Studies on Littoral Centric Diatoms of Setse Coastal Area

Nyunt Sandar Aung

Abstract

A total of 51 species of littoral centric diatoms belong to 25 genera from 16 families 7 orders were identified. The diatom specimens were collected from Setse coastal area from July 2010 to March 2011. Among the littoral centric diatoms, 47 species, 47 species and 50 species were recorded from different microhabitats of sandflat, mudflat and tide pool respectively. In the present study, tidal pool represented the best habitat for these diatoms abundance. The classification and occurrence of each centric diatom were also provided.

Keywords: littoral centric diatoms, mudflat, Phytoplankton, sandflat, Setse coastal area, tide pool,

Introduction

Phytoplankton is the autotrophic component of the plankton community in all water bodies. Phytoplankton, the single-cell plants are the food that can be utilized by the world largest and longest living animals and fishes. In phytoplankton, there are two large groups of algae which are commonly predominate as Diatoms (Bacillariophyceae) and Dinoflagellate (Dinophyceae). Diatom is single celled photosynthetic organism that has a shell or test made of silica. They are the most abundant and constitute the major part of the sea and serve as a vital first link in the food chain either directly or indirectly of almost every animals in the sea.

Two majors groups of diatoms are centric and pennate diatoms, which are subdivided based on the structure and shape of siliceous cell walls. Centric diatoms are mostly circular and oval elliptical in outline and the cell membrane as a whole can be linked to a circular box. Some centric diatoms have triangular or elliptical valves. In all of them are making on the valves are concentrically disposed about a central point. They are commonly found in sea and chromatophores numerous in the cells.

Those diatoms can be found in the water column or at the bottom sediments and on the intertidal beaches. In the present study, the centric diatoms from the littoral habitats Setse coastal area were investigated. The objectives of the present study are to record the diversity of littoral centric diatoms from the intertidal areas and to understand the biology and ecology of littoral centric diatoms in different substrates.

Materials and Methods

Phytoplankton samples were collected in $1m^2$ area of three different sampling substrates such as sandflat, mudflat and intertidal tidal pool from July 2010 to March 2011 at Setse coastal area (Lat. 15˚ 52′ N, Long. 97˚ 35′ E). The location of the study area was shown in Fig.1.

Lecturer, Department of Marine Science, University of Mawlamyine

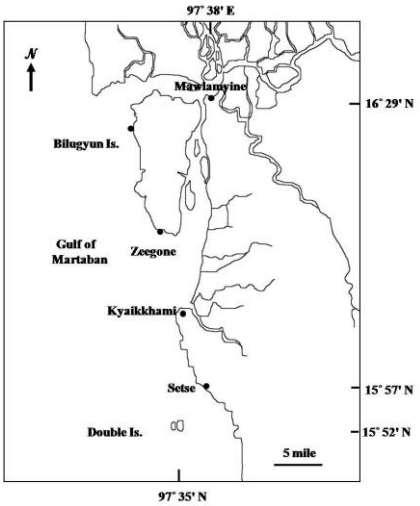


Figure 1. Map showing the collection area at Setse, Mon State

The samples were collected from sandflat in the low tide line of the intertidal area by using a flat spoon then they are separated by filtering and cleaning repeatedly with seawater. Samples were also collected in mud by shoveling the intertidal mudflat to the point where the seawater began to seep into the hole. The resultant seepage was collected with plastic bottle. In tidal pool, samples were collected by using hand made plankton net (mesh size 50μm, aperture diameter 10cm and length 12cm). The collected samples were preserved in Lugol's solution. The specimens were analyzed under compound light microscope Olympus (H20BIMF 200) at 10, 40, 100 magnifications and measured by using ocular meter. The centric diatoms were photographed by using an Olympus CH20BIMF200 microscope. In the present study, identification of marine phytoplankton was made by referring to Heurck (1896), Allen and Cupp (1930), Hendey (1964), Yamaji (1969), Shirota (1966) and Chandy *et al.* (1992). The classification system was used in this study based on Guiry (2009).

