

The molluscs' periodic table: Elemental analysis reveals distinct mineralization patterns in radular teeth

WENCKE KRINGS^{1,2,3*}, JAN-OLE BRÜTT^{1,2}, STANISLAV N. GORB³

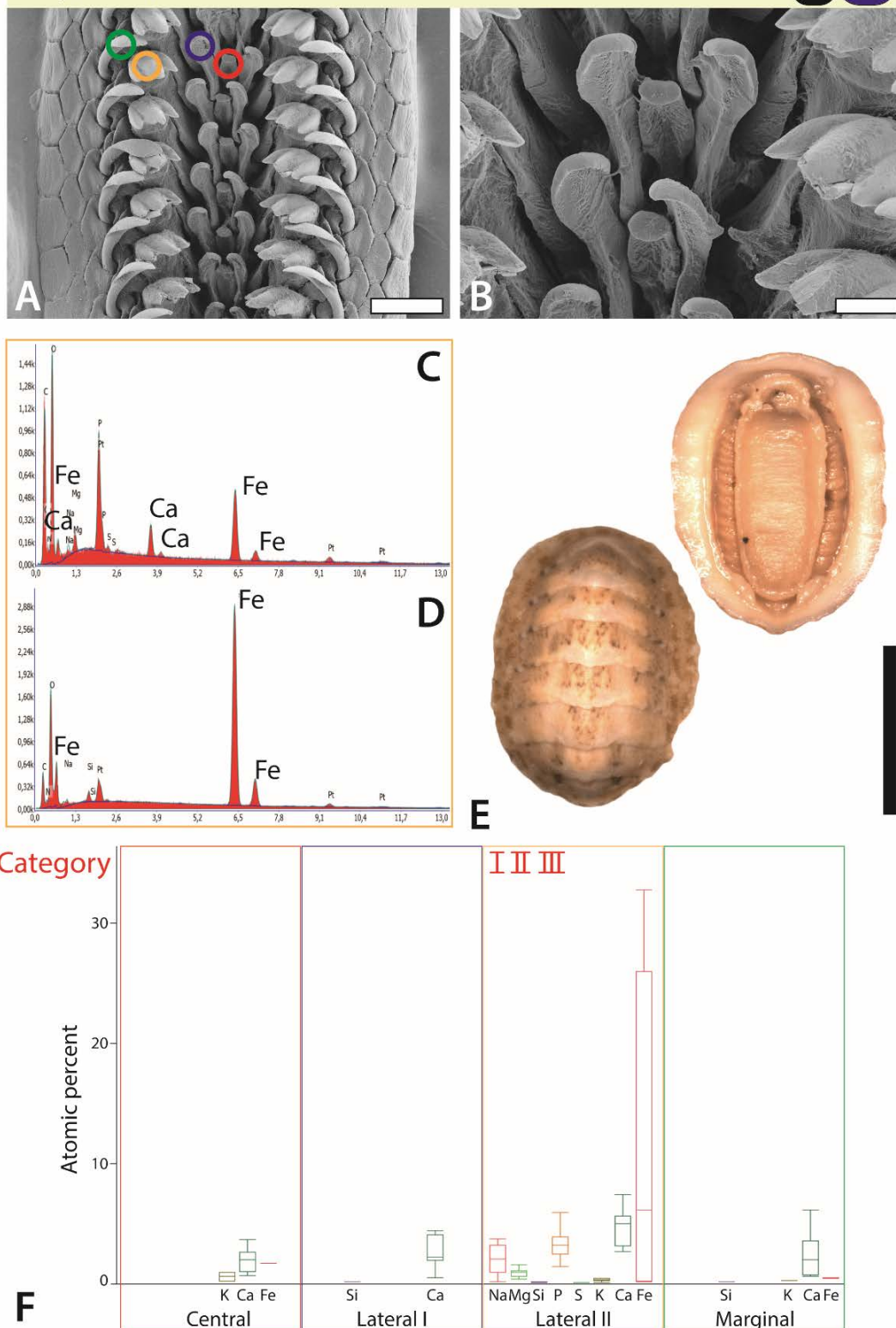
¹ Department of Behavioral Biology, Institut für Zell- und Systembiologie der Tiere, Universität Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany

² Department of Mammalogy and Palaeoanthropology, Leibniz Institute for the Analysis of Biodiversity Change, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany

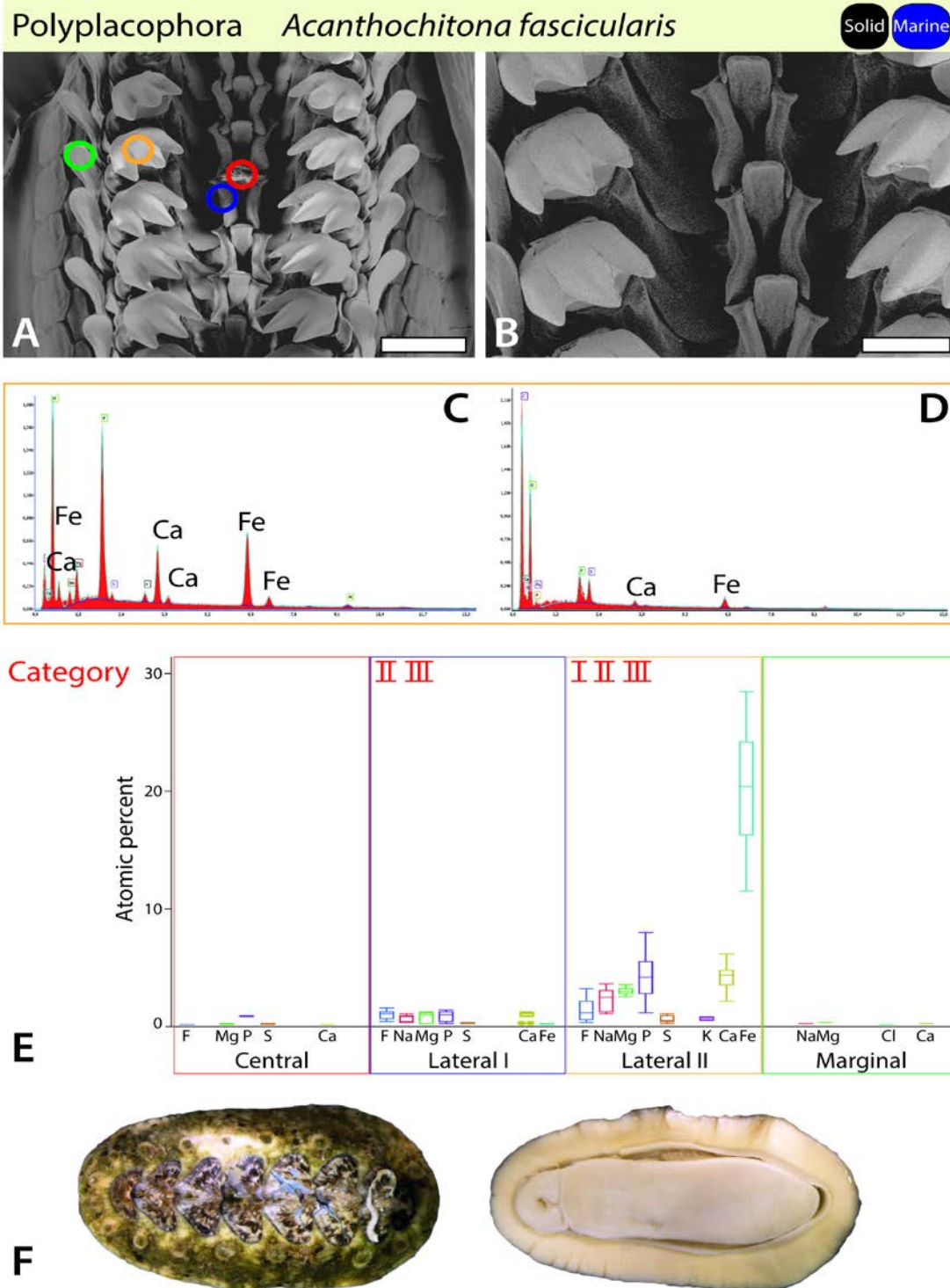
³ Department of Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrechts-Universität zu Kiel, Am Botanischen Garten 9, 24118 Kiel, Germany

