GLOBAL JOURNAL OF PURE AND APPLIED SCIENCES VOL. 8, NO. 2, MARCH 2002:223 - 237
COPYRIGHT(C) BACHUDO SCIENCE CO. LTD. PRINTED IN NIGERIA. ISSN 1118-0579

A CHECKLIST OF DESMIDS IN NIGERIA

M. O. KADIRI

(Received 20 March 2000; Revision accepted 12 November 2001)

ABSTRACT

The paper presents a checklist of diversity and distribution of desmid flora in Nigeria. Samples of desmids were collected by means of 55-micrometer mesh plankton net from different locations. There was a high diversity of desmids. A total of 478 taxa are listed in this report. These are categorized into 27 genera, 273 species, 176 varieties and 29 forma. Five of the genera belong to saccoderm desmids while 22 are placoderm desmids. Of all the genera, *Cosmarium* was dominant with 91 taxa, followed by *Closterium* with 84 taxa and *Staurastrum* with 83 taxa. The cosmopolitan taxa were *Closterium lunula, Cl. setaceum, Cosmarium monodii, Desmidium swartzii* and *Pleurotaenium trabecula.*

KEY WORDS: Taxonomy, desmids, phytogeography, tropics

INTRODUCTION

Desmids are typically freshwater and very attractive algae characteristic of acidic and nutrient-poor aquatic ecosystems. They belong to the division Chlorophyta and order Zygnematales. There are two types of desmids- the true desmids also called placcoderm desmids and false desmids or saccoderm desmids. While the former have symmetrical semicells at a median incision called isthmus, with cell in two parts and wall perforated by pores, the latter are short cylindrical smooth-walled lacking pores and median constriction. The roles of desmids are

a) contributing to the food supply of aquatic animals

b) primary producers in the aquatic environment

c) indicators of trophic status and pollution since they have a low tolerance for inorganic salts

Desmids have attracted the attention of microscopists because they exhibit great diversity in their external morphology as well as show remarkably complex cell symmetry making them of great natural beauty and aesthetic appeal. Distributional studies are very valuable for comparative purposes as well as providing a springboard for future work. This paper is considered very important for the following reasons:

a) distributional studies are rare generally ; this is the first of its kind in Nigeria

b) desmids constitute the dominant flora of all groups of algae in the 'wetter' part of Africa

c) not much of such studies have been done in the West African subregion These group of flora have been studied in various part of the world such as U.S.A.(Scott and Gronblad 1957, Prescott *et al* 1972,1977, 1981, Bland and Brook 1974),Britain (Lind and Brook 1980, Brook and Williamson 1991),Poland(Tomaszewicz and Kowalski 1993, Tomaszewicz 1994) Pakistan (Islam 1970), Iraq (Islam and Haroon 1985) , Japan (Kayamura 1967), Malaya (Prowse 1957), Indonesia (Scott and Prescott 1961), Bangladesh(Islam, 1975, Islam and Haroon, 1980) New Zealand (Thomasson 1972), Netherlands (Coesel, 1983), Germany (Ruizicka 1977,1981), Brazil (Scott *et al* 1965).In Africa, are Sudan (Gronblad *et* al (1958, Gronblad 1962) Chad (Compere 1977), Namibia (Gronblad and Croasdale 1971), Kenya (Lind 1967,1968), Uganda (Gronblad *et al* 1964,Lind 1971), Sierra-Leone (Gronblad *et al* 1968, Gerrath and Denny 1988, 1989, Alfinito and Mazzon 1986, Alfinito *et al* 1989, Ricci *et al* 1990), Ghana (Gerrath and John 1988, 1991), South Africa (Williamson 1995,1999) . However in Nigeria, desmids studies are very few and these include Khan (1984) in Jos, (Kadiri 1988,1993a,b, 1996), Kadiri and Opute 1989) in Ikpoba reservoir, Opute (1992) in Warri/Forcados estuary and Nwankwo (1996) in freshwater swamps of the eastern Niger Delta.

However comprehensive lists exist elsewhere, for instance Woodhead and Tweed (1958, 1960) produced checklist of West African algae. Hartley (1986) provided checklist of British freshwater, brackishwater and marine diatoms

M. O. KADIRI, Department of Botany, University of Benin, Benin City, Nigeria

TAXONOMIC LIST

	A	B	C	CA	E	G	I	Ik	J_1	J_2	K	L	LC	N	O	S	W
Family **Gonatozygonaceae**																	
Genus ***Genicularia*** De Bary																	•
Genicularia elegans W. & G. S. West																•	
Genicularia spirotaenia De Bary																	
Genus ***Gonatozygon*** De Bary																	
Gonatozygon De Bary																	
G. aculeatum Hastings								•			•		•				•
G. kinahani (Arch.) Rabh.				•													
G. kinahani var. *interruptum* Forster																	•
G. kinahani (Arch.) Rabh. var. *minor* Forster																	•
G. monotaenium De Bary									•	•			•			•	•
G. monotaenium De Bary var. *angustum* Forster																	•
G. pilosum Wolle				•													
Family **Mesotaeniaceae**																	
Genus ***Ancyclonema***																	
Ancyclonema nordenskiodii Bergi																•	
Genus ***Cylindrocystis*** (Menegh.) Ralfs																	
Cylindrocystis brebissonii Menegh.ex (Ralfs) De Bary	•			•			•						•				•
Cylindrocystis ovalis Turn.	•																
Genus ***Mesotaenium*** Näegeli																	
M. kramstai Lemm.							•										
Genus ***Netrium*** (Nageli) Itzigs. & Rothe																	
Netrium digitus (Ehr.) Itzigs. & Rothe	•		•	•											•	•	
N. digitus var. *lamellosum* (Bréb.) Grönbl.							•										•
N. oblongum De Bary							•										
Genus ***Spirotaenia*** (Bréb.) Ralfs																	
Spirotaenia condensata Bréb.				•			•										
S. brebisonii Menegh																•	
S. crassa De Bary																	
Family **Desmidiaceae**																	
Genus ***Actinotaenium*** (Nägeli) Teiling																	
Actinotaenium australe (Racib.) Croasd.							•										
A. capax (Joshua) Teil.				•			•	•									
A. cucurbitinum (Biss.) Teil.							•	•									
A. cucurbitinum (Biss.)Teil. var. ***cucurbitinum*** f. *maius* (W. West) Teil.																	•
A. globosum (Buln.) Forster							•	•									
A. mooreanum (Arch.) Teil. var. ***mooreanum***							•										
A. wollei (Grönbl.) Teil. var. *latius* Croasd.																	•
Genus ***Arthrodesmus*** (Ehrenberg) Ralfs																	
Arthrodesmus convergens var. *exaltata*											•						
A. convergens var. *deplanatum*											•						
A. curvatus Turn.							•										
A. heimii Bourrelly																•	•
A. longispinus Borge							•										
A. incus var. *sellatus* Teil.												•					
A. octocornus Ehr.																•	
Genus ***Bambusina*** (Kützing) Ralfs																	
Bambusina brebisonii Kütz. var. *maius* (Racib.) Croasd																	•
B. borreri										•							
B. borreri (Ralfs) Delp. var. *gracilescens* (Nordst.) Wolle																	•
Genus ***Closterium*** (Nitzsch) Ralfs																	