Results

In the present study, 51 species of littoral centric diatoms from Setse coastal area were collected and identified from July 2010 to March 2011. Among collected samples, 47 species, 47 species and 50 species were recorded in sandflat, mudflat and tidal pool respectively. The occurrences of littoral centric diatoms from sandflat, mudflat and tidal pool were shown in Table 1 and the classified list of recorded species was shown in Table 2. The families of littoral centric diatoms included: Melosiraceae, Skeletonemaceae, Thalassiosiraceae, Coscinodiscaceae, Actinodiscaceae, Stephanodiscaceae, Leptocylindriceae, Hemidiscusceae, Rhizosoleniaceae, Bacteriastraceae, Chaetoceraceae, Biddulphiaceae, Triceratiaceae, Hemiaulaceae, Litho desmiaceae and Eucampiaceae.

Table 1. The occurrences of littoral centric diatoms from sandflat, mudflat and tidal pool of Setse coastal area

Sr. No	Species	Sandflat	Mudflat	Tidal pool
1.	*Melosira borrei* Grev.	+	+	+
2.	*M. hyperborea* Grunow	+	+	–
3.	*M. malayensis* Ehr.	–	+	+
4.	*M. nummuloides* (Bory) C. A. Agardh	+	+	+
5.	*M. octogona* A. Schmidt	+	+	+
6.	*Hyalodiscus stelliger* Bail.	+	+	+
7.	*H. subtilis* Bail.	+	+	+
8.	*Lauderia borealis* Gran.	+	+	+
9.	*Skeletonema costatum* (Greville) Cleve	+	+	+
10.	*Thalassiosira decipines* (Grunow) Jornesen	+	+	+
11.	*T. eccentrica* (Ehr.) Cleve	+	+	+
12.	*T. punctigera* (Castracane) Halse	+	+	+
13.	*T. subtilis* (Ostenfeld) Gran	+	+	+
14.	*Coscinodiscus asteromphalus* Ehr.	+	+	+
15.	*C. excentrius* Ehrenberg	+	+	+
16.	*C. gigas* Ehrenberg	+	+	+
17.	*C. granii* Gough	+	+	+
18.	*C. lineatus* Ehr.	+	+	+
19.	*C. marginatus* Ehr.	+	+	+
20.	*C. radiatus* Ehrenberg	+	+	+
21.	*Planktoniella sol* Schutt	+	+	+
22.	*Gossleriella tropica* Schutt	+	+	+
23.	*Actinoptychus undulalus* Ehr.	+	+	+
24.	*Aulacodiscus voluta-coeli* Grun	+	+	+
25.	*A. zonulatus* Rattr	+	–	+
26.	*Actinocyclus ralfii* (W.Sm) Ralfs	+	+	+
27.	*Cyclotella meneghiniana* Kutz.	+	+	+

28.	*C. striata* (Kutz) Grun	+	+	+
29.	*Stephanodiscus niagrara* Ehr.	+	+	+
30.	*Perithyra denaria* Ehr.	+	–	+
31.	*Leptocylindrus danicus* Cleve	+	+	+
32.	*Hemidiscus cueniformis Wallich*	+	+	+
33.	*Rhizosolenia robusta Norm.*	+	–	+
34.	*R. setigera Brightwell*	+	+	+
35.	*R. stolterfothii Cleve*	+	+	+
36.	*Bacteriastrum varians Lauder*	+	–	+
37.	*Chaetoceros atlanticus Ehr.*	+	+	+
38.	*Biddulphia aurita (Lyng.) Breb.*	+	+	+
39.	*B. mobiliensis Bailey*	+	+	+
40.	*B. obtusa Kutzing*	+	+	+
41.	*B. pulchella Gray*	+	+	+
42.	*B. sinensis Gray*	+	+	+
43.	*Triceratium favus Ehr.*	+	+	+
44.	*T. reticulum Ehr.*	+	+	+
45.	*Hemiaulus hauckii Grunow*	–	+	+
46.	*Ditylum brightwellii (West) Grunow*	+	+	+
47.	*D. sol Grunow*	+	+	+
48.	*Eucampia zoodicus Ehr.*	–	+	+
49.	*Lithodesmium undulatum Ehr.*	+	+	+
50.	*Streptotheca indica Karten*	+	+	+
51.	*S. thamerisis Shrubsole*	–	+	+
	Total	47	47	50

Table 2. The classified list of littoral centric diatoms of Setse Coastal Area.