*corresponding author: wencke.krings@uni-hamburg.de

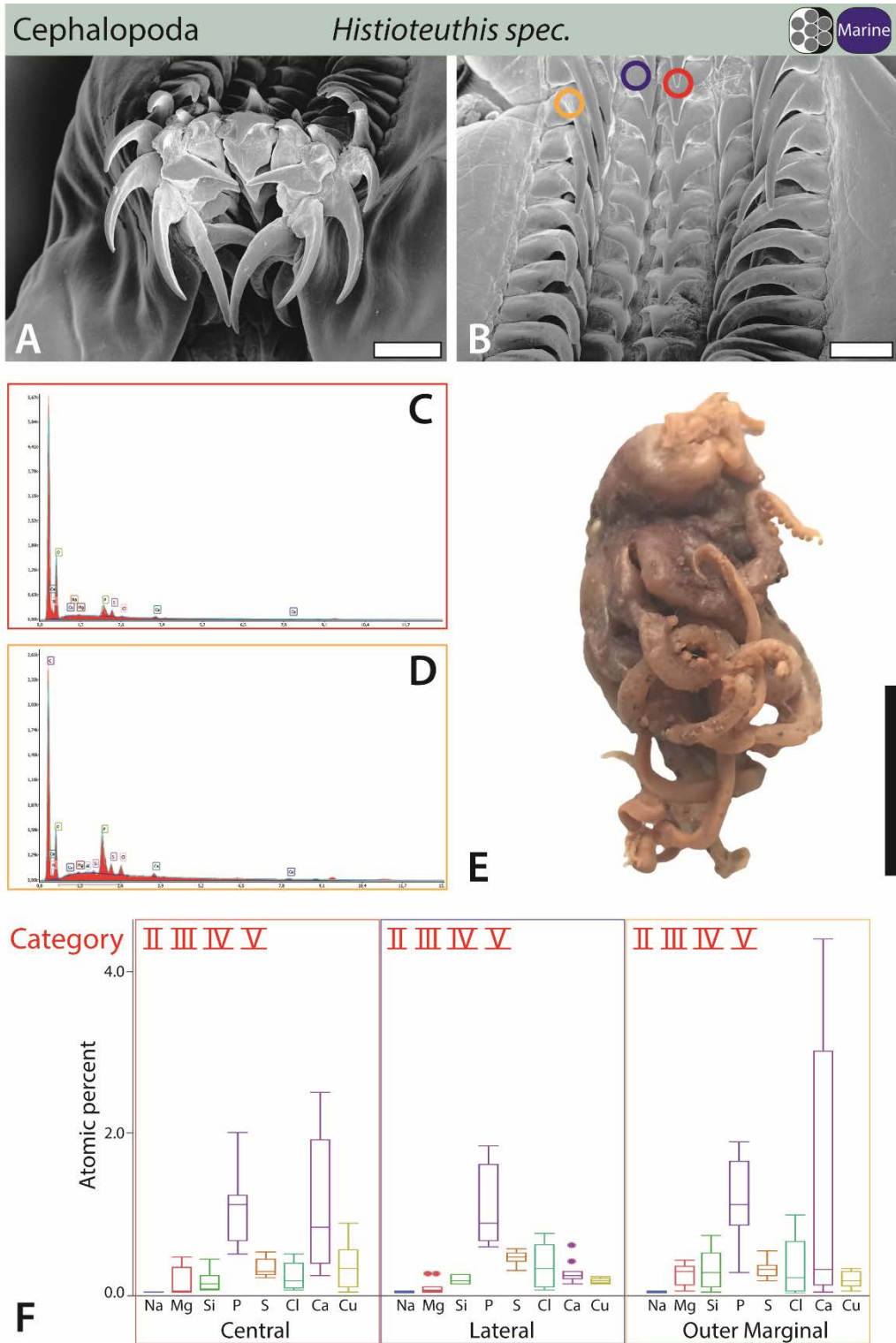
Supplementary materials



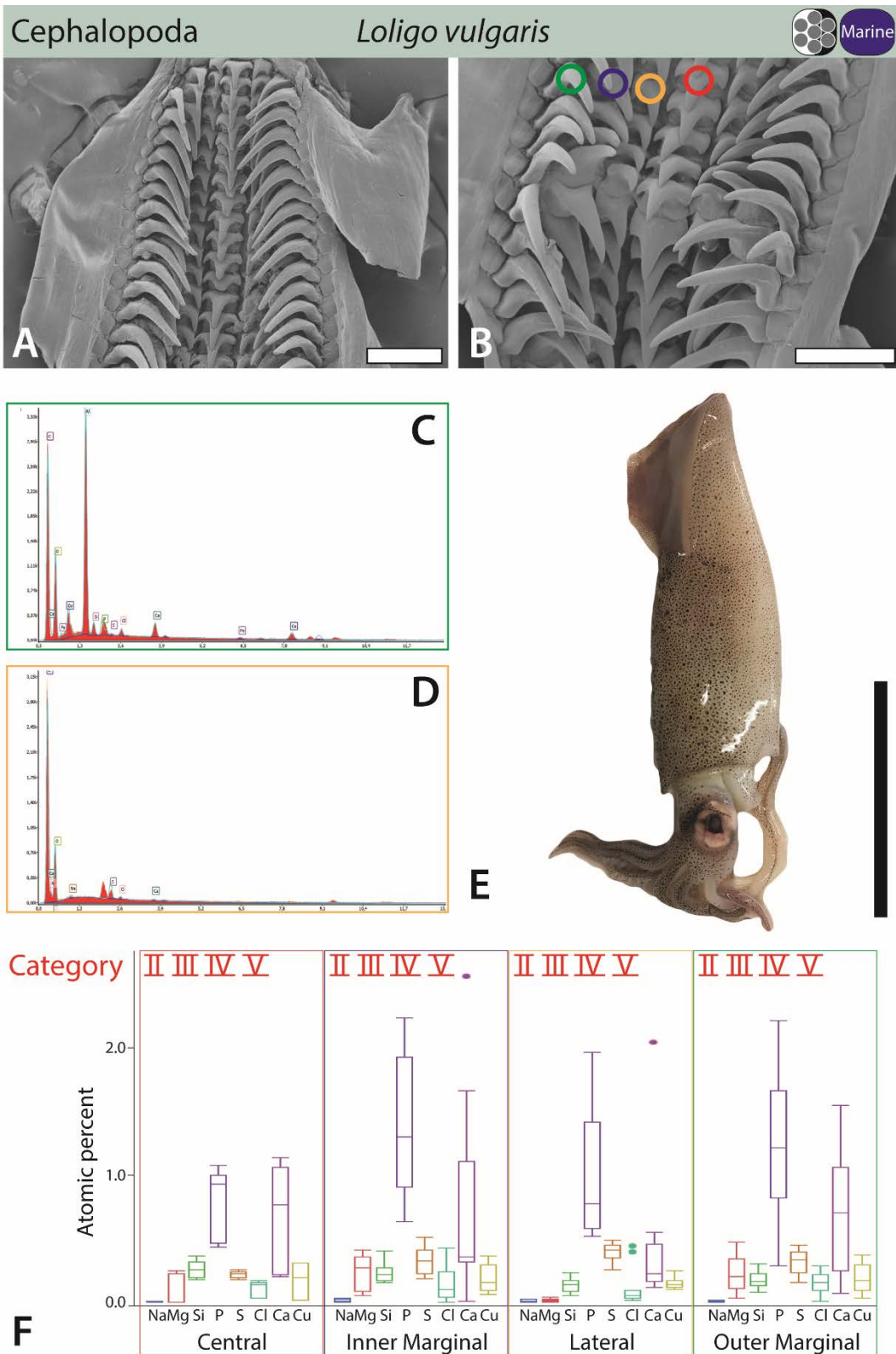
Supplementary Figure 1. *Lepidochitona cinerea*: A-B. SEM images of the working zone of one representative radula (adapted from Scheel et al., 2020). The circles indicate the area of the EDX analysis: green, marginal; yellow, lateral II; blue, lateral I; red, central teeth. C-D. Representative EDX spectra of the lateral tooth II. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, lateral I, lateral II, and marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 100 µm; B, 30 µm; E, 5 mm.