Closterium abruptum West &West							•					•	•				
Cl. acerosum (Schr.) Ehr. ex Ralfs				•			•						•	•		•	•
Cl. acerosum var. *angolense* W. & G. S West							•						•				
Cl. acerosum var. *elongatum* Bréb.													•			•	•
Cl. acerosum var. *minus* Hantzsch							•						•				
Cl. acerosum (Schrank) Ehr. f. *rectum*																•	
Cl. aciculare T. West													•			•	•
Cl. archerianum Cleve in Lund.							•									•	
Cl. baillyanum Bréb. in Ralfs																	•
Cl. calosporum var. *calosporum*							•						•				•
Cl. Closteriodes Kütz.		•		•			•				•						
Cl. closteriodes (Ralfs.) Louis & Peters var. *Closteriodes*							•										
Cl. closteriodes var. *intermedium* (Roy et Biss) Ruzicka							•										
Cl. commune											•						
Cl. cornu Ehr. ex Ralfs				•									•				
Cl. costatum Corda ex Ralfs											•						
Cl. costatum Corda var. *westii* Cushman							•										•
Cl. cynthia De Not.													•		•		
Cl. dianae Ehr. ex Ralfs				•			•	•					•			•	•
Cl. dianae var. *arcuatum* (Bréb.) Rabenh.																	•
Cl. dianae var. *compressum* Klebs							•										
Cl. dianae var. *dianae*							•										
Cl. dianae var. *intermedium* Kosinskaja							•										
Cl. dianae var. *minus* (Wille) Schroder							•										
Cl. dianae var. *pseudodianae* (Roy) Krieg																	•
Cl. eboracense (Ehr. ex Ralfs) Turner													•				•
Cl. exiguum W. & G. S. West																•	
Cl. giganteum Bern							•										
Cl. gracile Bréb.		•		•			•						•	•			•
Cl. gracile var. *brevius* Classen							•										
Cl. gracile var. *elongatum* W & G. S. West							•						•				
Cl. hutchinsonii Kütz.											•						
Cl. incurvum Bréb.				•			•										•
Cl. incurvum var. *incurvum*							•	•									
Cl. intermedium Ralfs				•												•	
Cl. jenneri Ralfs							•						•				
Cl. kuetzingii Bréb.				•			•						•	•		•	•
Cl. kuetzingii var. *kuetzingii* f. *croasdaleae* Forster																•	•
Cl. kuetzingii var. *vittatum* Nordst.							•						•				
Cl. lanceolatum (Kütz.) in Ralfs							•						•				•
Cl. lanceolatum var. *lanceolatum*													•			•	•
Cl. leibleinii(now *Cl.closteriodes*) Kütz.																	•
Cl. leibellula (*Cl.closteriodes*)Focke var. ***interuptum*** (West & West) Donat																	•
Cl. leibellula(*Cl.closteriodes*) var. ***elongatum*** Scott & Prescott,															•		
Cl. limneticum Lemm.							•						•				
Cl. lineatum Ehr. ex Ralfs				•			•						•				•
Cl. lineatum var. *curvatum* Thom.							•										•
Cl. lunula (Mull.) Nitzsch ex Ralfs		•		•			•	•				•	•				•
Cl. lunula var. *biconvexum* Schmidle							•										
Cl. lunula var. *massartii* (Wild) Kr. In Rabh.							•										
Cl. lunula var. *maximum* Borge																	•
Cl. lunula var. *maximum* f. *crassissimum* Croasd																	•
Cl. moniliferum (Bory) Ehr. ex Ralfs				•			•	•				•	•			•	•
Cl. parvulum Nag.		•						•					•				
Cl. parvulum var. *angustum*													•				
Cl. parvulum Nag. var. *maius* (Schmidle) Krieg.							•										
Cl. parvulum var. *parvulum*							•										
Cl. pronum Bréb.											•		•				•
Cl. pronum Bréb. var. *pronum*																•	

Cl. pritchardianum Archer							•					•	•				
Cl. pseudolunula Borge				•			•							•			
Cl. pseudolunula Borge var. *concavum* Forster & Eckert																	•
Cl. ralfsii Bréb.				•													•
Cl. ralfsii var. *hybridum* Rabenh.							•						•				•
Cl. rectimarginatum Scott & Prescott																	•
Cl. regulare Bréb.							•										
Cl. rostratum Ehr. ex Ralfs							•				•	•				•	•
Cl. rostratum var. *brevirostratum* W. West																	•
Cl. setaceum Ehr. ex Ralfs				•			•				•	•	•	•	•	•	•
Cl. speciosum Lund																•	
Cl. spetsbergense Borge var. *laticeps* Grönbl. f. *maius* Gronbl.																	•
Cl. strigosum Bréb.													•			•	•
Cl. strigosum var. *strigosum*							•										
Cl. striolatum (Ehr.) Ralfs.		•		•													•
Cl. striolatum var. *striolatum*							•										
Cl. subulatum. var. *maius* Krieg.													•				•
Cl. toxon W. West				•									•				
Cl. toxon var. *toxon*							•										
Cl. tumidum Johnson													•				
Cl. tumidum (Rabh.) Johnson var. *nyl&icum* Grönbl.							•						•				
Cl. turgidum Ehr. ex Ralfs				•									•	•			
Cl. turgidum Ehr. var *borgei* (Borge) Defl.							•									•	•
Closterium spp.	•																
Genus ***Cosmarium*** Corda																	
C. amoenum Bréb.							•						•			•	•
C. amoenum Ralfs var. *mediolaeve* Nordst.							•										
C. askenasyi Schmidle	•			•				•					•	•			•
C. askenasyi var. *latum* Scott & Prescott																	•
C. aspherosporum var. *desectum* Grönbl.							•										
C. binum Nordst. in Wittr. & Nordst.									•				•				
C. bioculatum Bréb.							•										
C. bioculatum var. *depressum* (Shaars) Schmidle			•				•										
C. biretum Bréb.				•			•	•									
C. biretum Bréb. var. *floridense* Wolle							•										
C. biretum Bréb. var. *minus* Hansg.							•										•
C. botrytis var. *tumidum* Wolle	•						•										
C. caeltum Ralfs	•																
C. capense De Toni											•						
C. ceratophoroides Bourr.											•						
C. ceylanicum Nordst.											•						
C. circulare Reinsch	•													•			
C. connatum var. *africanum* Fritsch & Rich																•	•
C. contractiforme Grönbl. & Scott													•				•
C. contractum Kirchn.							•				•		•				•
C. contractum var. *ellipsoideum* (Elf.) et. G. S. West							•										
C. contractum var. *incrassatum*(Grönbl. & Scott) West & West														•			•
C. contractum var. *Jaccobsenii* (Roy) W. & G. S. West																	•
C. contractum var.*pachydermum* Scott & Prescott																	•
C. crenatiforme Grönbl.							•						•				

