Supplemental Table 1. List of epibionts found during this study. Species names as used in this study and as suggested in AlgaeBase (assessed on 07-Feb-2023). Life forms (attached/unattached and colony/solitary) for diatoms are also listed.

Taxonomic units	Niigata	Osaka	Okinawa	Attachment	Form
Diatoms					
Achnanthes armillaris (O.F.Müller) Guiry 2019		+	+	attached	colony
Achnanthes grunowii Toyoda & D.M.Williams 2005		+		attached	colony
Achnanthes spp.	+	+	+	attached	colony
Actinoptychus senarius (Ehrenberg) Ehrenberg 1843	+			attached	colony
Amphora bigibba Grunow 1875	+	+	+	attached	solitary
Amphora japonica F.Meister			+	attached	solitary
Amphora lanceolata Ehrenberg	+			attached	solitary
Amphora longiceps Simonsen 2012		+	+	attached	solitary
Amphora ovalis (Kützing) Kützing 1844	+	+	+	attached	solitary
Amphora spp.	+	+	+	attached	solitary
Azpeitia nodulifera (A.W.F.Schmidt) G.A.Fryxell & P.A.Sims 1986	+		+	unattached	solitary
Bacillaria spp.			+	attached	colony
Biddulphia pulchella S.F.Gray, nom. illeg. 1821	+		+	attached	colony
Biddulphia spp.	+	+	+	attached	colony
Caloneis linearis (Cleve) Boyer 1927			+	attached	solitary
Campyloneis grevillei (W.Smith) Grunow & Eulenstein 1868	+			attached	colony
Chaetoceros sp.		+		unattached	colony
Cocconeis pediculus Ehrenberg 1838	+			attached	colony
Cocconeis placentula Ehrenberg 1838	+		+	attached	colony
Cocconeis scutellum Ehrenberg 1838		+		attached	colony
Cocconeis spp.	+	+	+	attached	colony
Coscinodiscus megalomma A.W.F.Schmidt 1891		+		unattached	solitary
Coscinodiscus plicatus Grunow 1878	+			unattached	solitary
Coscinodiscus radiatus var. *oculus-iridis* (Ehrenberg) E. Jørgensen 1905	+			unattached	solitary
Coscinodiscus spp.	+	+	+	unattached	solitary
Cyclophora spp.	+	+		attached	colony
Cyclophora tenuis Castracane 1878	+	+		attached	colony
Cymbella lanceolata C.Agardh 1830			+	attached	colony
Diatoma spp.	+			attached	solitary
Diploneis fusca (W.Gregory) Cleve 1894			+	unattached	solitary
Diploneis splendida Cleve 1894		+	+	unattached	solitary
Entomoneis alata (Ehrenberg) Ehrenberg 1845	+		+	attached	solitary
Entomoneis paludosa var. *hyperborea* (Grunow) Czarnecki & D.C.Reinke 1982		+	+	attached	solitary
Fragilaria hyalina (Kützing) Grunow 1862	+			attached	colony
Fragilaria oceanica Cleve 1873	+	+	+	attached	colony
Fragilaria spp.	+			attached	colony
Gomphoneis spp.		+		attached	colony
Gomphonema exiguum (Ostrup) Fricke, 1902	+	+	+	attached	colony
Gomphonema spp.	+			attached	colony
Gomphonemopsis spp.	+			attached	solitary
Grammatophora marina (Lyngbye) Kützing 1844		+		attached	colony
Halamphora coffeiformis (C.Agardh) Mereschkowsky 1903			+	attached	solitary
Lauderia annulata Cleve 1873	+			unattached	colony
Licmophora abbreviata C.Agardh 1831	+			attached	colony
Mastogloia minuta Greville 1857		+	+	attached	colony
Melosira hyperborea Grunow, 1882	+			attached	colony
Melosira moniliformis (Link) C.Agardh 1824		+	+	attached	colony
Melosira nummuloides C. Agardh	+	+	+	attached	colony
Melosira spp.	+			attached	colony
Meuniera membranacea (Cleve) P.C.Silva 1996	+	+	+	attached	solitary
Navicula pungens A.Cleve		+	+	attached	solitary
Navicula salinarum Grunow 1880	+		+	attached	solitary
Navicula spp.	+	+	+	attached	solitary
Nitzschia fasciculata (Grunow) Grunow 1881		+		unattached	solitary
Nitzschia longissima (Brébisson) Ralfs 1861	+		+	attached	solitary
Nitzschia pubens Cholnoky 1960		+	+	attached	solitary
Nitzschia spp.	+	+	+	attached	solitary