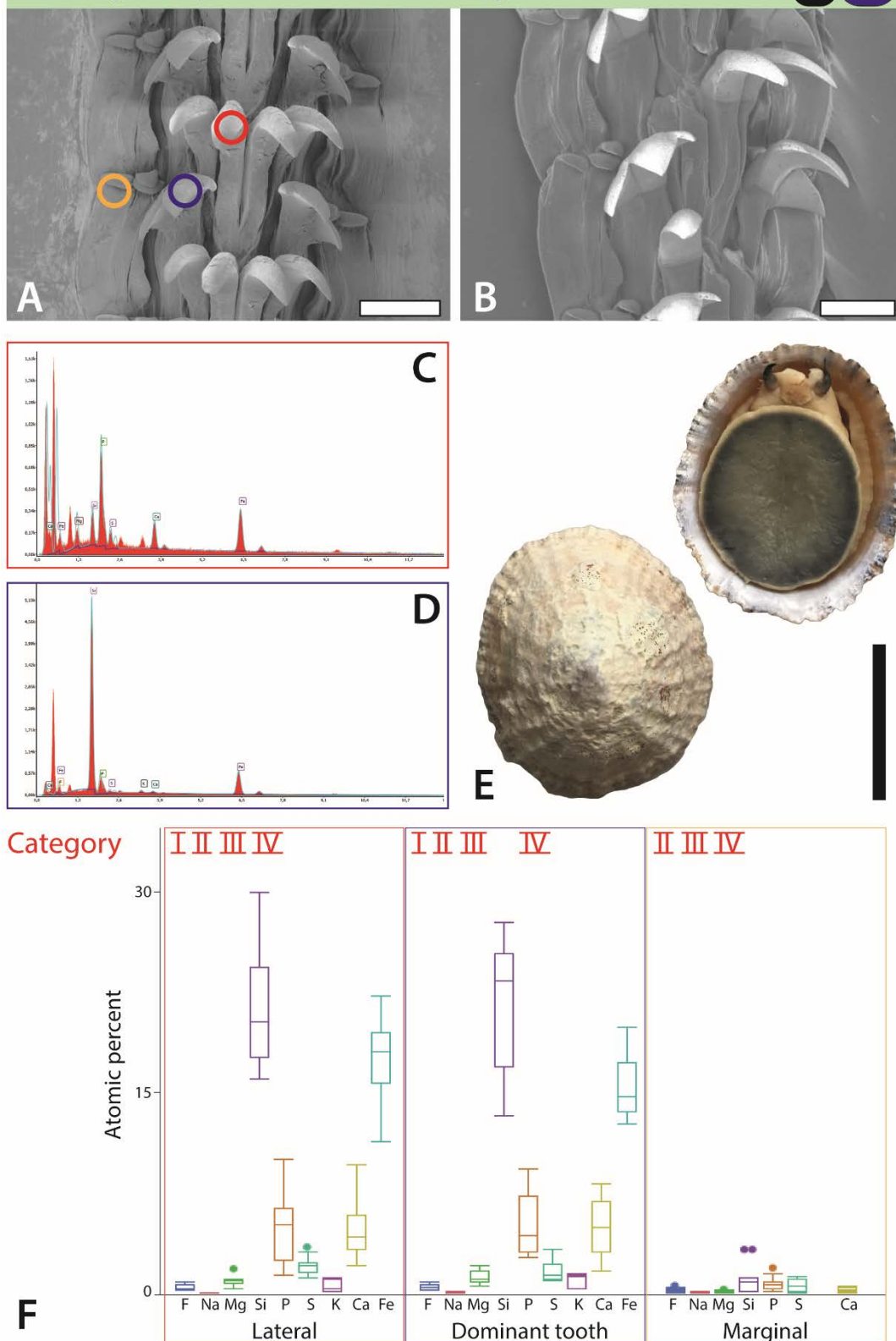
Supplementary Figure 2. *Acanthochitona fascicularis*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, marginal; yellow, lateral II; blue, lateral I; red, central teeth. C-D. Representative EDX spectra of the lateral tooth II. E. Results from EDX analyses: elemental proportions in atomic percent for central, lateral I, lateral II, and marginal teeth. F. Habitus from one representative specimen in dorsal and ventral views. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 200 μ m; B, 100 μ m.



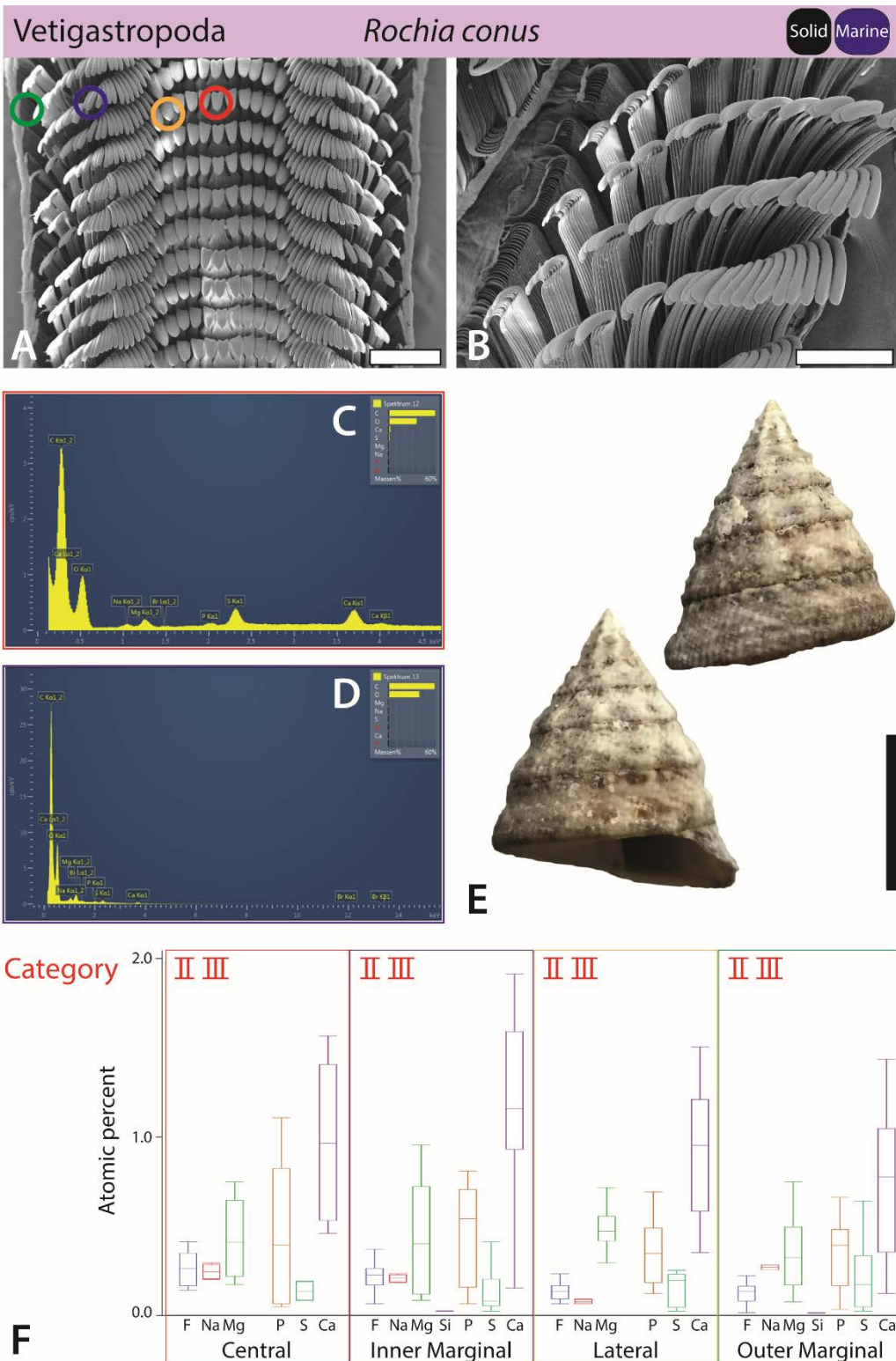
Supplementary Figure 3. *Histioteuthis spec.*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: yellow, outer marginal; blue, lateral; red, central teeth. C-D. Representative EDX spectra of central (C) and outer marginal (D) teeth. E. Habitus of one representative specimen. F. Results from EDX analyses: elemental proportions in atomic percent for central, lateral I, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 100 μm ; B, 60 μm ; E, 2 cm.



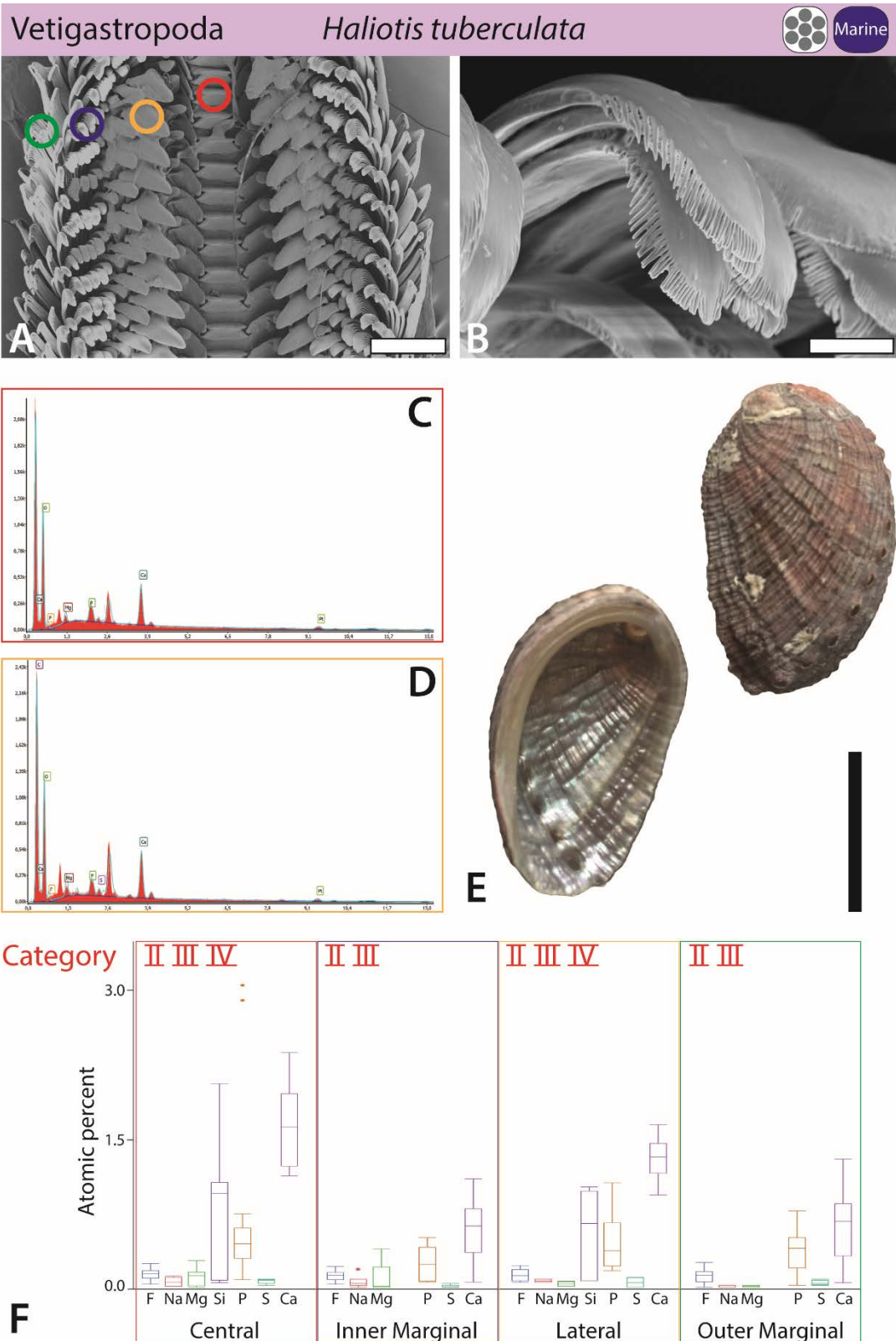
Supplementary Figure 4. *Loligo vulgaris*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of outer marginal (C) and lateral (D) teeth. E. Habitus of one representative specimen. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 300 µm; B, 400 µm; E, 10 cm.