C. creperum West & West							•						•				
C. decedens (Reinch) Racib																•	
C. decoratum W. & G. S. West							•		•	•			•				•
C. depressum (Nag.) Lund.							•	•					•				•
C. depressum var. *achrondrum* (Boldt.) W.& G. S West																	•
C. depressum var. *planctonicum* Rev.							•						•				
C. depressum var. *limneticum* West							•										
C. exiguum Arch. var.*maius* Arch.f. *major* West & West							•										
C. formosulum Hoff.		•															
C. galeatum W. & G. S. West							•										
C. galeritum Nordst.							•						•				
C. gayanum De Toni							•										
C. geminatum Lund. f. *ornatum* Behre							•										•
C. glyptodermum W. & G. S. West											•						
C. granatum Bréb.							•						•				
C. granulatum Bréb.							•			•							
C. hammeri var. *africanum* Fritsch	•							•	•								
C. identatum Grönbl. var. *ellipticum* Scott. & Grönbl.																•	
C. lobatum Borge var. *maius* (Fritsch & Rich) Krieg & Gerloff																	•
C. lundellii Delp.													•			•	
C. lundellii var. *circulare* (Reinsch) Krieg.																•	
C. majae Strom							•										
C. mansagense W. & G. S. West							•										
C. margaritatum (Lund.) Roy & Biss.				•			•						•			•	
C. magaritiferum (Ehr.) Menegh.							•										
C. moniliforme (Turp.) Ralfs									•				•			•	
C. monodii Bourr.				•			•			•			•	•			•
C. multiordinatum West & G. S. West				•									•				
C. multiordinatum West & G. S. West var. *africanum* Bourr.							•						•				
C. pappekuilense G. S. West											•		•				
C. parchydermum Lund. var. *aethiopicum* W & G.S. West													•			•	•
C. pardalis					•				•				•				
C. pericymatium var. *latior* Fritsch & Rich									•								
C. permaculatum Grönbl. & Scott				•			•										•
C. phaseolus var. *karlukens* Bréb.							•										
C. platydesmium (Nordst.) Nordst. & Schimdle									•								
C. porrectum Nordst.				•												•	•
C. portianum Arch. Var. *maius* Scott & Prescott																	•
C. pseudobroomei var. *compressum* G. S. West													•				
C. pseudoconnatum Nordst.				•				•	•				•				•
C. pseudoconnatum var. *subconstrictum* Okada									•	•							
C. pyramidatum Bréb. ex Ralfs				•			•	•		•						•	•
C. quadrum Lund.				•				•	•	•			•				•
C. raciborskii Lag.														•			
C. regulare Bréb.				•			•						•				
C. reniforme Ralfs & Archer																•	
C. salisburii Fritsch & Rich				•			•	•									•
C. scopulorum Borge																	

C. scottii Croasd.											•		•			•	
C. scottii Croasd. f. *minus* Croasd.													•			•	
C. spinuliferum W. & G. S. West							•						•			•	•
C. stappersii Evens	•			•									•				•
C. subauriculatum W. & G. S. West				•			•						•				
C. subauriculatum W. & G. S. West var. *bogoriense* (Bern.) Bourr.																	•
C. subbalteum Schmidle var. *maius* Thom.																	•
C. submonomazum forma											•		•				
C. subprotumidum Nordst.													•			•	
C. subspeciosum Nordst.																•	
C. subspecium Nordst. Var. *validius* Nordst,													•				•
C. subtumidum Nordst.													•	•			
C. sulcatum Nordst.											•						
C. thwaitesii Ralfs							•										
C. trachypleurum var. *minus* Racib.										•							
C. transvalense Fritsch & Rich				•												•	•
C. trilobulatum Reinsch							•										
Cosmarium sp.			•				•				•			•	•		•
Genus *Cosmocladium* Brèb.																	
Cosmocladium pusillum Hilse									•								•
Genus ***Desmidium*** (Agardh) Ralfs																	
D. aptogonium Brèb.				•									•			•	
D. aptogonium Brèb. var. *tetragonum* W. & G. S. West																	
D. assymetricum Grönbl.											•						
D. baileyi (Ralfs) Nordst.							•				•		•				
D. baileyi f. *tetragonum* Nordst.							•		•								•
D. coarctatum Nordst.							•										
D. coarctatum var. *cambricum* Nordst.																	•
D. gracileps (Nordst.) Lagerh.							•										
D. grevillei (Kütz.) De Bary																	•
D. quadratum Nordst.				•													•
D. swartzii Agardh ex Ralfs				•						•	•	•	•			•	•
Genus ***Euastrum*** (Ehrenberg) Ralfs																	
E. affine Ralfs				•												•	
E. ansatum Ehr ex Ralfs.							•									•	•
E. ansatum var. *robustrum* Ducellier																•	•
E. binale (Turp.) Ehr. ex Ralfs	•						•	•					•				
E. binale (Turp.) Ehr. var. *brasiliense* Borge							•										
E. brasiliense Borge							•										
E. brasiliense Borge var. *convergens* Krieger																	•
E. denticulatum (Kirchn.) Gay													•				•
E. didelta Ralfs		•		•												•	
E. didelta Ralfs var. *bengalicum* Lagerh.							•										•
E. divericatum Lund.							•										•
E. elegans (Brèb.) Kütz.		•											•			•	
E. germatum Brèb.																•	•
E. obesum Josh. var. *minor* W. et. T.				•			•										
E. pectinatum Brèb. Var. *inevolutum* W. & G. S. West																	•
E. platycerum Reinsch.									•	•						•	
E. platycerum Reinsch.var. *eximum* f. *clausum*. Gronbl. & Scott																	•
E. pseudopectinatum Schmidle							•										
E. pulcherimum W. & G. S. West																•	
E. quadriceps											•						