Phylum	Class	Order	Family	Genus	Sr. No.	Species
Bacillario-phyta	Bacillario-phyceae	Melosirales	Melosirales	*Melosira*	1.	*Melosira borrei* Grev.
					2.	*M.hyperborea* Grunow
					3.	*M.malayensis* Ehr.
					4.	*M.nummuloides* (Bory) C. A. Agardh
				Lauderia	5.	*M.octogona* A.Schmidt
					6.	*Hyalodiscus stelliger* Bail.
					7.	*H. subtilis* Bail.
					8.	*Lauderia borealis* Gran.
		Thalassiosirales	Skeletonemaceae	*Skeletonema*	9.	*Skeletonema costatum* (Greville) Cleve
			Thalassiosiraceae	*Thalassiosira*	10.	*Thalassiosira decipines* (Grunow) Jornesen
					11.	*T.eccentrica* (Ehr.) Cleve
					12.	*T. punctigera* (Castracane) Halse
					13.	*T. subtilis* (Ostenfeld) Gran.
		Coscinodiscales	Coscinodiscaceae	*Coscinodiscus*	14.	*Coscinodiscus asteromphalus* Ehr.
					15.	*C. excentrius* Ehrenberg
					16.	*C. gigas* Ehrenberg
					17.	*C. granii* Gough
					18.	*C.lineatus* Ehr.
					19.	*C.marginatus* Ehr.
					20.	*C. radiatus* Ehrenberg
				Planktoniella	21.	*Planktoniella sol* Schutt
				Gossleriella	22.	*Gossleriella tropica* Schutt
				Actinoptychus	23.	*Actinoptychus undulalus* Ehr.
				Aulacodiscus	24.	*Aulacodiscus voluta-coeli* Grun
					25.	*A. zonulatus* Rattr
			Actinodiscaceae	*Actinocyclus*	26.	*Actinocyclus ralfii* (W.Sm) Ralfs
			Stephanodiscaceae	*Cyclotella*	27.	*Cyclotella meneghiniana* Kutz.
					28.	*C. striata* (Kutz) Grun

		Stephanodiscus	29.	*Stephanodiscus niagrara* Ehr.
		Perithyra	30.	*Perithyra denaria* Ehr.
Rhizosoleniales	Leptocylindriceae	*Leptocylindrus*	31.	*Leptocylindrus danicus* Cleve
	Hemidiscusceae	*Hemidiscus*	32.	*Hemidiscus cueniformis* Wallich
	Rhizosoleniaceae	*Rhizosolenia*	33.	*Rhizosolenia robusta* Norm.
			34.	*R. setigera* Brightwell
			35.	*R. stolterfothii* Cleve
	Bacteriastraceae	*Bacteriastrum*	36.	*Bacteriastrum varians* Lauder
	Chaetoceraceae	*Chaetoceros*	37.	*Chaetoceros atlanticus* Ehr.
Biddulaphiales	Biddulaphiaceae	*Biddulaphia*	38.	*Biddulphia aurita* (Lyng.) Breb.
			39.	*B. mobiliensis* Bailey
			40.	*B. obtusa* Kutzing
			41.	*B. pulchella* Gray
			42.	*B. sinensis* Greville
Triceratiales	Triceratiaceae	*Triceratium*	43.	*Triceratium favus* Ehr.
			44.	*T. reticulum* Ehr.
	Hemiaulaceae	*Hemiaulus*	45.	*Hemiaulus hauckii* Grunow
Lithodesmiales	Lithodesmiaceae	*Ditylum*	46.	*Ditylum brightwell* (West) Grunow
			47.	*D. sol* Grunow
		Lithodesmium	48.	*Lithodesmium undulatum* Ehr.
	Eucampiaceae	*Eucampia*	49.	*Eucampia zoodicus* Ehr.
		Streptotheca	50.	*Streptotheca indica* Karten
			51.	*S. thamerisis* Shrubsole

Discussion and Conclusions

In the present study, 51 species of littoral centric diatoms from Setse Coastal Area were recorded. Among those, total 47 species, 47 species and 50 species were recorded in sandflat, mudflat and tidal pool respectively.