Nitzschia vitrea G.Norman 1861	+	+	+	attached	solitary
Odontella aurita (Lyngbye) C.Agardh 1832	+			attached	colony
Odontella obtusa Kützing 1844	+			attached	colony
Paralia sulcata (Ehrenberg) Cleve 1873	+			attached	colony
Pinnularia spp.	+	+		unattached	solitary
Pinnunavis elegans (W.Smith) Okuno 1975	+	+	+	attached	solitary
Placoneis anglophila (Lange-Bertalot) Lange-Bertalot 2005		+		attached	solitary
Pleurosigma affine Grunow 1880	+			unattached	solitary
Pleurosigma inflatum Shadbolt 1853		+		unattached	solitary
Pleurosigma normanii Ralfs 1861		+		unattached	solitary
Pleurosigma spp.			+	unattached	solitary
Podosira stelligera (Bailey) A.Mann 1907	+			attached	solitary
Psammodiscus nitidus (W.Gregory) Round & D.G.Mann 1980	+			attached	solitary
Pseudo-nitzschia fraudulenta (Cleve) Hasle 1993	+			unattached	colony
Rhabdonema arcuatum (Lyngbye) Kützing 1844	+		+	attached	colony
Rhizosolenia arafurensis Castracane 1886		+		unattached	colony
Rhizosolenia spp.		+	+	unattached	colony
Rhizosolenia styliformis T.Brightwell 1858		+		unattached	colony
Rhoicosphenia genuflexa (Kützing) Medlin 1984		+		attached	colony
Scytonematopsis pilosa (Bornet & Flahault) Umezaki & M.Watanabe 1994	+			unattached	colony
Serratifera opephoroides Chunlian Li & Witkowski, nom. inval. 2018	+			attached	colony
Skeletonema costatum (Greville) Cleve 1873		+		unattached	colony
Stephanopyxis nipponica Gran & Yendo 1914	+			unattached	colony
Stephanopyxis palmeriana (Greville) Grunow 1884	+			unattached	colony
Surirella spp.	+			attached	solitary
Tabularia fasciculata (C.Agardh) D.M.Williams & Round 1986			+	attached	solitary
Tabularia parva (Kützing) D.M.Williams & Round 1986	+	+	+	unattached	colony
Tabularia spp.	+	+	+	unattached	colony
Thalassionema frauenfeldii (Grunow) Tempère & Peragallo 1910		+		unattached	colony
Trichodesmium spp.	+			unattached	colony
Cyanobacteria					
Cyanobacteria sp. A	+	+			
Cyanobacteria sp. B	+				
Chlorella spp.	+	+	+		
Microspora spp.		+			
Phormidium nigroviride (Thwaites ex Gomont) Anagnostidis & Komárek 1988		+	+		
Green algae	+	+			
Red algae					
Bangia spp.	+				
Protozoa					
Protozoa spp.	+				

Supplemental Table 2. Results of ANOVAs on species richness, Simpson diversity (species level), and density of epibionts (N = 103). Fixed factors were site (Niigata, Osaka, and Okinawa), living status (shells with live molluscs, shells with dead molluscs, and inert surfaces), and surface group (bivalves, chitons+limpets, globose gastropods, and inert surfaces). The species richness and the Simpson diversity index were transformed to square-rooted values, and the density was transformed to log values. Homogeneity of variances was tested by Levene test and all the cases, except for the cases of the Simpson diversity on site and the density on surface group, were not significant ($p \geq 0.05$).

Factors	df	Species richness		Simpson diversity		Density	
		F	p	F	p	F	p
One-way							
Site	2	13.98	< 0.001	6.49	0.002	39.52	< 0.001
Living status	2	1.86	0.162	7.18	0.001	3.67	.029
Surface group	3	9.06	< 0.001	8.55	< 0.001	12.35	< 0.001
Two-way							
Site	2	15.01	< 0.001	6.75	0.002	40.82	< 0.001
Living status	2	5.55	0.005	3.94	0.023	0.593	0.555
Site × Living status	2	0.15	0.863	0.06	0.943	3.052	0.052
Site	2	19.57	< 0.001	8.58	< 0.001	56.155	< 0.001
Surface group	3	13.28	< 0.001	6.20	< 0.001	13.909	< 0.001
Site × Surface group	4	1.78	0.139	5.13	< 0.001	1.841	0.127

Supplemental Table 3. Results of analysis of deviance on the ratio of attached and colony forming diatoms against the total density of diatoms (N = 103). Fixed factors were site (Niigata, Osaka, and Okinawa), living status (shells with live molluscs, shells with dead molluscs, and inert surfaces), and surface group (bivalves, chitons+limpets, globose gastropods, and inert surfaces).

Factors	df	Ratio of attached diatoms deviance	p	Ratio of colony diatoms deviance	p
Site	2	52.233	< 0.001	252.403	< 0.001
Living status	2	4.694	0.096	7.729	0.021
Site × Living status	2	5.429	0.066	2.043	0.360
Total	102	522.83		1224.02	
Site	2	52.233	< 0.001	252.403	< 0.001
Surface group	3	104.098	< 0.001	69.855	< 0.001
Site ×Surface group	4	130.723	< 0.001	50.379	< 0.001
Total	102	522.83		1224.02	

Supplemental Table 4. Hierarchical partitioning of taxon richness and Simpson diversity both at species and genus levels (Fig. 6): α_1; diversity at the sample level, β_1; additive β-diversity between the sample and the basibiont levels (basibiont species, plastics, and rock chips), β_2; additive β-diversity between substrate and the surface group levels (including inert surfaces), β_3; additive β-diversity between the surface groups and the site levels, β_4; additive β-diversity between the sites and total levels γ; total diversity (sum of α_1, β_1, β_2, β_3, and β_4). p: significance by permutation tests (n = 999).

	Species level				Genus level			
	Richness		Simpson		Richness		Simpson	
	value	p	value	p	value	p	value	p
α_1	7.97	0.001	2.85	0.013	7.29	0.001	2.75	0.121
β_1	5.68	0.001	1.32	0.001	3.82	0.081	1.11	0.001
β_2	15.85	0.001	0.67	0.001	10.09	0.001	0.38	0.001
β_3	21.50	0.057	0.69	0.001	9.47	0.105	0.72	0.001
β_4	44.00	0.001	3.33	0.001	20.33	0.001	2.92	0.001
γ (sum)	95		8.86		51		7.88	