E. sinosum Lenorm.											•					•	
E. sinosum Lenorm. var. *ceylanicum* W. & G. S. West																•	
E. sinosum Lenorm. var. *prallelum* Krieg.																•	
E. sinosum **Lenorm. var. *sercuriformiceps*** **(Borge) Krieg.**																•	
E. spinulosum Delp.	•												•				
E. spinulosum **Delp. var. *lindae*** **Gronbl. & Scott**									•				•				•
E. subbinale **Gutes**	•						•										
E. trigibberum **West & West**									•								
E. truncatiforme G. S. West													•				
E. turgidum Wallich var. *granowii* Turner																	•
Genus *Hyalotheca* (Ehrenberg) Ralfs																	
Hyalotheca dissiliens (Smith) Bréb. in Ralfs				•			•						•				•
H. mucosa (Mert.) Ehrenberg													•			•	
H. mucosa (Mert. in Dillw.) Ralfs var. *minor* Roy & Biss.												•					
H. undulata Nordst.				•			•										
H. undulata var. *perundulata* Grönbl.																	•
Genus *Micrasterias* (Agardh) Ralfs																	
Micrasterias alata Wallich				•													
M. alata f. *gracilior* Grönbl.																•	•
M. ambadiensis (Grönbl. & Scott) Thom.				•			•										•
M. americana (Ehr.) Ralfs							•		•				•				
M. americana var. *hybrida* Woodhead & Tweed																	•
M. apiculata (Ehr.) Menegh.							•						•			•	
M. apiculata var. *lacerata* Turner							•										•
M. apiculata var. *uberrima* Behre							•										
M. apiculata var. *sinhlmanii* (Hieron) Bourrelly																	•
M. brachyptera Lund.							•										
M. conferta **Lund. var. *hamata*** **Wolle f. *spinosa*** **Presc. & Scott**							•										•
M. crux- melitensis **(Ehr.) Hass.**									•				•		•		
M. crux- melitensis **var. *janeira*** **(Racib.) Grönbl.**											•						
M. crux-melitensis **f. *minor*** **Turner**																	•
M. decemdentata **(Nag.) Arch.**				•									•				
M. decemdentata **(Nag.) Arch. var. *decemdentata***							•										
M. doveri **Biswas var. *africana*** **Bourrelly**							•										•
M. echinata **Br&ham**																	•
M. fimbriata **Ralfs**																•	•
M. fimbriata **var. *spinosa*** **Biss.**																	•
M. foliaceae **Bail. in Ralfs**				•			•						•				•
M. foliaceae **var. *ornata*** **Nordst.**							•										
M. jenneri **Ralfs**																	•
M. jenneri **, var. *simplex*** **W. West**							•										•
M. mahabuleshwarensis **Hobs.**				•			•				•						
M. mahabuleshwarensis **var. *bengalicum*** **(Lagerh.) Krieg.**							•										
M. mahabuleshwarensis **var. *comperei*** **Coute & Rouss**													•				•
M. mahabuleshwarensis **var. *dichotoma*** **Smith**																	•
M. mahabuleshwarensis **var. *europaea*** **(Nordst.) Teil**																	•
M. mahabuleshwarensis **var. *ringens*** **(Bail) Krieg.**																	•
M. mahabuleshwarensis **var. *wallichii*** **(Grun.) W. & G. S. West**											•						
M. moebii **Borge var. *ridleyi*** **West & West**							•										•
M. papillifera **Bréb. ex Ralfs**			•														
M. pinnatifida **(Kütz.) Ralfs var. *polymorpha*** **Bourr. & Manguin**							•										•
M. radians **Turner**			•				•				•		•				

M. radians var. *bogoriense* (Bern.) W. & G. S. West																	•
M. radiata Hass.				•							•						
M. radiata var. *brasiliensis* Grönbl.							•										•
M. thomasiana Arch. var. *notata* (Nordst.) Grönbl.							•										•
M. torreyi Bail.							•										
M. torreyi var. *curvata* Krieger							•										•
M. tropica Nordst var.*ambadiensis* f.*sudparallela* Grönbl. & **Scott.**																	•
M. tropica var. *elegans* W. & G. S. West													•				•
M. tropica var. *elongata* Schmidle							•										•
M. tropica var. *tenior* Fritsch & Rich											•						
M. truncata (Corda) Bréb.				•													
M. truncata (Corda) Bréb. var. *pusilla* G. S. West													•				•
M. zeylanica Fritsch													•				•
Genus ***Onychonema*** Wallich																	
Onychonema (now *Sphaerozosma*) *laeve* Nordst.											•		•			•	
Onychonema laeve var. *latum* W. & G. S. West																	•
Genus ***Penium*** (Bréb.) Ralfs																	
Penium cylindrus (Ehr.) Bréb. ex Ralfs							•									•	•
P. margaritaceum (Ehr.) ex Ralfs				•			•										•
P. spinulosum (Wolle) Gerrath																	•
Penium spp.															•		
Genus ***Phymatodocis*** Nordst.																	
Phymatodocis irregularis Schmidle var. *intermedia* Gutw.																	•
Genus ***Pleurotaenium*** Nageli																	
Pleurotaenium baculoides (Roy & Biss.) Playfair							•										•
Pl. coronatum (Bréb.) Rabh.							•										•
Pl. coronatum var. *fluctuatum* W. West							•										•
Pl. coronatum var. *nodulosum* (Bréb.) W. & G. S. West f. *constrictum* Krieg.																	•
Pl. cylindricum var. *stuhmalnii* Heiron Krieg.													•			•	
Pl. ehrenbergii (Bréb.) De Bary	•			•			•						•				•
Pl. elatum				•									•				
Pl. Gloriosum (Turner) West & G. S. West							•						•				
Pl. maculatum (Turner) Krieg.																	•
Pl. minutum (Ralfs) Delp.							•						•				
Pl. minutum var. *latum* Kaiser																	•
Pl. ovatum Nordst.				•			•						•			•	•
Pl. ovatum var. *elephantinum* (Cohn) Krieg.				•													•
Pl. ovatum var. *inermius* Mooius																	•
Pl. ovatum var. *tumidum* (Mask.) G. S. West													•				•
Pl. simplissimum Grönbl. var. *simplissimum* Krieg.																	•
Pl. subcoronulatum (Turner) West & G. S. West				•			•										•
Pl. subcoronulatum var. *africanum* Schmidle																	•
Pl. subcoronatum var. *spinolosum* Opute																	•
Pl. trabecula (Ehr.) Nageli ex Krieg.				•			•		•				•		•	•	•
Pl. Trabecula var. *rectum* (Delp.) W. & G. S. West.				•													•
Genus ***Sphaerozosma*** Corda																	
Sph. aubertianum West var. ***compressum*** Rich				•													•
Sph.(Teilingii) granulatum Roy & Biss.																	•

