		Sphere					
<i>Spiraulax</i>	Kofoed	2 cones					
<i>Spirogyra</i>	Link	Cylinder					
<i>Spiromonas</i>	Dujardin	Cone + half sphere					
<i>Spirotaenia</i>	Brebisson Ex Ralfs, 1848	Rotational ellipsoid					
<i>Spirulina</i>	Turpin ex Gomont, 1892	Cylinder					
<i>Spongiococum</i>	Deason	Sphere					
<i>Spumella</i>	Cienkowski	Cone + half sphere					
<i>Stanieria</i>	Komarek & Anagnostidis	Sphere					
<i>Starria</i>	Lang	Cylinder					
<i>Staurostrum</i>	Meyen	2 tetrahedrons		<i>anatinum</i>	Cooke&Wills	Staurostrum shape	
				<i>arachne</i>	Ralfs	Staurostrum shape	
				<i>arctiscon</i>	(Ehr.) Lund.	Staurostrum shape	
				<i>boreale</i>	W.&G.S.West	Staurostrum shape	
				<i>brachiatum</i>	Ralfs	Staurostrum shape	
				<i>bullardii</i>	G.M.Sm.	Staurostrum shape	
				<i>cerastes</i>	Lund.	Staurostrum shape	
				<i>chaetoceras</i>	(Schröd.) G.M.Sm.	Staurostrum shape	
				<i>cingulum</i>	(W.&G.S.West) G.M.Sm.	Staurostrum shape	
				<i>cyrtocentrum</i>	Bréb.	Staurostrum shape	
				<i>disputatum</i>	W.&G.S.West	Staurostrum shape	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>elongatum</i>	Barker	Staurastrum shape	
				<i>furcigerum</i>	Breb.	Staurastrum shape	
				<i>inconspicuum</i>	Nordst.	Staurastrum shape	
				<i>longipes</i>	(Nordst.) Teil.	Staurastrum shape	
				<i>luetkemuelleri</i>	Donat&Ruttn .	Staurastrum shape	
				<i>manfeldtii</i>	Delp.	Staurastrum shape	
				<i>ophiura</i>	Lund.	Staurastrum shape	
				<i>pelagicum</i>	W.&G.S.Wes t	Staurastrum shape	
				<i>pingue</i>	Teil.	Staurastrum shape	
				<i>planctonicum</i>	Teil.	Staurastrum shape	
				<i>polymorphum</i>	Bréb.	Staurastrum shape	
				<i>pseudopelagicum</i>	W.&G.S.Wes t	Staurastrum shape	
				<i>sebaldi</i>	Reinsch	Staurastrum shape	
				<i>setigerum</i>	Cleve	Staurastrum shape	
				<i>sexangulare</i>	(Bulnh.) Lund.	Staurastrum shape	
				<i>smithii</i>	(G.M.Sm.) Teil.	Staurastrum shape	
				<i>tetracerum</i>	(Kütz.) Ralfs	Staurastrum shape	
				<i>tohopekaligense</i>	Wolle	Staurastrum shape	
				<i>vestitum</i>		Staurastrum shape	
<i>Staurodesmus</i>	Teiling 1948	Staurastrum shape					
<i>Stauroneis</i>	Ehrenberg	Elliptic cylinder		<i>anceps</i>	Ehr.	Cuboid	
				<i>smithii</i>	Grun.	Cuboid	
<i>Staurophora</i>	Mereschk.	Elliptic cylinder					
<i>Stauroopsis</i>	Meunier	Elliptic cylinder					
<i>Staurosira</i>	(Ehrenberg) Williams & Round	Cuboid					
<i>Staurosirella</i>	Williams & Round	Elliptic cylinder					
<i>Stellexomonas</i>		Rotational ellipsoid					
<i>Stellarima</i>	Hasle & Sims	Cylinder					
<i>Stenokalyx</i>		Rotational ellipsoid					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Stenopterobia</i>	De Breb.	Cuboid					
<i>Stephanodiscus</i>	Ehr.	Cylinder					
<i>Stephanopyxis</i>	(Ehrenberg) Ehrenberg	Cylinder					
<i>Stichococcus</i>		Cylinder					
<i>Stichogloea</i>		Rotational ellipsoid					
<i>Stichosiphon</i>	Geitler	Cylinder					
<i>Stictocyclus</i>	A Mann	Cylinder					
<i>Stictodiscus</i>	Greville	Cylinder					
<i>Stigeoclonium</i>		Cylinder					
<i>Stipitococcus</i>		Rotational ellipsoid					
<i>Stokesiella</i>		Rotational ellipsoid					
<i>Streptotheca</i>	Shrubsole	Cuboid					
<i>Striatella</i>	CA Agardh	Elliptic cylinder					
<i>Strombomonas</i>		Rotational ellipsoid		<i>subcurvata</i>	(Proshk.-Lavr.) Defl.	Triaxial ellipsoid	
<i>Stylochrysalis</i>		Rotational ellipsoid					
<i>Stylodinium</i>	Klebs	Sphere					
<i>Stylosphaeridium</i>	Geitler & Gimesi 1925	Rotational ellipsoid					
<i>Surirella</i>	Turpin	Elliptic cylinder		<i>angusta</i>	Kütz.	Cuboid	
				<i>biseriata</i>	Brébisson in Brébisson & Godey 1836	Cuboid	0.8
				<i>capronii</i>	Brébisson in Kitton 1869	Elliptic cylinder	0.7
				<i>linearis</i>	W.Sm.	Cuboid	
				<i>turgida</i>	W.Sm.	Cuboid	
<i>Symbiodinium</i>	Freudenthal	Rotational ellipsoid					
<i>Symploca</i>	Kützing	Cylinder					
<i>Syncrypta</i>	Ehrenberg	Rotational ellipsoid					
<i>Synechococcus</i>	Nägeli , 1849	Sphere		<i>sigmoideus</i>	(Moore&Cart er) Kom.	Cylinder	
<i>Synechocystis</i>	Sauv.	Sphere					
<i>Synedra</i>	Ehrenberg	Elliptic cylinder		<i>acus</i>	Kütz.	Cuboid	
				<i>amphicephala</i>	Kütz.	Cuboid	