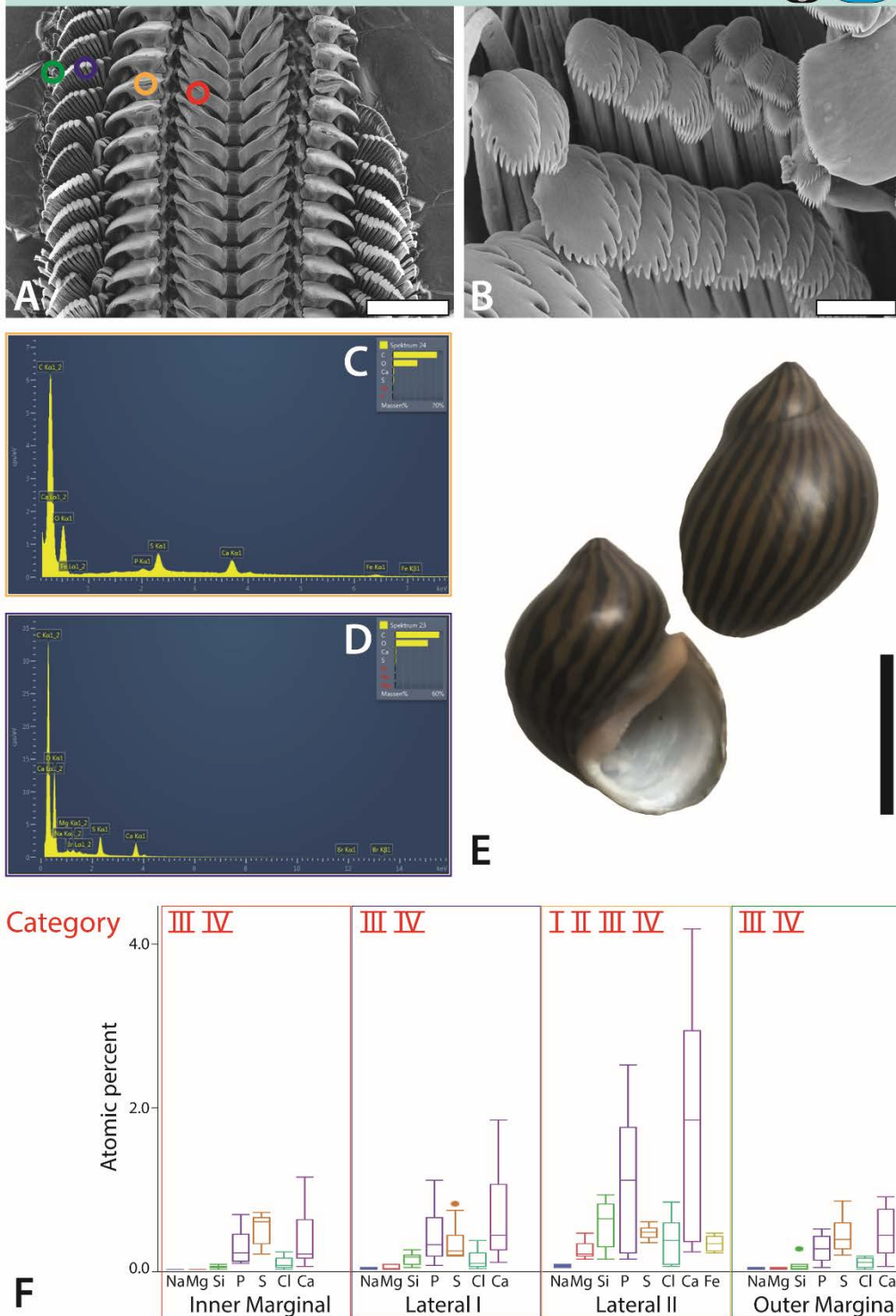
Supplementary Figure 5. *Patella vulgata*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of EDX analysis: yellow, marginal; blue, lateral; red, central teeth. C-D. Representative EDX spectra of central (C) and lateral I (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, lateral, and marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 200 µm; B, 150 µm; E, 2.5 cm.



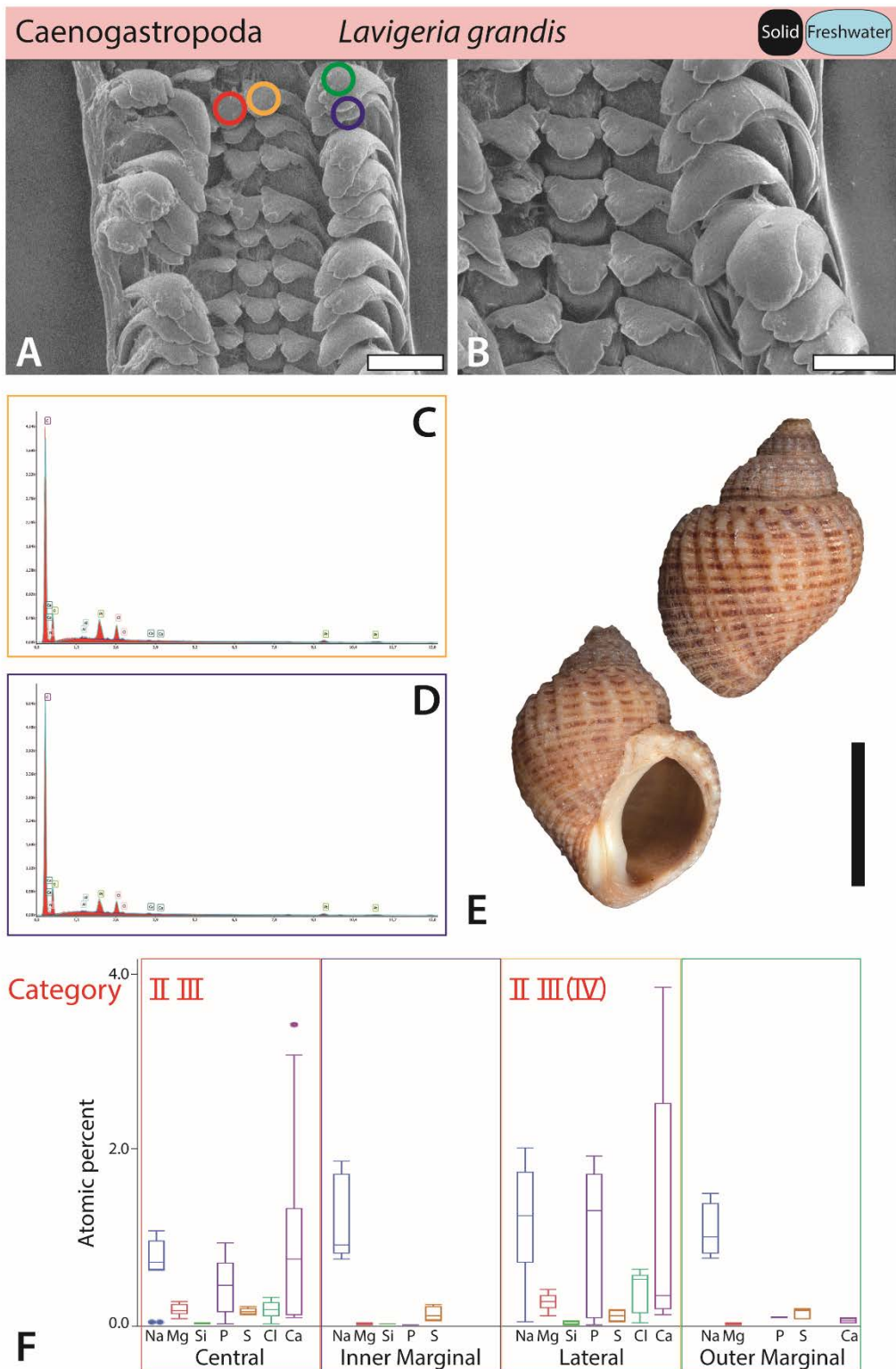
Supplementary Figure 6. *Rochia conus*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of central (C) and inner marginal (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 600 μ m; B, 300 μ m; E, 3.5 cm.