Genus ***Spondylosum*** (Bréb.) Ralfs																	
Spondylosum moniloforme Lund.																•	
Sp. planum (Wolle) W. & G. S. West							•		•		•	•				•	•
Sp. pulchrum (Bail.) Arch ex Smith																	•
Sp. secedens De Bary						•											
Genus ***Staurastrum*** Meyen																	
St. alternans Bréb							•						•				
St. arachne Ralfs											•						
St. asterias Nygaard							•						•	•		•	•
St. brebisonii											•						
St. ?c&ianum Delp.											•						
St. caledrionense													•				
St. chaetoceros (Schroder) G. M. Smith																	
St. corniculatus Lund. var. *subsingerous* (Foster) Teil.											•						
St. crenulatum (Nag) Delp							•						•				
St. cuspidatum Bréb. var. *divergens* Nordst.																•	
St. cyclacanthum var. *armigerum* Coutê & Rousselin									•	•							
St. dejectum (Bréb in Menegh.) Ralfs							•										
St. dickiei Ralfs											•						
St. excavatum Coutê & Rousselin									•				•				
St. fuellebornei Schmidle											•		•			•	•
St. fuellebornei f. *longiradiatum* Thom.																•	•
St. fuellebornei f. *reductum* Grönbl.																	•
St. furcatum (Ehr.) Brèb.											•		•				•
St. furcatum var.*asymmetricum* f. *depauperatum* Grönbl. & Scott.									•								
St. furcatum f. *richae* Croasd.									•	•							
St .furcigerum Brèb.											•					•	
St. gladiosum Turner							•		•				•	•			•
St. gracile Ralfs				•									•			•	
St. gracile Ralfs var. *coronatum* Boldt									•								•
St. hirsutum (Ehr.) Brèb.				•					•								
St. iversenii Nygaard		•												•			
St. iversenii Nygaard *var. americanum* Scott & Grönbl.																	•
St. Johnsonii West & West var. *altiuis* Fritsch &. Rich																	•
St. kiellmanni Wille											•						
St. leptocladum Nordst.				•			•					•	•	•			
St. leptocladum var. *cornutum* Wille											•		•	•		•	•
St. leptocladum var. *cornutum* f. *crassius* Grönbl.																	•
St. leptocladum var. *insignis* West & West											•						
St. leptopus Krieg.											•						
St. lezae Thom.				•										•			
St. lezae Thom. var. *warriense* Opute																	•
St. limneticum Schmidle							•										
St. limneticum var. *cornutum* Wille																•	
St. longibrachiatum var. *africanum* Bourr.									•				•				
St. longiradiatum											•						
St. longispinum (Bail.) Arch																	•

St. manfeldii Delp.												•	•		•		
St. mutabile (Bail.) Coutê & Rousselin										•							
St. obiculare (Ehr.) Menegh.													•				
St. octoverrucosum Scott & Grönbl.							•							•			
St. paradoxum Meyen						•					•	•	•			•	
St. penicilliforum Grönbl.											•						
St. pilosum (Nag.) Arch.																	•
St. polymorphum Bréb. ex Ralfs											•		•				
St. polymorphum var. *divergens* (Nygaard)										•							
St. punctulatum Bréb.											•						
St. pseudopelagicum West &West										•							
St. pseudozatum Borge											•						
St. quadrangulare var *contecium* (Turner) Grönbl.										•			•				
St. quadrinotatum Grönbl.											•						
St. raphidacanthum Scott. & Presc.											•						
St. Rzoskae Grönbl. & Scott																	•
St. sagitarium Nordst.														•			
St. sebaldi Reinsch				•							•			•			
St. sebaldi Reinsch var. *ornatum* Nordst.												•				•	•
St. sebaldi var. *productum* West & G. S. West											•					•	•
St. setigerum Cleve									•				•			•	•
St. sexcostatum Bréb.											•						
St. smithii (G. M. Smith) Teil.												•				•	
St. striolatum (Nag) Arch.									•	•							
St. subindentatum											•						
St. subulatus (Kütz.) Thom											•		•			•	
St. subradians Fritsch & Rich	•												•				
St. subtrifurcatum Schmidle in Engler				•			•										
St. teliferum Ralfs											•		•				
St. tetracerum Ralfs											•		•				
St. tetracerum var.*cameloides* (Georgev.) Florin										•							
St. tohopekaligense Wolle											•						
St. tohopekaligense Wolle f. *acuminatum* Scott & Presc.																	•
St. tohopekaligense f. *trifurcatum* West & West									•	•	•		•				
St. tohopekaligense var. *nonnum* (Turn.) Schmidle																	•
St. tricorne Bréb.												•					
St. tryssos Scott. & Grönbl.																•	
St. vestifum											•						
St. wildemanii Gutw.													•			•	•
St. wildemanii var. *maius* (West & West) Scott & Presc.																	•
St. wildemanii f. *quadrispinum* Thom.																	•
Staurastrum spp.			•											•			
Genus ***Staurodesmus*** Teiling																	
Staurodesmus brevispina (Ralfs) Croasd.				•							•		•			•	•
Std. brevispina (Ralfs) Croasd. var. *tumidum*											•		•				
Std. connatus (Lund.) Teil.										•			•				
Std. convergens (Ehr.) Teil.				•									•	•		•	
Std. convergens (Ehr.) Teil. var. *incrassatus* Gutw.																•	

