

Supplementary Information

A comparison between the morphological and molecular approach to identify the benthic diatom community in the St Lucia Estuary, South Africa

M Nunes, JB Adams, S Van Aswegen and GF Matcher

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Table S1: Locations of the six sampling sites for benthic diatoms in the St Lucia estuarine system, South Africa (western Indian Ocean)

Sampling site	GPS coordinates	
	Latitude (°S)	Longitude (°E)
1	28.383063	32.423336
2	28.387573	32.412510
3	28.387058	32.404032
4	28.379304	32.407502
5	28.369224	32.409715
6	28.221057	32.485870

Table S2: Summary of the matched samples of benthic diatoms collected for each habitat type, per site, in the St Lucia Estuary, South Africa: sites 1–5 were in the Narrows, and site 6 was at Catalina Bay in South Lake (see Figure 1 in main text). All samples were used for downstream analysis

Sampling site	Habitat type		
	Unvegetated	Vegetated	Epiphytes
1	✓	✓	✗
2	✓	✓	✗
3	✓	✓	✗
4	✓	✓	✗
5	✓	✓	✗
6	✓	✓	✓

Table S3: The taxonomic rank and assignment of the unclassified DNA reads, per habitat type, identified using DNA metabarcoding, for benthic diatoms collected from the St Lucia estuarine system, South Africa

Taxonomic rank	Taxonomic assignment	Habitat type		
		Unvegetated	Vegetated	Epiphytes
Subkingdom	Chromobiota		x	
Phylum	Bacillariophyta	x	x	x
Class	Bacillariophyceae	x	x	x
Order	Achnanthes	x	x	x
Order	Naviculales	x	x	x
Order	Surirellales	x	x	
Order	Thalassiosirales	x	x	x
Family	Achnanthidiaceae	x	x	
Family	Bacillariaceae	x	x	x
Family	Catenulaceae	x	x	x
Family	Cocconeidaceae	x	x	
Family	Fragilariaceae	x	x	x
Family	Mediophyceae	x	x	x
Family	Naviculaceae	x	x	x
Family	Pinnulariaceae	x		
Family	Surirellaceae	x	x	
Family	Thalassiosiraceae		x	x
Family	Triceratiaceae		x	x

Table S4: Relative abundance (RA, %) of the diatom species, per habitat type, identified using light microscopy, for benthic diatoms in the St Lucia estuarine system, South Africa. Dominant (RA >10%) and subdominant (RA >5% but ≤10%) species are shown in bold

Species	Habitat type		
	Unvegetated	Vegetated	Epiphytes
<i>Achnantheidium minutissimum</i> (Kützinger) Czarnecki	0.00	0.00	1.75
<i>Actinoptychus splendens</i> (Shadbolt) Ralfs	0.74	0.00	0.00
<i>Amphora</i> Ehrenberg ex Kützinger sp. 1	0.50	0.00	0.00
<i>Aulacoseira granulata</i> (Ehrenberg) Simonsen	0.00	0.10	0.00
<i>Cocconeis placentula</i> Ehrenberg	1.24	3.26	37.75
<i>Cocconeis lineata</i> Ehrenberg	0.00	0.00	0.50
<i>Craticula accomodiformis</i> Lange-Bertalot	0.00	0.00	0.25
<i>Craticula ambigua</i> (Ehrenberg) DG Mann	0.00	0.20	0.00
<i>Cyclotella meneghiniana</i> Kützinger	0.00	0.10	0.00
<i>Cymbella</i> C.Agardh sp. 1	0.25	0.10	0.00
<i>Denticula</i> Kützinger sp. 1	0.00	0.59	0.00
<i>Diploneis elliptica</i> (Kützinger) Cleve	0.00	0.30	0.00
<i>Diploneis interrupta</i> (Kützinger) Cleve	1.73	0.59	0.00