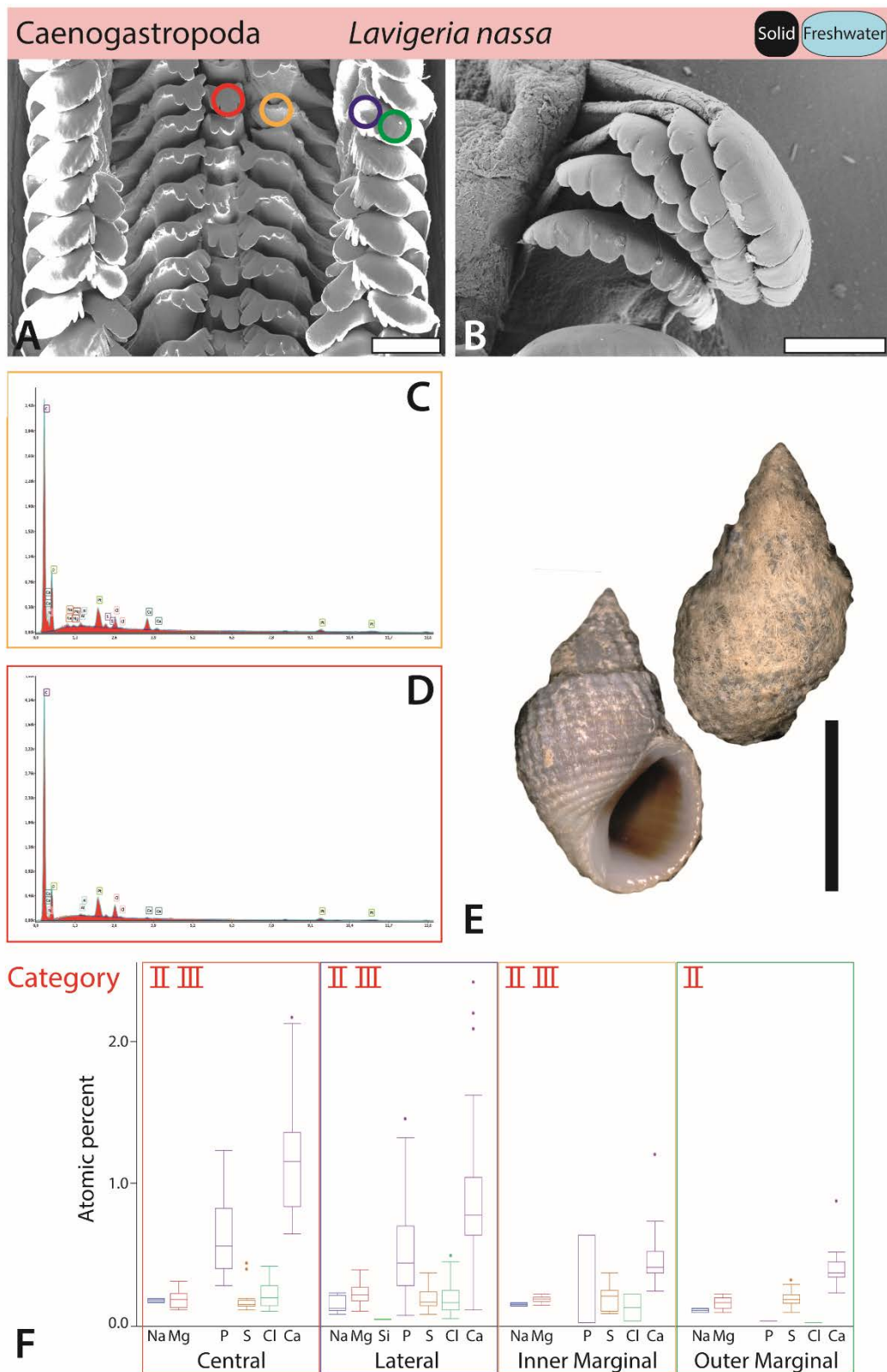
Supplementary Figure 7. *Haliotis tuberculata*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of central (C) and lateral (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 400 μ m; B, 10 μ m; E, 5.5 cm.



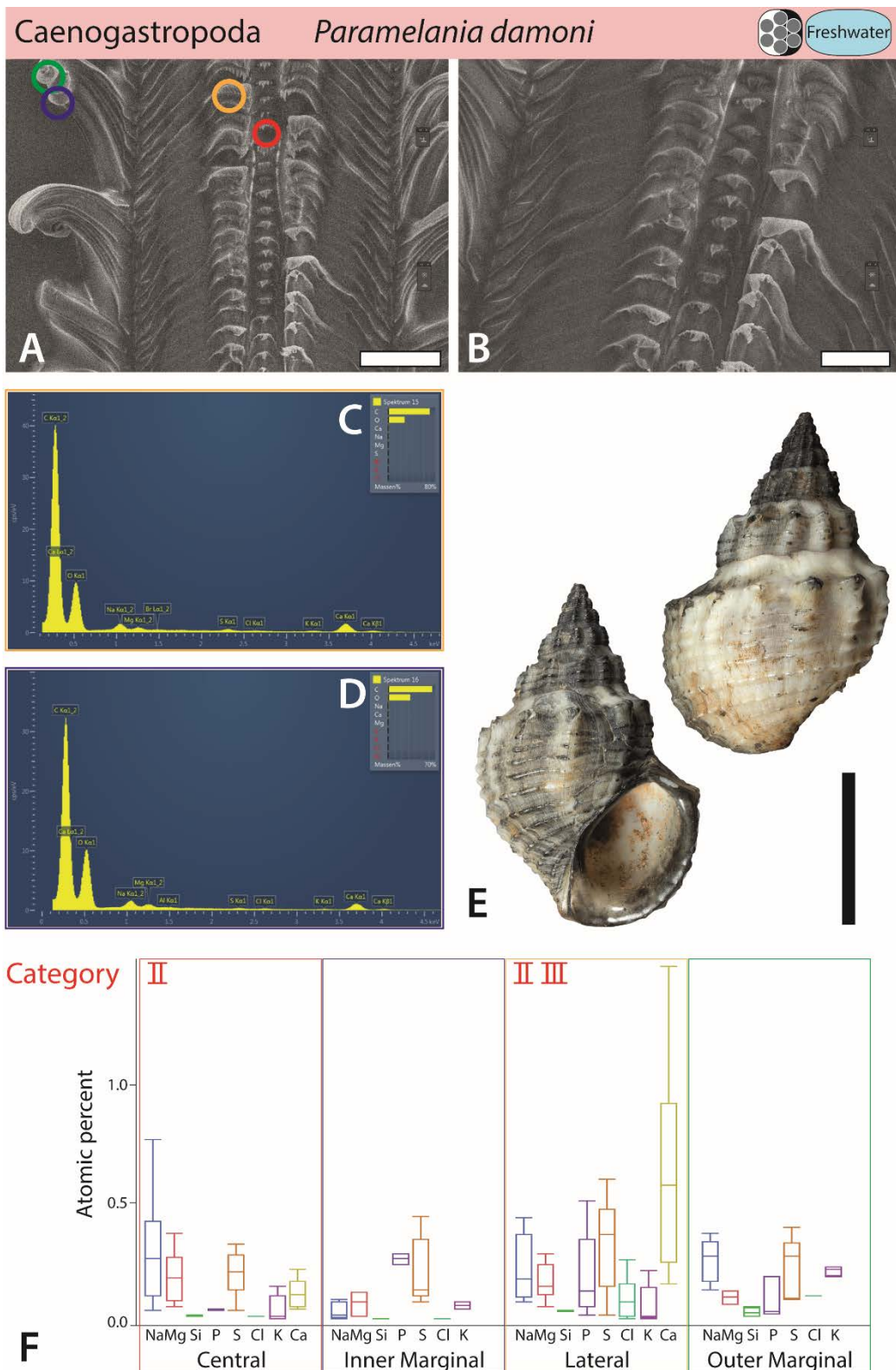
Supplementary Figure 8. *Vittina turrata*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral II; red, lateral I teeth. C-D. Representative EDX spectra of central (C) and lateral (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for inner marginal, lateral I, lateral II (=dominant lateral teeth), and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 300 μ m; B, 10 μ m; E, 1.5 cm.