Std. convergens(Ehr.)Teil.var.*incrassatus* Gutw.f.reductus Teil.																	•
Std. convergens var. *laportei* Teil.											•		•				•
Std. corniculatus (Lund.)Teil. var. *subspinigerus* (Forster) Teil.																	•
Std. cornutus Wolle				•													
Std. cornutus (Wolle) Teil. var *minor* (Nygaard) Teil.																•	•
Std. curvatus Turner var. *latus* (Scott & Presc.) Thom.																	•
Std curvatus var. *kalamantanus* (Scott & Presc.) Teil.																	•
Std. dickiei (Ralfs) Lillier. var. *maximus* (West) Thom													•			•	•
Std. dickiei (Ralfs) var. *romboideus* (West) Lillier.													•				•
Std. glaber var. *hirundinella* (Messik.) Teil.																•	•
Std. glaber (Ehr.) Teil. f. *subflabtrus* (Grönbl.) Teil.																	•
Std. gr&is (Buln.) Teil.																•	•
Std. lapponicum (Schmidle) Grönbl.											•						
Std. leptodermus (Lund.) Teil.											•					•	•
Std. leptodermus var. *ikapoe* (Schmidle) Thom							•						•				•
Std. leptodermus var. *ikapoe* f. *minor*											•						
Std. lobatus (Scott. & Grönbl.) Teil.										•							
Std. lobatus (Borge) Bourrelly var. *ellipticus* (Fritsch & Rich) Teil. f. *minor* Teil.													•				•
Std. lobatus var. *ellipticus* f. *major* (Fritsch & Rich) Teil.							•										
Std. megacanthus (Lund.) Thunmark																	•
Std. mucronatus var.*subtriangularis* (W.& G. S.West) Croasd.													•				•
Std. setigerum Cleve											•						
Std. subpygmaeus (W. & G. S. West) Croasd. var. *spiniferus* (Scott & Grönbl.) Teil.														•			•
Std. subtriangularis											•						
Std. subulatus (Kütz.) Thom.											•		•				•
Std. subulatus var. *subaequalis* (West) Thom.																	•
Std. triangularis (Lagerh.) Teil. var. *subparallelus* (Smith) Teil.																	•
Std. tumidum Bréb.											•						
Std. validus (W. & G.S.West)Thom var.*subvalidus* (Grönbl.) Teil.																	•
Staurodesmus sp.														•			
Genus ***Tetmemorus*** Ralfs																	
Tetmemorus brebissonii (Menegh.) Ralfs							•									•	•
T. granulatus Bréb. Ralfs																•	
Genus ***Xanthidium*** (Ehr.) Ralfs																	
Xanthidium antilopaeum (Bréb.) Kütz.																•	
X. antilopaeum var. *basionatum* Eich. & Racib.																	•
X. antilopaeum var. *laeve* Schmidt																•	
X. biincrasatum Thom.																	•
X. borgei Thom.																•	
X. burkillii var. *alternans* Skuja																	•
X. calcereo-aculeatum (Hieron.) Schmidle																	•
X. calcereo-aculeatum var. *sudanese* Grönbl. & Scott																	•
X. cristatum Bréb. var. *depressum* Racib.																	•
X. eloisianum Wolle Opute comb. nova. var. *depressum* (W. & G. S. West) Opute comb. Nova.																	•
X. regulare Nordst.																•	
X. sansibarense (Hieron) Schmidle f. *major* Fritsch & Rich																	•
X. subtrifurcatum Schimidle											•						
X. subtrilobum W. & G. S. West				•									•				•
X. subtrilobum var. *africanum* Grönbl. & Scott											•		•			•	•

X. subtrilobum var. *kriegeri* Jao															•	•
X. subtriobum W. & G. S. West f. *Rich*																•
	A	B	C	CA	E	G	I	Ik	J_1	J_2	K	L	LC	N	O	S	W

A = Akoko-Edo (present author); B = Bonny River (Chindah & Pudo 1991); C = Calabar River (Erondu & Chindah 1991);CA = Coastal Area (present author); E = Eleiyele reservoir (Imevbore 1965, 1967,1968); G = Ogelube lake (Biswas 1992, Biswas & Nweze 1990); I = Ikpoba reservoir (present author); Ik = Ikogosi springs (present author); J_1 = Liberty dam (Khan 1984); J_2 = Lamingo dam (Khan 1984); L = Lagos Lagoon (Nwankwo 1988) LC = Lake Chad (Compere 1977);N = River Niger (present author); O = River Oshun (Egborge 1973, 1974, 1979); S = Swamps of eastern Niger Delta (Nwankwo 1996) W = Warri/Forcados estuary

and recently Cocquyt *et al* (1993) provided the checklist of East African Great Lakes algal flora. Lind (1980) specifically addressed the distribution of desmids in the English lakes district.

The aim of this paper is to produce a comprehensive list of the desmid flora of Nigeria, indicating their distribution.

MATERIALS AND METHODS

Spot samples of desmids were collcted from the different locations using 55-micrometer mesh size plankton net. These samples were preserved in Lugol's iodine and identified by a Leitz compound research microscope using the description by Lind (1967,1971), Compere (1977), Coute and Rousselin (1975), Gronblad

Table 2: Summary of desmids according to their genera, species and forma

Genus	No. of Taxa	No.of species	No.of variety	No. of forma
Saccodermae				
Ancylonema	1	1	0	0
Cylindrocystis	2	2	0	0
Mesotaenium	1	1	0	0
Netrium	3	2	1	0
Spirotaenium	3	3	0	0
Placodermae				
Actinotaenium	7	4	3	1
Bambusina	3	1	2	0
Arthrodesmus	7	4	3	0
Closterium	84	43	37	4
Cosmarium	91	58	30	3
Cosmocladium	1	1	0	0
Desmidium	11	8	2	1
Euastrum	30	18	11	1
Genicularia	2	2	0	0
Gonatozygon	7	4	3	0
Hyalotheca	5	3	2	0
Micrasterias	48	18	26	4
Onychonema	2	1	1	0
Penium	4	4	0	0
Phymatodocis	1	0	1	0
Pleurotaenium	21	10	10	1
Sphaerozosma	2	1	1	0
Spondylosium	4	4	0	0
Staurastrum	83	57	19	7
Staurodesmus	35	14	16	5
Tetmemorus	2	2	0	0
Xanthidium	17	7	8	2
	478	273	176	29

and Croasdale (1971), Gronblad et al (1958,1968), Lind and Brook (1980), Prescott *et al.*(1972, 1977, 1981). These were compared with previous studies carried out on major water bodies in the country. The key to the different water bodies indicated are as follows:-

RESULTS

A total of 478 taxa of desmid flora are reported in this paper. These belong to 27 genera, 273 species, 176 varieties and 29 forms. Of these five were saccoderm desmids while 22 genera were placcoderm desmids. The taxonomic inventory is shown in Table 1.

DISCUSSION

In this report 478 taxa of desmids are listed. They belong to 27 genera, 273 species,176 varieties and 29 forma. These are summarized in Table 2:

The genera *Closterium, Cosmarium, Staurastrum* are particularly striking. Others such as *Euastrum, Micrasterias, Staurodesmus, Pleurotaenium* and *Xanthidium* were fairly represented.