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
				<i>berolinensis</i>	Lemmerman 1900	Triangular prism	
				<i>capitata</i>	Ehr.	Cuboid	
				<i>closterioides</i>	Grun.	Cuboid	
				<i>famelica</i>	Kütz.	Cuboid	
				<i>nana</i>	Meist.	Cuboid	
				<i>parasitica</i>	(W. Smith) Hustedt 1930	Triangular prism	
				<i>pulchella</i>	Ralfs	Cuboid	
				<i>rumpens</i>	Kütz.	Cuboid	
				<i>tabulata</i>	(C.A.Ag.) Kütz.	Cuboid	
				<i>ulna</i>	(Nitzsch) Ehr.	Cuboid	
<i>Synedropsis</i>	Hasle, Medlin & Syvertsen	Elliptic cylinder					
<i>Synedrosphenia</i>	(H Peragallo) Zaragosa	Gomphonemoid					
<i>Synura</i>	Ehrenberg	Cone + half sphere		<i>petersenii</i>	Korsh.	Rotational ellipsoid	
				<i>spinosa</i>	Korsh.	Rotational ellipsoid	
<i>Syracolithus</i>	(Kamptner) Deflandre	Sphere					
<i>Syracosphaera</i>	Lohmann em Gaarder	Sphere					
<i>Tabellaria</i>	Ehrenberg	Elliptic cylinder		<i>binalis</i>	(Ehr.) Grun.	Cuboid	
				<i>fenestrata</i>	(Lyngbye) Kützing 1844	Cuboid	
<i>Tabularia</i>	Williams & Round	Triangular prism					
<i>Teilingia</i>	Bourrelly 1964	Triaxial ellipsoid					
<i>Teleaulax</i>	Hill, 1991	Cone + half sphere					
<i>Telonema</i>	Griessmann 1913	Cone + half sphere					
<i>Tesselaria</i>	Playfair	Triaxial ellipsoid					
<i>Tetmemorus</i>	Ralfs ex Ralfs 1848	Triaxial ellipsoid					
<i>Tetrachlorella</i>	Kors.	Rotational ellipsoid					
<i>Tetracyclus</i>	Ralfs	Cuboid					
<i>Tetracystis</i>	Brown & Bold	Rotational ellipsoid					
<i>Tetradesmus</i>	GM Smith	2 cones					
<i>Tetradinium</i>	Klebs 1912	Cone					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Tetraëdiella</i>	Pascher	Triangular prism					
<i>Tetraedron</i>	Kützing 1845	Tetrahedron		<i>lunula</i>	(Reinsch) Wille	2 cones	
				<i>triangulare</i>	Korsh.	Trident	
				<i>verrucosum</i>	G.M.Sm.	Trident	
<i>Tetraplektron</i>	Fott 1957	Trident					
<i>Tetrarcus</i>	Skuja	Rotational ellipsoid					
<i>Tetraselmis</i>	Stein	Rotational ellipsoid					
<i>Tetraspora</i>	Link	Sphere					
<i>Tetrasporopsis</i>	Lemm.	Sphere					
<i>Tetrastrum</i>	Chodat	Sphere					
<i>Tetratoma</i>	Bütschli	Rotational ellipsoid					
<i>Thalassioneis</i>	Round	Elliptic cylinder					
<i>Thalassionema</i>	Grun.	Elliptic cylinder		<i>nitzschioides</i>	(Grunow) Grunow ex Hustedt 1932	Cuboid	
<i>Thalassiophysa</i>	Conger	Elliptic cylinder					