In sandflat, 26 species, 17 species, 20 species, 23 species, 13 species, 14 species, 15 species, 22 species, 20 species of littoral centric diatoms were observed in July, August, September, October, November, December, January, February and March respectively during the study period. Also in mudflat, 9 species, 17 species, 14 species, 18 species, 19 species, 10 species, 16 species, 12 species and 17 species of littoral centric diatoms were observed in July, August, September, October, November, December, January, February and March respectively during the study period. Moreover, in tidal pool, 28 species, 18 species, 16 species, 16 species, 29

species, 36 species, 22 species, 24 species and 18 species were observed at the same months.

Among the recorded species, *Melosira malayensis*, *Hemiaulus hauckii*, *Eucampia zoodicus* and *Streptotheca thamerisis* were not found in sandflat. *Aulacodiscus zonulatus*, *Perithyra denaria*, *Hemidiscus cueniformis* and *Bacteriastrum varians* were not observed in mudflat. In tidal pool, only one species of centric diatom *Melosira hyperborean* not occurred. A total of 39 genera and 98 species of phytoplankton in Mawtin and Leik Is. were listed by Saw Han Shein, Kyi Shwe and Kyi Win (1972). Among these species, 18 species of centric diatoms, viz., *Lauderia borealis*, *Skeletonema costatum*, *Thalassiosira subtilis*, *Coscinodiscus excentrius*, *C. gigas*, *C. radiatus*, *Planktoniella sol*, *Hemidiscus cueniformis*, *Rhizosolenia robusta*, *R. stolterfothii*, *Biddulaphia aurita*, *B. mobiliensis*, *B. obtusa*, *B. pulchella*, *B. pulchella*, *Ditylum brightwell*, *D. sol*, and *Eucampia zoodicus*, were found in the present study.

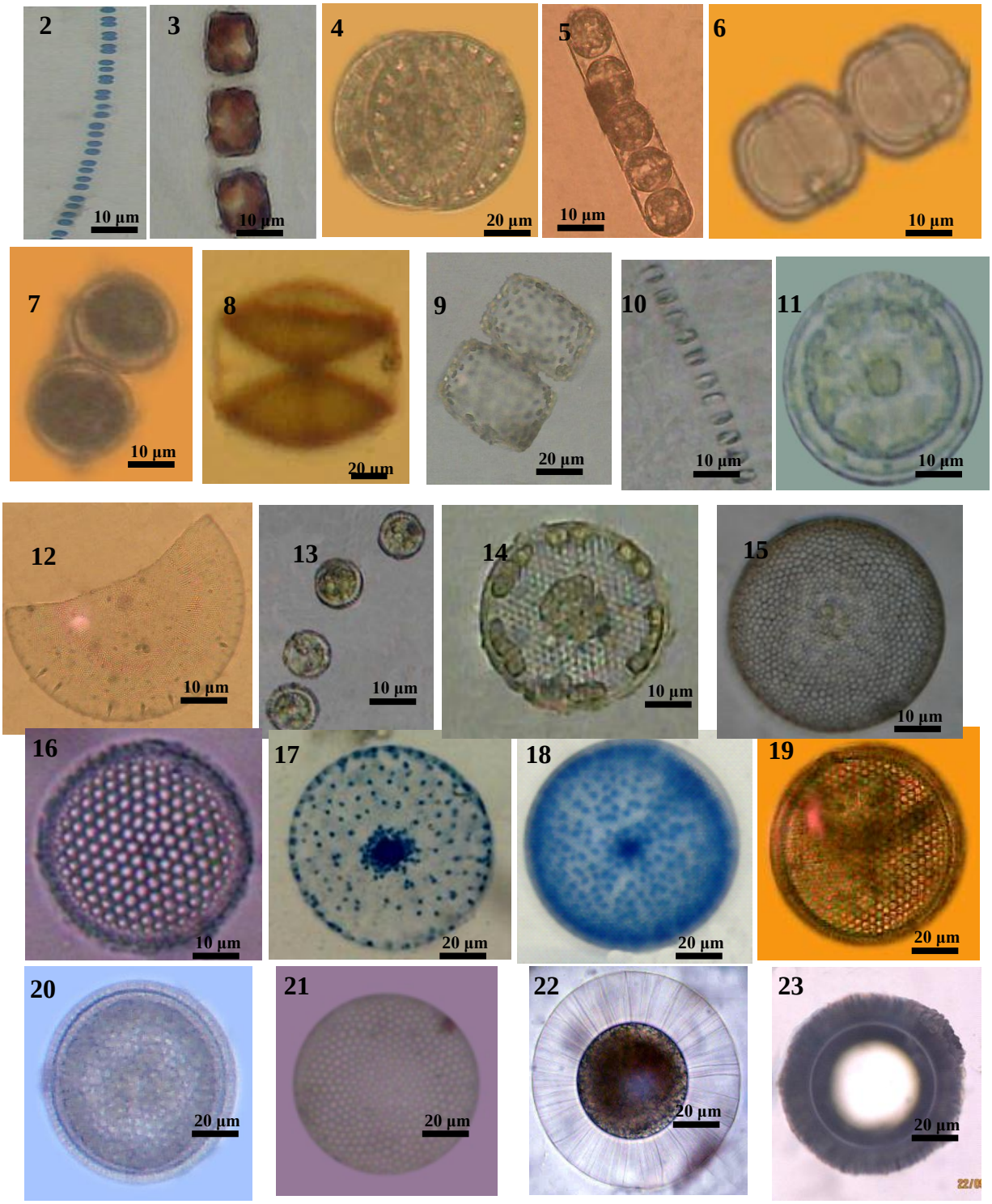
A total of 43 genera and 76 species of phytoplankton in Zyae Phyu Thaung were observed by Thein Lwin and Kyi Win (1972). Among these species, 20 species of centric diatoms, viz., *Hyalodiscus stelliger*, *Lauderia borealis*, *Thalassiosira subtilis*, *Coscinodiscus granii*, *C.lineatus*, *C.marginatus*, *C. radiatus*, *Planktoniella sol*, *Hemidiscus cueniformis*, *Rhizosolenia robusta*, *Bacteriastrum varians*, *Biddulaphia aurita*, *B. mobiliensis*, *B. obtusa*, *B. pulchella*, *B. pulchella*, *Triceratium favus*, *T. reticulum*, *Ditylum brightwellii*, *D. sol* and *Streptotheca thamerisis* occurred in the present study.