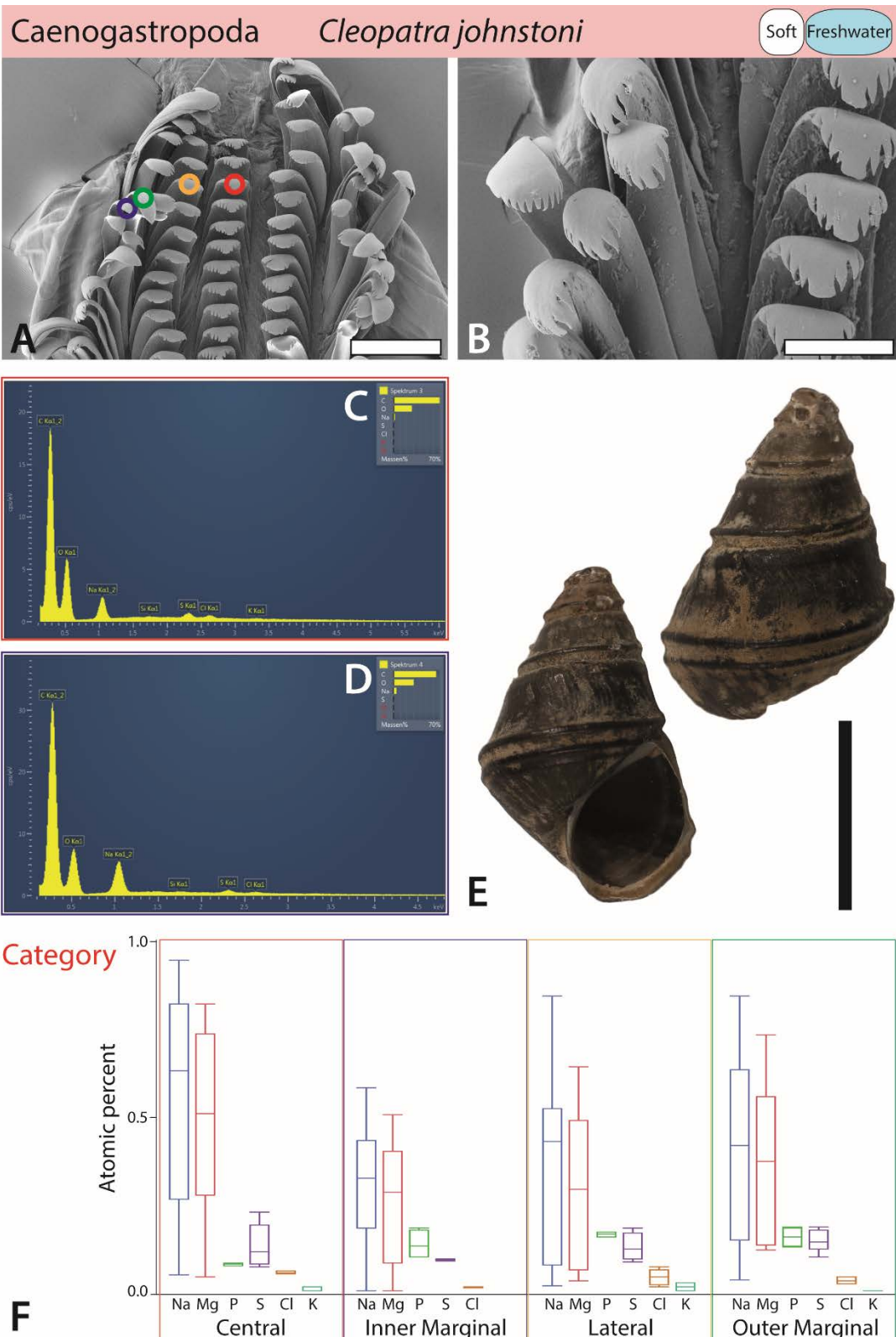
Supplementary Figure 9. *Lavigeria grandis*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of lateral (C) and inner marginal (D) teeth. E. Habitus from one representative specimen (ZMB 220.121_3) in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomimetalization categories for each tooth type are written in red. Scale bars: A, 150 μm ; B, 100 μm ; E, 1 cm.



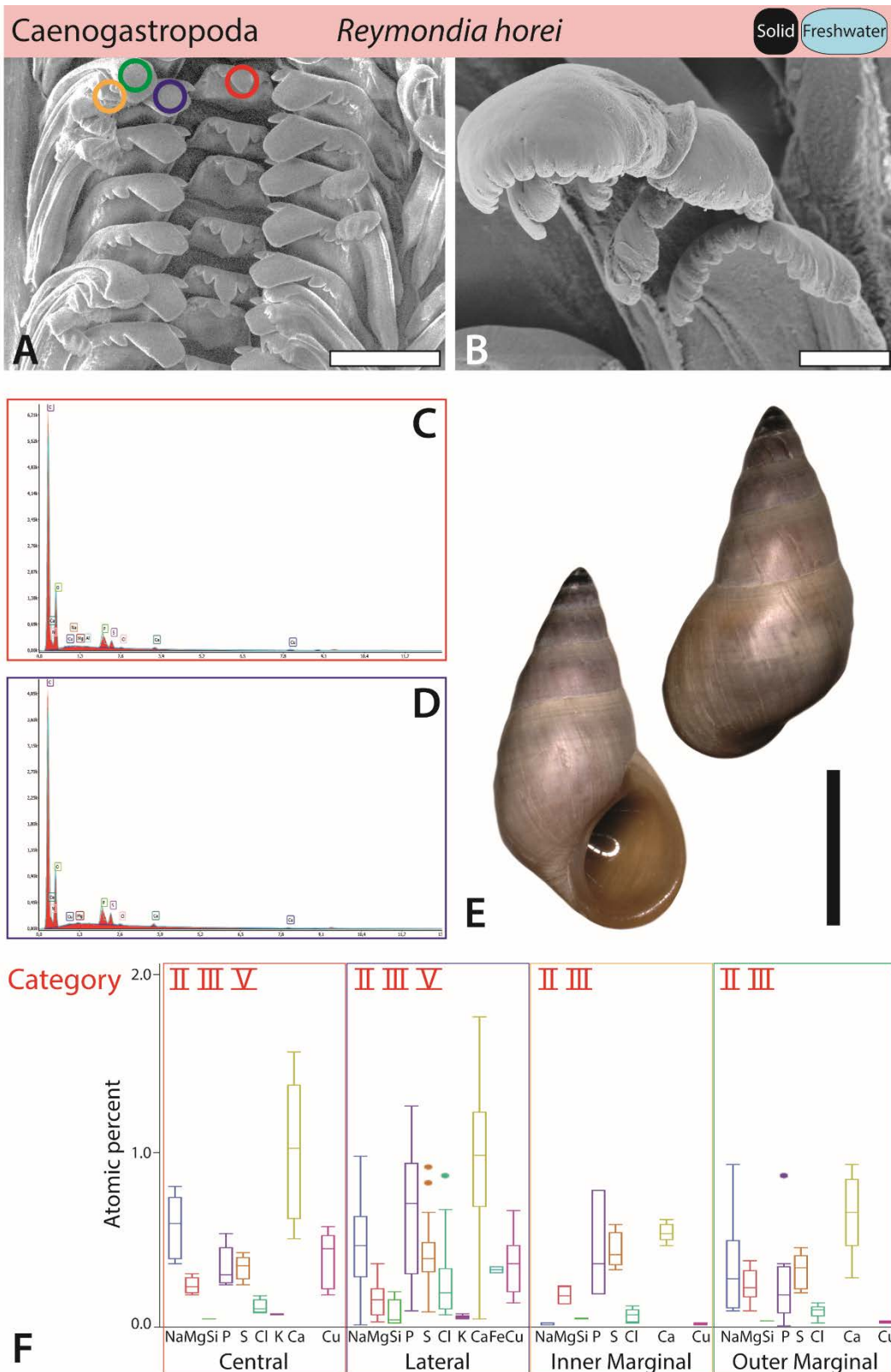
Supplementary Figure 10. *Lavigeria nassa*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of lateral (C) and central (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, lateral, inner marginal, and outer marginal teeth. Proposed biomimetic categories for each tooth type are written in red. Scale bars: A, 80 μm ; B, 40 μm ; E, 1 cm.