<i>Thalassiosira</i>	Cleve	Cylinder					
<i>Thecadinium</i>	Kofoed & Skogsberg	Triaxial ellipsoid					
<i>Thompsodinium</i>	Bour.	Triaxial ellipsoid					
<i>Thorakomonas</i>	Korschikoff	Triaxial ellipsoid					
<i>Thorosphaera</i>	Ostenf.	Sphere					
<i>Tolypothrix</i>	Kützing	Cylinder					
<i>Torodinium</i>	Kofoed & Swezy, 1921	Rotational ellipsoid		<i>robustum</i>	Kofoed & Swezy 1921	Triaxial ellipsoid	
<i>Toxonidea</i>	Donkin	Half elliptic cylinder					
<i>Trachelomonas</i>	C.G. Ehrenberg 1835	Rotational ellipsoid		<i>aculeata</i>	Dolg.	Sphere	
				<i>conradii</i>	Skv.	Sphere	
				<i>rugulosa</i>	Stein	Sphere	
				<i>volvocina</i>	Ehrenberg 1833	Sphere	
				<i>volvocinopsis</i>	Svir.	Sphere	
<i>Trachychloron</i>	Pascher	Triaxial ellipsoid		<i>regulare</i>	Pasch.	Rotational ellipsoid	
<i>Trachydiscus</i>	Ettl	Triaxial ellipsoid					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Trachyneis</i>	Cleve	Elliptic cylinder					
<i>Trachysphenia</i>	Petit	Elliptic cylinder					
<i>Trebouxia</i>	Paymaly	Sphere					
<i>Treubaria</i>	Bernard	Sphere		<i>crassispina</i>	G.M.Sm.	Trident	
				<i>quadrispina</i>	(G.M.Sm.) Fott&Kovak	Cuboid	
				<i>setigera</i>	(Archer) G.M.Sm.	Trident	
<i>Tribonema</i>	Derbes & Solier	Cylinder					
<i>Triceratium</i>	Ehrenberg	Triangular prism					
<i>Trichodesmium</i>	Ehr.	Cylinder					
<i>Trichormus</i>	Komarek & Anagnostidis	Cylinder					
<i>Trigonaspis</i>	H.A. Thomsen 1980	Sphere					
<i>Trigonium</i>	Cleve	Triangular prism					
<i>Triploceras</i>		Cylinder					
<i>Trochiscia</i>		Sphere					
<i>Tryblionella</i>	W Smith	Elliptic cylinder					
<i>Tubiella</i>	Hollerb.	Rotational ellipsoid					
<i>Tychonema</i>	K. Anagnostidis et J. Komárek, 1988	Cylinder					
<i>Ulothrix</i>		Cylinder					
<i>Umbellosphaera</i>	Paasche	Sphere					
<i>Umbilicosphaera</i>	Lohm.	Sphere					
<i>Undatella</i>	Paddock & Sims	Half elliptic cylinder					
<i>Uroglena</i>	Ehrenb.	Sphere		<i>americana</i>	C.G. Ehrenberg 1834	Triaxial ellipsoid	
				<i>gracilis</i>	(Korsh.) Bourr.	Rotational ellipsoid	
				<i>soniaca</i>	Conr.	Rotational ellipsoid	
				<i>volvox</i>	Ehr.	Rotational ellipsoid	
<i>Urosolenia</i>	Round & Crawford	Cylinder					
<i>Vacuolaria</i>		Triaxial ellipsoid					
<i>Vischeria</i>	Pascher	Sphere					
<i>Volvox</i>	(L.) Ehrenb.	Sphere					