A total of 114 species of phytoplankton in Akyab, Kyaukphyu and Gwa were observed by Maung Maung Myint, Aung Myint and Saw Han Shein (1973). Among these species, 23 species of centric diatoms, viz., *Melosira nummuloides*, *Lauderia borealis*, *Thalassiosira subtilis*, *Coscinodiscus asteromphalus*, *C. gigas*, *C. granii* Gough, *C.lineatus*, *C. radiatus*, *Planktoniella sol*, *Leptocylindrus danicus*, *Hemidiscus cueniformis*, *Rhizosolenia robusta*, *R. setigera*, *Bacteriastrum varians*, *Biddulaphia aurita*, *B. mobiliensis*, *B. obtusa*, *B. pulchella*, *B. pulchella*, *Triceratium favus*, *T. reticulum*, *Ditylum brightwellii* and *D. sol* were observed in the present study.

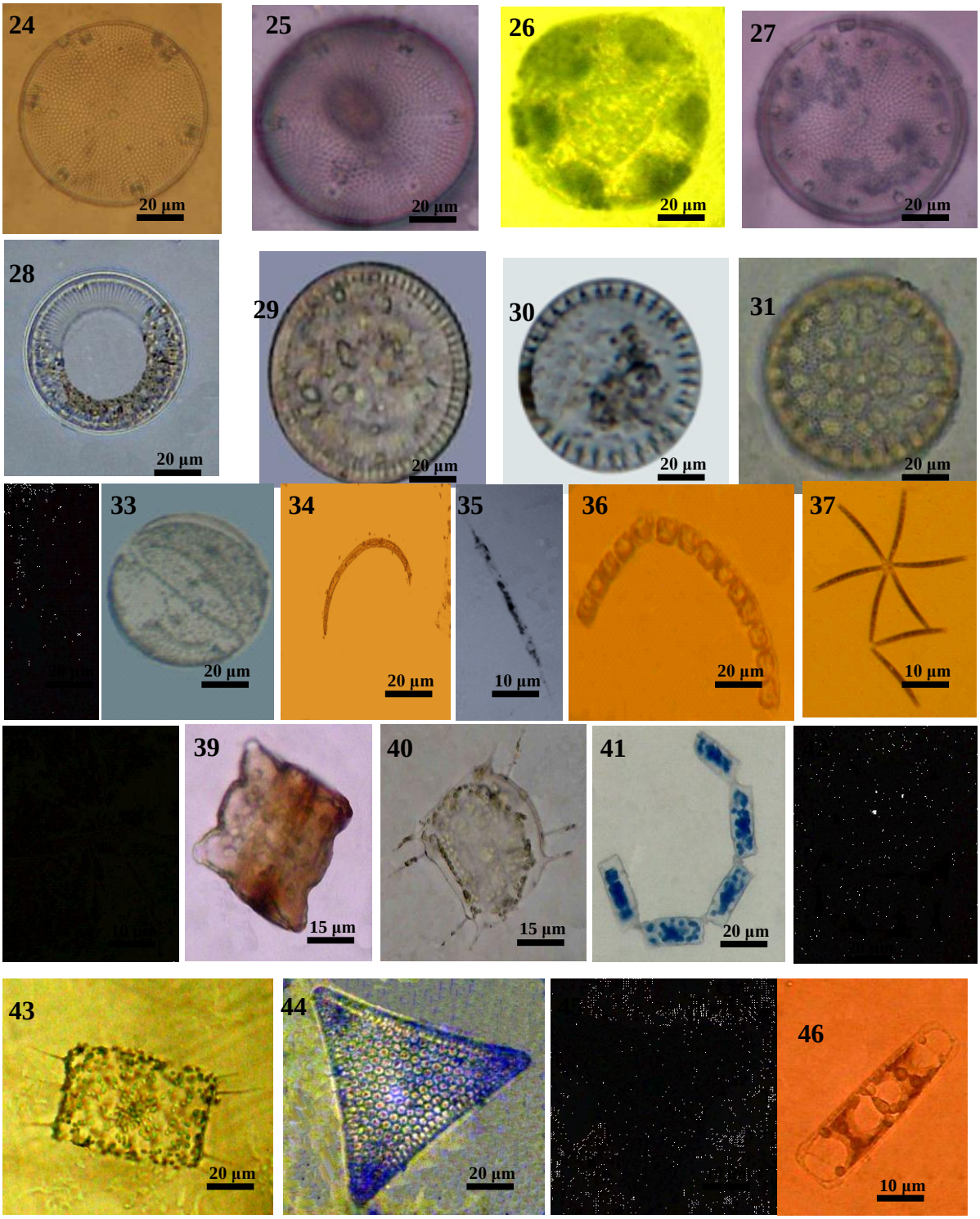
A total of 314 species of phytoplankton in Myanmar coastal water were observed by Kyi Win (1972). Among these species, 34 species of centric diatoms, viz., *Melosira borrei*, *Hyalodiscus stelliger*, *Lauderia borealis*, *Skeletonema costatum*, *Thalassiosira decipines*, *T. subtilis*, *Coscinodiscus asteromphalus*, *C. excentrius*, *C. gigas*, *C. granii*, *C.lineatus*, *C.marginatus*, *C. radiatus*, *Actinoptychus undulalus*, *Aulacodiscus voluta-coeli*, *Cyclotella striata*, *Planktoniella sol*, *Leptocylindrus danicus*, *Hemidiscus cueniformis*, *Rhizosolenia robusta*, *R. setigera* , *R. stolterfothii*, *Bacteriastrum varians*, *Chaetoceros atlanticus*, *Biddulaphia aurita*, *B. mobiliensis*, *B. obtusa* , *B. pulchella*, *B. pulchella*, *Triceratium favus*, *T. reticulum*, *Ditylum brightwellii*, *D. sol*, *Eucampia zoodicus*, *S.indica* and *Streptotheca thamerisis* were observed in the present study. A total of 59 species of phytoplankton in Myanmar coastal water of North-East Andaman Sea were observed by Zin Lin Khine and Htay Aung (2009). Among these species 1 species of centric diatom, viz., *Ditylum brightwellii* was also found in the present study.