Diploneis littoralis (Donkin) Cleve	2.23	0.00	0.00
<i>Diploneis oblongella</i> (Nägeli ex Kützing) Cleve-Euler	1.24	3.66	1.25
<i>Diploneis smithii</i> (Brébisson) Cleve	12.13	13.75	0.00
<i>Encyonema neogratile</i> Krammer	0.00	0.00	0.25
<i>Falacia</i> sp. 1 Stickle & DG Mann	0.00	0.30	0.00
<i>Frustulia vulgaris</i> (Thwaites) De Toni	0.00	0.10	0.00
<i>Frustulia</i> cf. <i>saxonica</i> Rabenhorst	2.48	0.49	0.00
<i>Gomphonema parvulum</i> (Kützing) Kützing	0.25	0.49	1.75
<i>Gomphonema subclavatum</i> var. <i>commutatum</i> (Grunow) Mayer	0.00	0.00	0.50
<i>Gyrosigma acuminatum</i> (Kützing) Rabenhorst	5.45	5.54	0.00
<i>Gyrosigma balticum</i> (Ehrenberg) Rabenhorst	2.48	0.00	0.00
<i>Gyrosigma eximium</i> (Thwaites) Boyer	1.98	0.20	0.50
<i>Gyrosigma fasciola</i> (Ehrenberg) Griffith & Henfrey	0.25	0.00	0.00
<i>Gyrosigma scalproides</i> (Rabenhorst) Cleve	0.00	0.69	0.00
<i>Gyrosigma</i> Hassall sp.	0.00	0.10	0.00
<i>Hantzschia distinctepunctata</i> Hustedt	0.50	0.10	0.00
<i>Hantzschia amphioxys</i> (Ehrenberg) Grunow	0.25	0.10	0.00
<i>Halamphora coffeiformis</i> (C Agardh) Levkov	1.24	0.49	0.00
<i>Halamphora veneta</i> (Kützing) Levkov	0.00	1.09	25.50
<i>Haslea spicula</i> (Hickie) Bukhtiyarova	2.48	0.20	0.00
<i>Mastogloia smithii</i> Thwaites ex W Smith	0.50	0.49	0.75
<i>Podosira dubia</i> (Kützing) Grunow	1.73	1.78	0.00
<i>Navicula cryptotenella</i> Lange-Bertalot	4.46	0.99	0.00
<i>Navicula eidrigeana</i> Carter	0.74	1.29	5.50
<i>Navicula germainii</i> Wallace	3.22	1.68	0.00
<i>Navicula hasteaformis</i>	0.25	0.89	0.25
<i>Navicula pennata</i> Schmidt	5.69	1.98	0.00
<i>Navicula schroeteri</i> Meister	0.00	2.67	0.00
<i>Navicula</i> Bory sp. 1	0.25	0.00	0.00
<i>Navicula</i> Bory sp. 2	0.00	0.30	0.00
<i>Navicula</i> Bory sp. 3	0.00	0.00	0.75
<i>Navicula subrhynchocephala</i> Hustedt	0.25	1.09	0.25
<i>Navicula symmetrica</i> Patrick	9.16	2.47	0.00
<i>Navicula tenelloides</i> Hustedt	8.42	0.79	0.75
<i>Navicula tripunctata</i> (OF Müller) Bory	0.00	0.00	1.25
<i>Navicula veneta</i> Kützing	0.00	2.08	0.00
<i>Navicymbula pusilla</i> (Grunow) Krammer	0.74	2.18	0.50
<i>Nitzschia acicularis</i> (Kützing) W Smith	9.41	0.10	0.00
<i>Nitzschia amphibia</i> Grunow	0.00	0.10	0.00
<i>Nitzschia aremonica</i> Archibald	1.49	1.98	0.25
<i>Nitzschia clausii</i> Hantzsch	0.00	1.68	0.00
<i>Nitzschia dissipata</i> (Kützing) Rabenhorst	0.25	1.29	0.00

<i>Nitzschia lieberthrutii</i>	0.25	0.00	3.50
<i>Nitzschia linearis</i> var. <i>subtilis</i> Hustedt	0.25	0.00	0.00
<i>Nitzschia palea</i> (Kützinger) W Smith	0.25	1.78	0.00
<i>Nitzschia reversa</i> W Smith	0.00	0.10	0.00
<i>Nitzschia sigma</i> (Kützinger) W Smith	2.97	4.25	0.00
<i>Nitzschia</i> Hassall sp. 1	0.74	0.00	0.00
<i>Nitzschia incurva</i> var. <i>lorenziana</i> Ross	0.00	2.18	0.00
<i>Petroneis</i> cf. <i>marina</i> (Ralfs) DG Mann	0.25	0.10	0.00
<i>Pinnularia biceps</i> W Gregory	0.00	0.00	0.25
<i>Pinnularia borealis</i> Ehrenberg	0.25	0.00	0.00
<i>Pinnularia microstauron</i> (Ehrenberg) Cleve	0.00	0.30	0.00
<i>Placoneis</i> Mereschkowsky sp. 1	0.25	0.20	0.00
<i>Psammodictyon constrictum</i> (Gregory) DG Mann	0.99	1.09	0.00
<i>Rhopalodia gibberula</i> (Ehrenberg) O Müller	0.50	22.26	3.75
<i>Seminavis robusta</i> Danielidis & DG Mann	0.25	0.30	9.75
<i>Staurosira construens</i> Ehrenberg	4.46	0.30	0.25
<i>Tabularia fasciculata</i> (Agardh) Williams & Round	1.73	1.98	1.25
<i>Terpsinoë americana</i> (Bailey) Ralfs	0.25	0.20	0.00
<i>Tryblionella littoralis</i> (Grunow) DG Mann	0.50	2.67	0.00
<i>Tryblionella debilis</i> Arnott ex O'Meara	0.50	3.26	0.00
<i>Tryblionella granulata</i> (Grunow) DG Mann	1.73	0.59	0.25
<i>Ulnaria ulna</i> (Nitzsch) Compère	0.00	0.00	0.75