The genus *Cosmarium* had the highest taxa of 91 followed by *Closterium*, 84, and *Staurastrum* 83. This is in consonance with the often reported dominance by these genera especially *Staurastrum* and *Cosmarium* which have been noted by other authors as constituting about half the population occurring in equal or nearly equal numbers (Lind, 1971, Khan,1984, John 1986, Kadiri 1999). According to Lind and Croasdale (1966), and Thomasson (1972), the abundance of *Staurastrum* is usually attributed to to its polymorphic nature, making a particular species appear like different species. Other authors who previously reporeted the prevalence of *Cosmarium* over other genera include Lind (1980) and Brook and Williamson (1991). Genera such as *Ancylonema, Mesotaenium, Phymatodocis, Mesotaenium* and *Cosmocladium* were few while taxa like *Gronbladia* and *Teilingii* were not recorded at all.This is probably because these taxa are new to desmid taxonomy.

Cosmopolitan taxa occurring in over 40% of the regions include *Closterium linula, Cl. Setaceum, Cosmarium monodii, Desmidium swartzii* and *Pleurotaenium trabecula.*

Generally, the high diversity of desmids in West Africa has been ascribed to high rainfall prevalent in the region (Lind 1968, John 1986) as well as occurrence and distribution of aquatic macrophytes (Bland and Brook 1974).

REFERENCES

Alfinito, S.,Fumanti, S. and Ricci, S. 1989. Freshwater algae from Kania (Sierra-Leone, West tropical Africa)- *Revta Idrobiol. 28*: 167-178.

Alfinito, S. and Manzzoni, I.A., 1986. Some desmids from Bathurst Falls. *Quad. Accademia Nationale dei Lincei 260*:97-104.

Biswas, S., 1992. Phytoplankton periodicity of Ogelube lakes, Anambra State, Nigeria, during 1979-1980. *Hydrobiologia 246* 169-172.

Biswas, S.and Nweze, N.O. 1990. Phytoplankton of Ogelube lake, Opi, Anabra State, Nigeria. *Hydrobiologia199*: 81-86.

Bland, R.D. and Brook, A.J., 1974. The spatial distribution of desmids in lakes in northern Minnesota, U.S.A.*Freshwater Biol. 4*: 543-556.

Brook A.J. and Williamson, D.B., 1991. A Check-List of Desmids of the British Isles. Freshwater Biological Association Occasional Publication no 28, 40pp.

ChindahChindah, A.C. & Pudo, J.K., 1991. A preliminary checklist of algae found in plankton of Bonny River in Niger Delta, Nigeria. *Fragm.Flor. Geobot.* 36, 117-126.

Cocquyt, C., Vyverman, W. and Compere, P 1993. A check-list of the algal flora of the East African great Lakes *Scripta Belgica 7*: 1-55.

Coesel, P. F. M., 1983. De desmidiaceeen van Nederland, sieralgen-deel 2, Fam. Closteriaceae. Wet Medel. K.'Med. Natural Veren. 157: 49pp.

Compere, P., 1977. Algues de la region du lac Tchad. 7. Chlorophytes(3eme partie:Desmiddiees). *Cah. O.S.T.O.M. Ser. Hydrobiol.11*: 75-175.

Coute, A. and Rousselin, G., 1975. Contribution a l'etude des algues d'eau douce du Moyen –Niger (Mali) *Bull. Mus. Nat. Hist. Natur(Paris) Ser. 3277, Bot. 21*: 75-175.

Egborge, A.B.M. 1973. A Preliminary Checklist of Phytoplankton of River Oshun. *Freshwat. Biol.3*: 569-572.

Egborge, A.B.M. 1974. The seasonal variation and distribution of phytoplankton in the River Oshun *Freshwat. Biol.4*: 177-191.

Egborge, A.B.M. 1979. The effect of impoundment on the phytoplankton of the River Oshun, Nigeria. *Nova Hedwiga, 31*: 407-418

Erondu, E.S., Chindah A.C., 1991. Physico-chemical and phytoplankton changes in a tidal freshwater station of the New Calabar River, South Eastern. *Environ. Ecol., 9*: 561-570.

Gerrath, J.F. and Denny, P., 1988. Freshwater algae of Sierra-Leone. V. Desmids from Lake Sonfon region. *Nova Hedwigia 46*:39- 58.

Gerrath J.F. and Denny, P., 1989. Freshwater algae of Sierra-Leone. 6. Desmids(*Gonatozygon* to *Pleurotaenium*). *Nova Hedwigia 48*: 167-186.

Gerrath J.F. and John, D.M.1988. Desmids of Ghana, West Africa I.*Nova Hedwigia 46*:187-230.

Gronblad, R. 1962. Sudanese desmids. II. *Acta Bot.Fenn.63*: 1-19.

Gronblad, R. and Croasdale, H.T. 1971. Desmids from Namibia (SW Africa). *Acta Bot. Fenn. 93*: 1-40.

Gronblad, R.,Prowse, G.A. and Scott, A.M. 1958. Sudanese desmids. *Acta Bot. Fenn.* 58: 1-82.

Gronblad, R., Scott, A.M. and Croasdale, H.T. 1964. Desmids from Uganda and Lake Victoria collected by Dr.Edna M. Lind. *Acta Bot. Fenn. 66*: 1-57.

Gronblad, R., Scott, A.M. and Croasdale, H.T. 1964. Desmids from Sierra-Leone, tropical West Africa. *Acta Bot. Fenn. 78*: 3-32.

Hartley, B. 1986. A check-list of the freshwater, brackish and marine diatoms of the British Isles and adjoining coastal waters. *J.Mar. Biol.Ass. U.K. 66*:531-610.

Imevbore, A.M.A., 1965. A preliminary checklist of the planktonic organisms of Eleiyele reservoir, Ibadan Nigeria. *J.W. Afri. Sci Ass. 10*: 56-60.

Imevbore, A.M.A., 1967. Hydrology and plankton of Eleiyele Reservoir, Ibadan, Nigeria. *Hydrobiologia, 30*: 154-176.

Imevbore, A.M.A., 1968. Planktonic algae of Eleiyele reservoir. *Nig. J. Sci. 2*: 85-90.

Islam A.K.N.M. 1970 Contribution to the knowledge of desmids of East Pakistan. Part I. *Nova Hedwigia. 20*:903-983.

Islam A.K.N.M. 1975Contribution to the knowledge of desmids of Bangladesh. Part II. *Dacca Univ. Studies, B, 23*;31-39.