Among the above-mentioned littoral centric diatoms, *Skeletonema costatum*, and *Chaetoceros atlanticus* are very useful in aquaculture for the larvae of fauna. Most of centric diatoms are benefit greatly for fishery and aquaculture. As these diatoms are important food for fish and prawn. They are of ecological importance for fishery in the Setse coastal area. So, further studies on the seasonal occurrence,

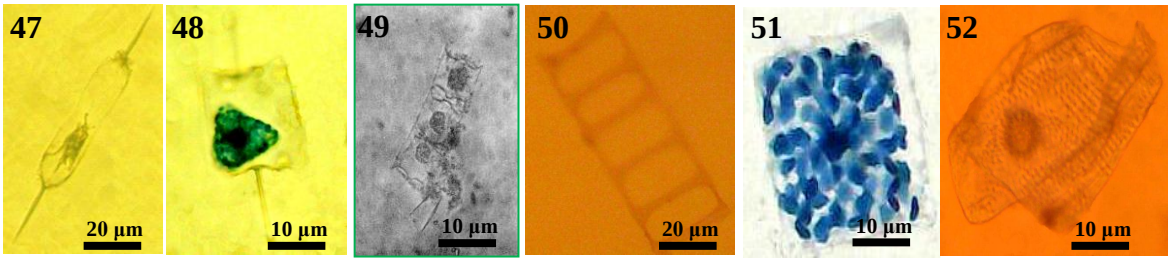
distribution and abundance of diversity of littoral centric diatoms in the Setse coastal area should be continued on a long-term basis.



Figs. 2-23. Centric diatoms: 2. *Melosira borrei* Grev., 3. *M. hyperborea* Grunow 4. *M. malayensis* Ehr. 5. *M. nummuloides* (Bory) C. A. Agardh. 6. *M. octogona* A. Schmidt, 7. *Hyalodiscus stelliger* Bail., 8. *H. subtilis* Bail., 9. *Lauderia borealis* Gran., 10. *Skeletonema costatum* (Greville) Cleve, 11. *Thalassiosira decipines* (Grunow) Jornesen, 12. *T. eccentrica* (Ehr.) Cleve., 13. *T. punctigera* (Castracane) Halse, 14. *T. subtilis* (Ostenfeld) Gran, 15. *Coscinodiscus asteromphalus* Ehr., 16. *C. excentrius* Ehrenberg, 17. *C. gigas* Ehrenberg., 18. *C. granii* Gough, 19. *Coscinodiscus lineatus* Ehr., 20. *C. marginatus* Ehr., 21. *C. radiatus* Ehrenberg., 22. *Planktoniella sol* Schutt., 23. *Gossleriella tropica* Schutt.



Figs. 24-46. Centric diatoms: 24. *Actinoptychus undulalus* Ehr., 25. *Aulacodiscus voluta-coeli* Grun., 26. *A. zonulatus* Rattr., 27. *Actinocyclus ralfii* (W.Sm) Ralfs., 28. *Cyclotella meneghiniana* Kutz., 29. *C. striata* (Kutz) Grun., 30. *Stephanodiscus niagrara* Ehr., 31. *Perithyra denaria* Ehr., 32. *Leptocylindrus danicus* Cleve., 33. *Hemidiscus cueniformis* Wallich, 34. *Rhizosolenia robusta* Norm, 35. *R. setigera* Brightwell. 36. *R. stolterfothii* Cleve, 37. *Bacteriastrum varians* Lauder, 38. *Chaetoceros atlanticus* Ehr., 39. *Biddulphia aurita* (Lyng.) Breb., 40. *B. mobiliensis* Bailey, 41. *B. obtusa* Kutzing, 42. *B. pulchella* Gray., 43. *B. sinensis* Gray., : 44. *Triceratium favus* Ehr., 45. *T. reticulum* Ehr., 46. *Hemiaulus hauckii* Grunow.



Figs. 47-52. Centric diatoms: 47. *Ditylum brightwellii* (West) Grunow., 48. *D. sol* Grunow, 49. *Eucampia zoodicus* Ehr., 50. *Lithodesmium undulatum* Ehr., 51. *Streptotheca indica* Karten, 52. *S. thamerisis* Shrubsole.

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