Table S5: Relative abundance (RA, %) of the diatom species, per habitat type, identified using DNA metabarcoding, for benthic diatoms collected from the St Lucia estuarine system, South Africa. The dominant and subdominant molecular operational taxonomic units (MOTUs) are shown in in bold

Species	Habitat type		
	Unvegetated	Vegetated	Epiphytes
<i>Actinopterychus splendens</i> (Shadbolt) Ralfs	0.01	0.00	0.00
<i>Amphora pediculus</i> (Kützinger) Grunow	0.00	0.004	0.00
<i>Anomoeoneis sphaerophora</i> var. <i>sculpta</i> (Ehrenberg) Müller	0.00	0.004	0.04
<i>Aulacoseira granulata</i> (Ehrenberg) Simonsen	0.00	0.02	0.00
<i>Aulacoseira ambigua</i> (Grunow) Simonsen	0.00	0.35	0.00
<i>Cocconeis placentula</i> Ehrenberg	0.08	0.03	1.79
<i>Cocconeis</i> Ehrenberg sp. 1	0.09	0.00	0.00
<i>Cocconeis</i> Ehrenberg sp. 2	0.91	0.32	0.02
<i>Coronia</i> (Ehrenberg ex Grunow) Ehrenberg sp.	0.05	0.00	0.00
<i>Cyclostephanos</i> Round sp.	0.00	0.07	0.00
<i>Cyclotella meneghiniana</i> Kützinger	0.00	0.06	0.04
<i>Cyclotella atomus</i> Hustedt	2.78	6.86	0.00

<i>Cyclotella cryptica</i> Reimann, Lewin & Guillard	0.00	0.004	0.00
<i>Cyclotella</i> (Kützing ex Brébisson)	0.00	0.08	0.02
<i>Diploneis</i> Ehrenberg ex Cleve sp. 1	0.04	0.76	0.07
<i>Diploneis</i> Ehrenberg ex Cleve sp. 2	2.03	7.48	2.08
<i>Entomoneis alata</i> (Ehrenberg) Ehrenberg	1.35	0.27	0.00
<i>Entomoneis</i> Ehrenberg sp. 1	1.32	0.07	0.00
<i>Entomoneis</i> Ehrenberg sp. 2	1.05	0.14	0.00
<i>Epithemia sorex</i> Kützing	0.00	0.00	0.03
<i>Epithemia</i> Kützing sp. 1	0.00	0.05	0.003
<i>Epithemia</i> Kützing sp. 2	0.75	11.38	0.08
<i>Fallacia pygmaea</i> (Kützing) Stickle & Mann	0.00	1.59	0.00
<i>Fistulifera saprophila</i> (Lange-Bertalot & Bonik) Lange-Bertalot	0.02	0.004	6.47
<i>Gomphonema subclavatum</i> var. <i>commutatum</i> (Grunow) Mayer	0.00	0.00	0.06
<i>Gomphonema</i> Ehrenberg sp.	0.09	0.17	17.73
<i>Halamphora veneta</i> (Kützing) Levkov	0.00	0.004	13.14
<i>Halamphora montana</i> (Krasske) Levkov	0.04	0.40	0.00
<i>Halamphora</i> (Cleve) Levkov	2.56	1.47	0.003
<i>Halamphora subtropica</i> (Wachnicka & Gaiser) Rimet & Jahn	0.21	0.08	0.00
<i>Halamphora tenerrima</i> (Aleem & Hustedt) Levkov	0.00	0.19	0.001
<i>Luticola sparsipunctata</i> Levkov, Metzeltin & Pavlov	0.00	0.004	0.001
<i>Mastogloia</i> Thwaites ex Smith sp.	0.00	0.01	0.00
<i>Mayamaea permitis</i> (Hustedt) Bruder & Medlin	0.00	0.10	0.00
<i>Mayamaea</i> Lange-Bertalot sp.	0.004	0.002	0.01
<i>Podosira dubia</i> (Kützing) Grunow	1.97	0.83	1.08
<i>Melosira</i> Agardh sp.	32.57	4.39	1.03
<i>Minidiscus trioculatus</i> (Taylor) Hasle	0.00	0.00	0.01
<i>Navicula germainii</i> Wallace	0.22	0.25	0.00
<i>Navicula veneta</i> Kützing	0.00	0.70	0.23
<i>Navicula</i> Bory sp. 1	1.80	0.88	0.00
<i>Navicula</i> Bory sp. 2	18.95	10.91	0.29
<i>Nitzschia amphibia</i> Grunow	0.00	0.00	0.001
<i>Nitzschia palea</i> (Kützing) W Smith	0.00	0.28	0.18
<i>Nitzschia sigma</i> (Kützing) W Smith	2.32	2.28	0.00
<i>Nitzschia incurva</i> var. <i>lorenziana</i> Ross	0.00	4.42	0.01
<i>Nitzschia bulnheimiana</i> (Rabenhorst) HL Smith	0.02	0.04	5.39
<i>Nitzschia filiformis</i> (W Smith) Van Heurck	0.05	3.99	0.22
<i>Nitzschia inconspicua</i> Grunow	0.02	0.15	8.10
<i>Nitzschia</i> Hassall sp. 3	0.24	1.67	0.00
<i>Nitzschia</i> Hassall sp. 4	11.83	23.29	36.81
<i>Nitzschia supralittorea</i> Lange-Bertalot	0.55	0.67	0.65
<i>Nitzschia tubicola</i> Grunow	0.00	0.40	0.00
<i>Nitzschia valdestriata</i> Aleem & Hustedt	0.03	0.00	0.00
<i>Opephora</i> Petit sp.	0.01	0.02	0.00