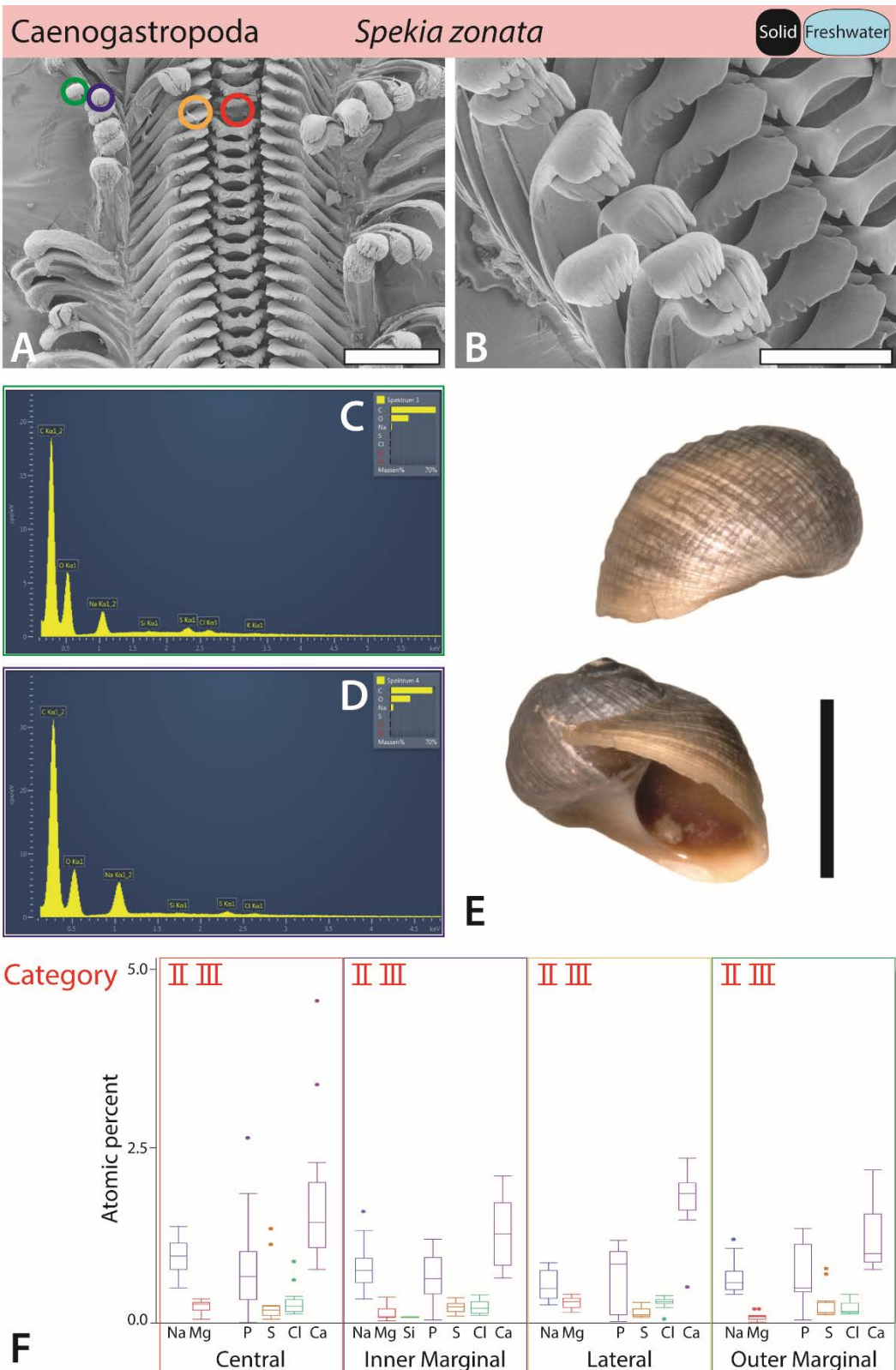
Supplementary Figure 11. *Paramelania damoni*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of lateral (C) and inner marginal (D) teeth. E. Habitus from one representative specimen (ZMB 92361_1) in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomimetalization categories for each tooth type are written in red. Scale bars: A, 100 μ m; B, 50 μ m; E, 1 cm.



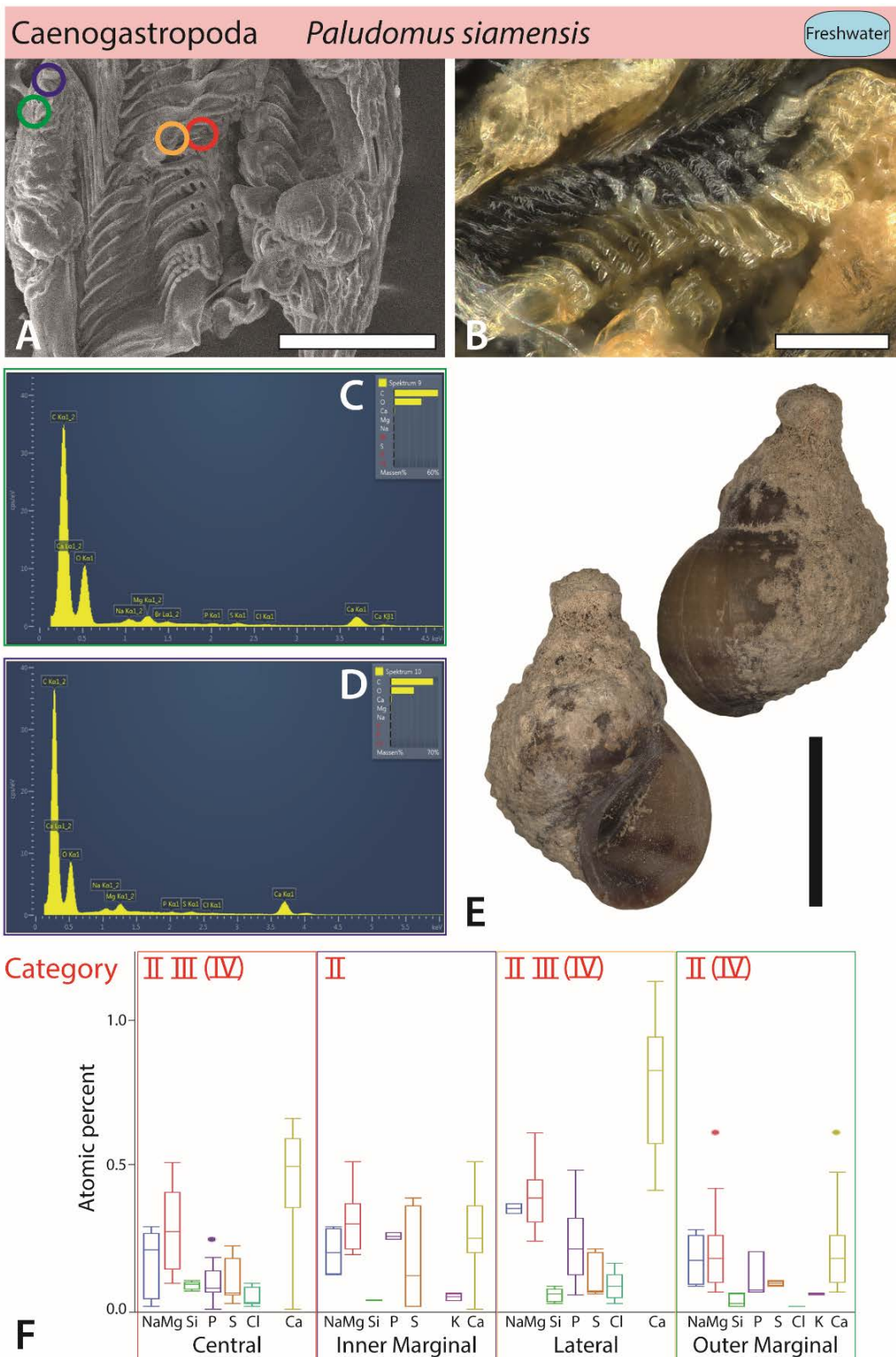
Supplementary Figure 12. *Cleopatra johnstoni*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of central (C) and inner marginal (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomineralization category for each tooth type are written in red (none for this species). Scale bars: A, 200 μ m; B, 80 μ m; E, 1 cm.



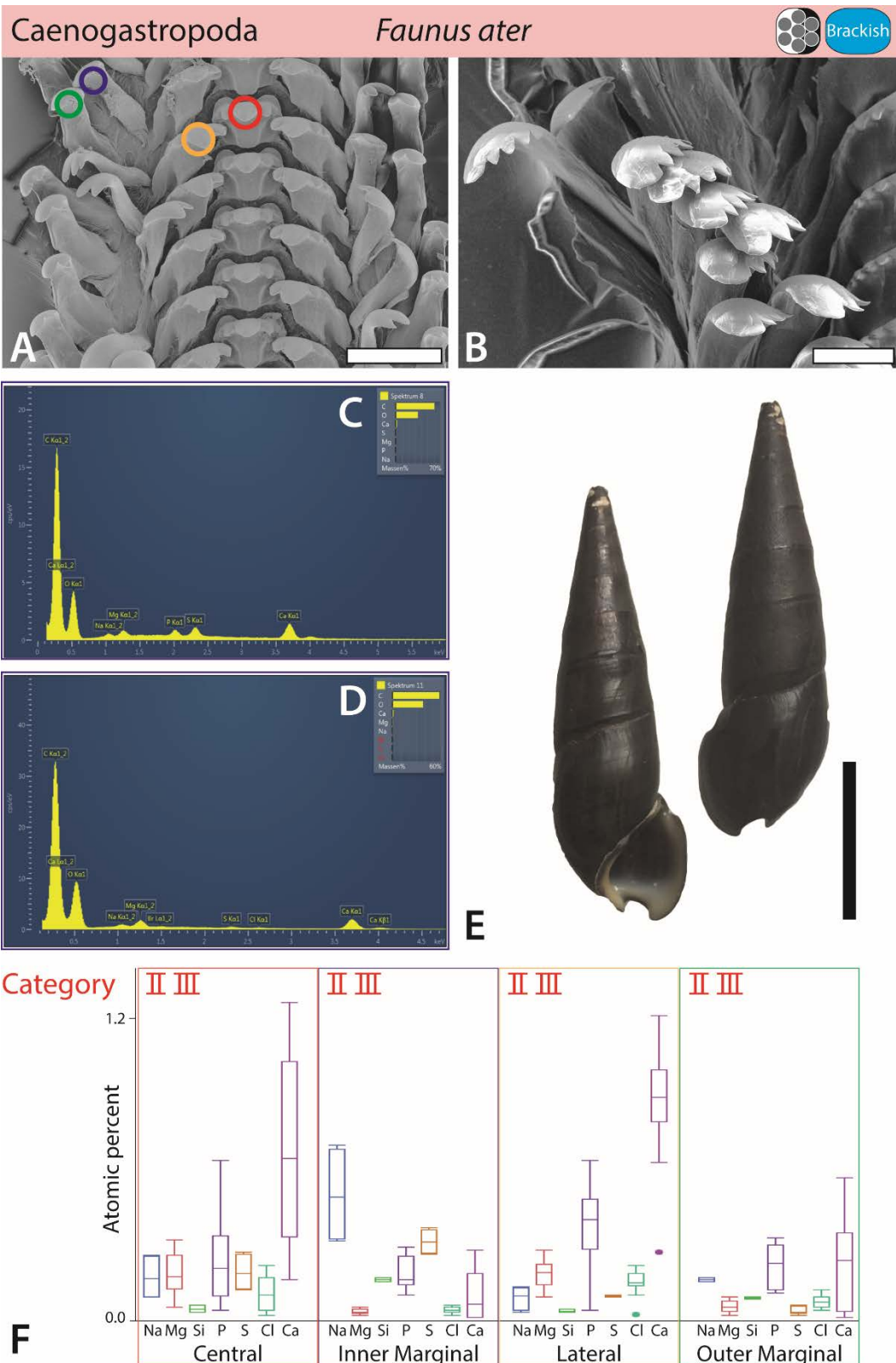
Supplementary Figure 13. *Reymondia horei*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; yellow, inner marginal; blue, lateral; red, central teeth. C-D. Representative EDX spectra of central (C) and lateral (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, lateral, inner marginal, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 100 μ m; B, 20 μ m; E, 5 mm.