Islam A.K.N.M. and Haroon, A.K.Y.1980. Desmids of Bangladesh. *Int. Revue ges Hydrobiol. 64*:551-604.

Islam A.K.N.M. and Haroon, A.K.Y., 1985. Desmids from Iraq. *Int. Revue ges Hydrobiol. 70:* 877-889.

John, D.M. 1986. The inland waters of tropical West Africa. *Arch. Hydrobiol. 23:*1-244.

Khan, M. A., 1984. Contribution to freshwater algae of Nigeria. 1. Some Jos Plateau desmids. *Nova Hedwigia* 39: 239-296.

Kayamura Y., 1967. The desmid flora of the Senna district. *Jap.J. Limnol. 28*: 26-40.

Kadiri, M. O., 1988: A taxonomic study of the Genus *Closterium* (Nitzsch. 1817) Ralfs 1848 (Desmidiaceae, with ecological notes. *Tropical Freshwater Biology, 1*:71-80.

Kadiri, M.O., 1993a. Records of members of the Genus *Cosmarium* Corda ex Ralfs (Desmidiaceae, Chlorophyta) in a shallow West African Reservoir, *Nova Hedwigia, 57*: 109 - 122.

Kadiri, M. O., 1993b. Further desmids from the Ikpoba Reservoir: Comparison from elsewhere in Africa. *Algological Studies, 71*:23 - 35.

Kadiri, M.O., 1996. More desmids from the Ikpoba reservoir, Nigeria: Comparison with other African records. *Algol.Studies. 80:* 87-98.

Kadiri, M.O., 1999. A comprehensive preliminary check-list of the algae of the Ikpoba Reservoir, Edo State, Nigeria. *Global Journal of Pure and Applied Sciences 5:* 485-491.

Kadiri, M.O., and Opute, F. I., 1989. A rich flora of *Micrasterias* from the Ikpoba Reservoir, Nigeria. Archiv fur *Hydrobiologie, 116 :* 391 - 399.

Lind, E. M., 1967. Some East African desmids. *Nova Hedwigia13:* 361-387.

Lind, E., M. 1968.Notes on the distribution of phytoplankton in some Kenyan waters.*Br.Phycol Bull.3*:481-493.

Lind, E. M., 1971.Some desmids from Uganda. *Nova Hedwigia 22:* 535-585.

Lind, E.M. 1980. The distribution of desmids in some tarns in the English Lakes district. *Naturalist. 105:* 145-149.

Lind, E.M. and Brook, A.J. 1980. Desmids of the English Lakes District. Freshwater Biological Association Publication No. 42, 123pp.

Lind, E. M. and Croasdale, H., 1966. Variations in the desmids *Staurastrum sebaldi* v. *ornatum* J.Phycol. 2: 111-116.

Nwankwo, D. I., 1988. A preliminary checklist of planktonic algae in Lagos Lagoon, Nigeria. *Nig. J. Basic & Appl. Sci. 2*: 73-85.

Nwankwo, D. I., 1996. Freshwater swamps desmids from south east Niger Delta, Nigeria. *Pol. Arch. Hydrobiol. 43*: 411-420.

Opute, F. I., 1992. Contribution to the knowledge of algae of Nigeria. 1. Desmids from Warri/Forcados estuaries part 2. The genera *Euastrum* and *Micrasterias.* Arch. Hydrobiol. Suppl. 93: 73-92.

Prescott, G. W., Croasdale, H.T. and Vinyard, W.C., 1972. Desmidiales. Part I. Saccodermae, Mesotaeniaceae. *A. Am. Flora, Ser. 2,(* 6): 1-84.

Prescott, G.W., Croasdale, H.T. and Vinyard, W.C., 1977. A Synopsis of North American Desmids. Part II. Desmidiaceae: Placodermae. Section 2., Univ. of Nebraska Press Lincoln 413pp.

Prescott, G.W., Croasdale, H.T., Vinyard, W.C. and Bicudo, C.E. 1981. A synopsis of North American desmids. Part II. Desmidiaceae: Placodermae. Section 3. Lincoln, Univ. of Nebraska press, 720pp.

Prowse, G A. 1957. An introduction to the desmids of Malaya. *Malayan Nat. J. 11:* 42-57.

Ricci, S. Alfinito, S. and Fumanti, B., 1990 Desmids from Guma valley (Sierra-Leone, West Africa) *Hydrobiologia 208:* 235-243.

Ruzicka, J., 1977. Die Desmidiaceen Mittlelereupos Stuttgart. *Schweizerkartsche Bd. 1, lief* 1292pp + 44plates. Town, South Africa. *Q.J. Microsc.37:* 379-383.

Ruzicka, J., 1981. Die Desmidiaceen Mittlelereupos Stuttgart. *Schweizerkartsche Bd. 1, lief 2*: 293-736.

Scott, A. M. and Gronblad, R., 1957. New and interesting desmids from Southern eastern United States. *Acta Soc. Sci. Fenn Nova ser. B 11*:3-62.

Scott, A.M. and Prescott, G. W., 1961. Indonesian desmids. *Hydrobiologia 17:* 1-132.

Scott, A. M., Gronblad, R., and Croasdale, H. T., 1965. Desmids from Amazon Basin, Brasil, collected by Dr. H.Sioli *Acta Bot. Fennica 69*:1-94.

Williamson, D. B., 1995.*Cosmarium phaseolus* Breb. or *Euastrum tunneri* W. West? A dichotypic desmid population from the plateau of Table Mountain, Cap

Thomasson K., 1972. Some planktonic *Staurastra* from New Zealand. *Swensk. Bot. Tidskr. 66*: 257-274.

Tomaszewicz, G. H., 1994. Abundance and composition of the desmid flora in a series of peat pits, in relation to pH and some other habitat parameters. *Biologia Bratislavia 49:* 519-524.

Tomaszewicz, H. and Kowalski, W.W.. 1993 Desmids of some polyhumic lakes in the Wigry National Park, north-eastern Poland. Fragm.Flor. Geobot. 38: 525-548.

Williamson, D.B., 1999. A proposed new desmid genus *Cruciangulum* and descriptions of three new species from the rock pools in the Western Cape, South Africa *Algol. Studies 93:* 55-62.

Woodhead, W. and Tweed, R.D., 1958. A check-list of tropical West African algae (fresh and brackish water *). Hydrobiologia 11*: 299-395.

Woodhead, W. and Tweed, R.D. 1960. A secondcheck-list of tropical West African algae. *Hydrobiologia 15.* 225-286.