<i>Pinnularia</i> Ehrenberg sp.	0.00	0.08	0.00
<i>Pleurosigma</i> W Smith sp. 1	0.07	0.36	0.01
<i>Pleurosigma</i> W Smith sp. 2	0.00	0.10	0.00
<i>Psammodictyon constrictum</i> (W.Gregory) DG Mann	0.00	0.10	0.00
<i>Psammodictyon</i> DG Mann sp.	0.14	1.11	0.00
<i>Rhopalodia gibberula</i> (Ehrenberg) Otto Müller	0.00	0.00	0.00
<i>Eolimna minima</i> (Grunow) Lange-Bertalot	0.00	0.01	0.00
<i>Sellaphora seminulum</i> (Grunow) DG Mann	0.00	0.02	0.00
<i>Sellaphora</i> Mereschkowsky sp.	0.00	0.01	0.00
<i>Seminavis robusta</i> DB Danielidis & DG Mann	0.01	0.08	2.96
<i>Skeletonema potamos</i> (CI Weber) Hasle	0.00	0.02	0.00
<i>Staurosira construens</i> Ehrenberg	0.91	1.75	0.22
<i>Stephanodiscus</i> Ehrenberg sp. 1	0.00	0.01	0.00
<i>Stephanodiscus</i> Ehrenberg sp. 2	0.00	0.03	0.00
<i>Tabularia</i> (Kützing) Williams & Round sp.	0.00	0.00	0.35
<i>Tabularia tabulata</i> (C Agardh) Snoeijs	0.00	0.00	0.001
<i>Terpsinoë americana</i> (Bailey) Ralfs	13.85	1.75	0.00
<i>Thalassiosira minuscula</i> Krasske	0.00	0.00	0.001
<i>Thalassiosira gravida</i> Cleve	0.01	0.01	0.00
<i>Thalassiosira</i> Cleve	0.00	0.01	0.003
<i>Tryblionella littoralis</i> (Grunow) DG Mann	0.00	0.00	0.00
<i>Tryblionella debilis</i> Arnott ex O'Meara	0.004	1.52	0.00
<i>Tryblionella granulata</i> (Grunow) DG Mann	0.00	0.00	0.00
<i>Tryblionella</i> W.Smith sp. 1	0.00	0.04	0.00
<i>Tryblionella</i> W.Smith sp. 2	1.03	1.86	0.00
<i>Ulnaria ulna</i> (Nitzsch) Compère	0.01	0.01	0.86