Recommended geometric shapes				Note the following Species differ			
Genus	Author	Geometric shape	Volume correction factor	Species	Author	Geometric shape	Volume correction factor
<i>Warnowia</i>	Lindemann	Rotational ellipsoid					
<i>Westella</i>	De Wildermann, 1897	Sphere					
<i>Willea</i>	Schmidle, 1900	Rotational ellipsoid					
<i>Wollea</i>	Bornet & Flahault	Cylinder					
<i>Woloszynskia</i>	Thompson	Triaxial ellipsoid					
<i>Wolskyella</i>	Claus	Rotational ellipsoid					
<i>Woronichinia</i>	Elenkin, 1933	Rotational ellipsoid					
<i>Xenococcus</i>	Thuret	Rotational ellipsoid					
<i>Zygabikodinium</i>	Loeblich Jr. & Loeblich III 1970	Triaxial ellipsoid					
<i>Zygnema</i>	CA Agardh	Cylinder					
<i>Zygosphaera</i>	Kamptner	Sphere					

Annex C

(informative)

Carbon content calculation

Organic carbon is a main component of organisms. It is the energy source transported along the food chains and therefore an important basis for food web modelling. The carbon content of the phytoplankton should be calculated from the biovolume:

$$\text{Carbon content}_{\text{taxon}} [\text{pg C cell}^{-1}] = 0.216 * (\text{Biovolume}_{\text{taxon}} [\text{mm}^3/\text{l}])^{0.939}$$

NOTE:

Diatoms require a particular formula because of their lower specific carbon content. The formulas by Menden-Deuer and Lessard (2000) take the decrease in specific carbon content with cell size into account and calculate the carbon content of diatoms directly from the biovolume without plasmavolume calculation.

$$\text{Carbon content}_{\text{diatom taxon}} [\text{pg C cell}^{-1}] = 0.288 * (\text{Biovolume}_{\text{diatom taxon}} [\text{mm}^3/\text{l}])^{0.811}$$

The calculation of the carbon content is non-obligatory, but if executed it has to be done according to the given formulas.

Sometimes colony forming taxa have to be counted in cell aggregates. In these cases it has to be distinguished between counting of cell packages (e.g. 100 cells of *Microcystis*) and filaments (e.g. 100 µm pieces of *Nodularia*). In filaments, the cell length has to be known. For these both special cases the carbon content has to be calculated by the following formulas:

For multi-cell colonies:

$$\text{Carbon content} [\text{pg C counting unit}^{-1}] = 0.216 * \text{CPU} * (\text{VCU}/\text{CPU})^{0.939}$$

For filaments:

$$\text{Carbon content} [\text{pg C counting unit}^{-1}] = 0.216 * \text{LCU}/\text{CL} * (\text{VCU} * \text{CL}/\text{LCU})^{0.939}$$

VCU: volume of counting unit [µm³]

CPU: number of cells per counting unit

CL: cell length [µm]

LCU: length of counting unit (mostly 100 µm) [µm]

References:

HELCOM, 1988: Guidelines for Baltic Monitoring Programme for the third stage. Part D. Biological determinands. Baltic Sea Environment Proceedings No. 27 D.

MENDEN-DEUER, S. and E.J. LESSARD, 2000. Carbon to volume relationships for dinoflagellates, diatoms and other protist plankton. *Limnol. Oceanogr.* 45: 569-579.