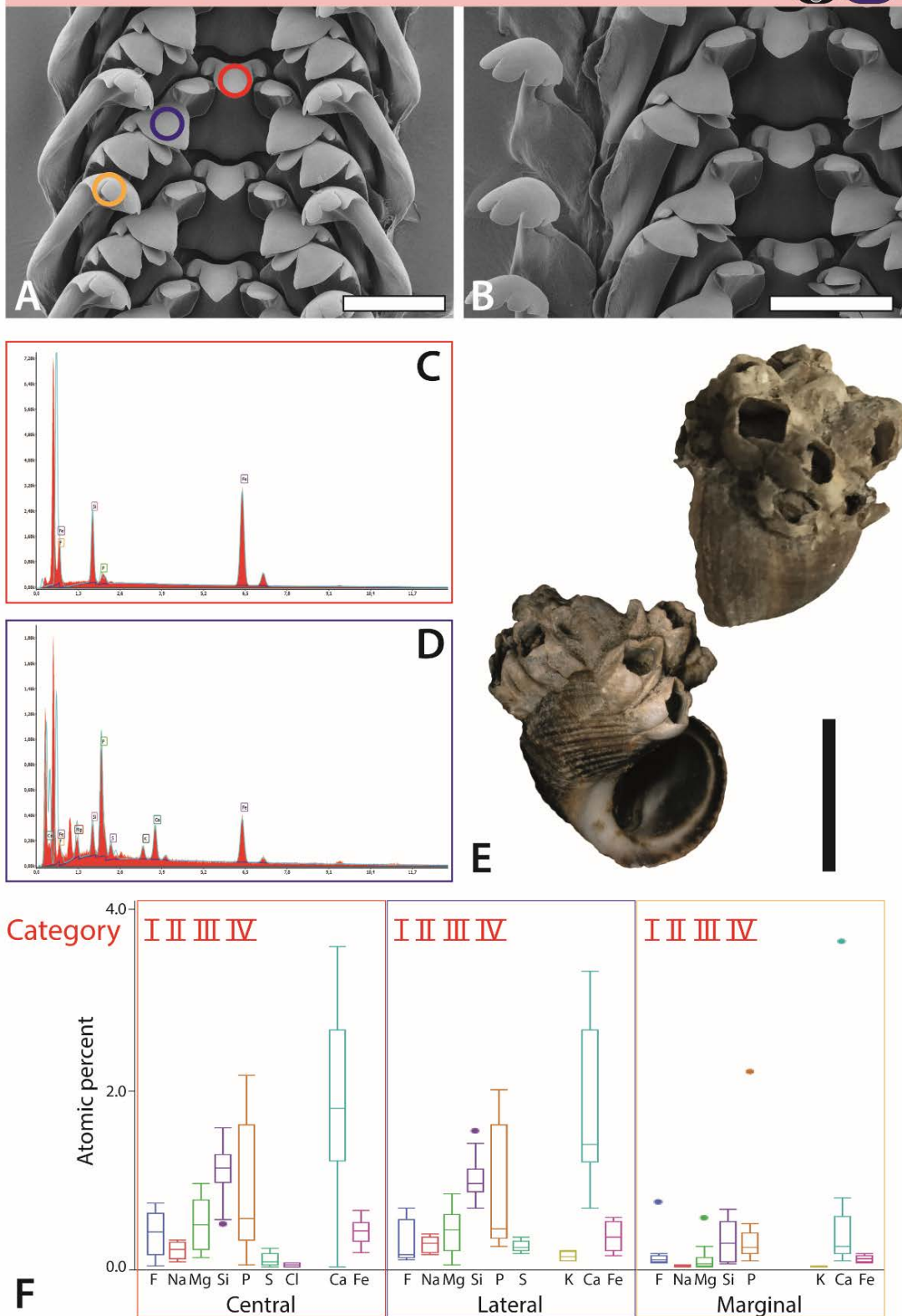
Supplementary Figure 14. *Spekia zonata*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of outer marginal (C) and inner marginal (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A-B, 200 μ m; E, 5 mm.



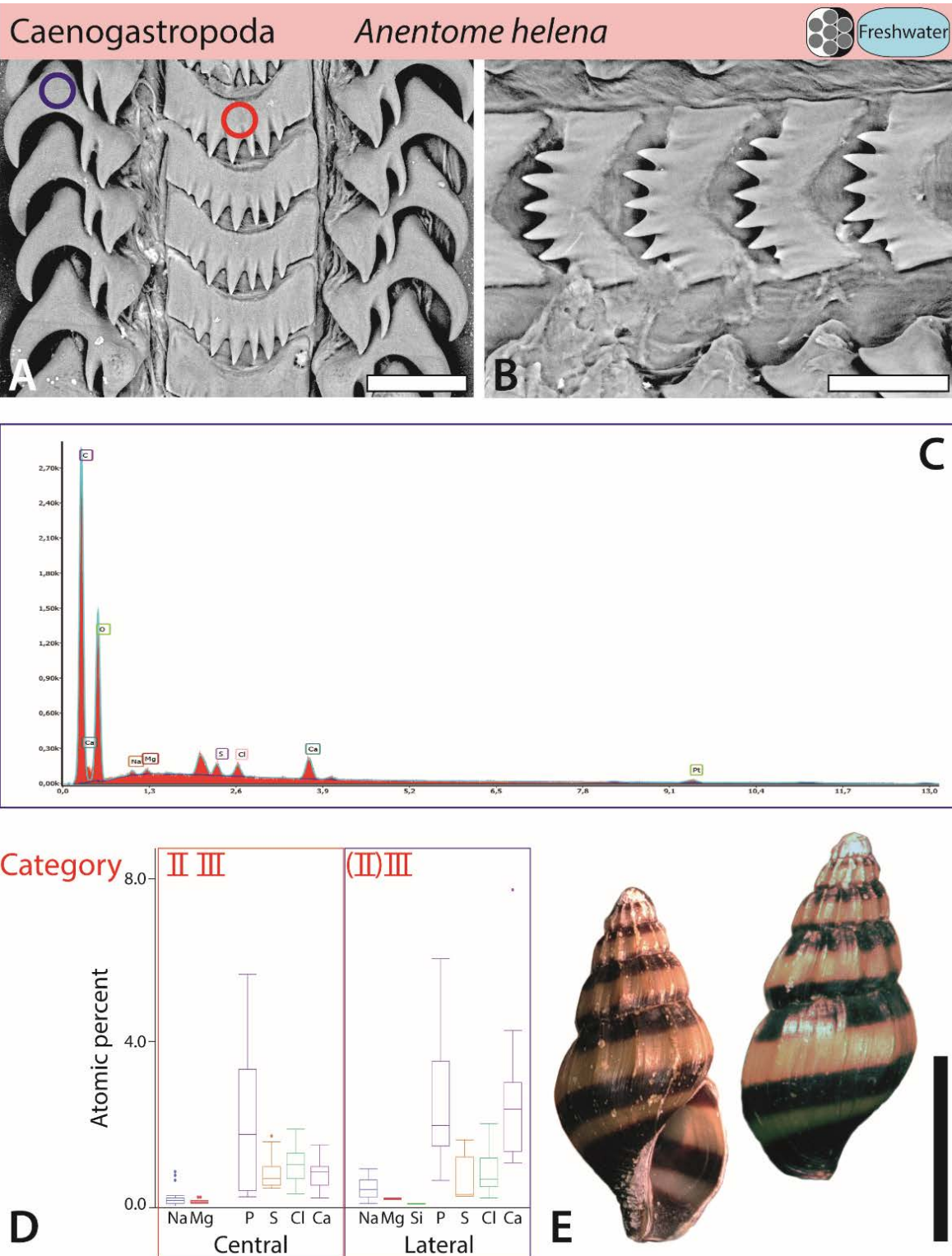
Supplementary Figure 15. *Paludomus siamensis*: A. SEM image and B. picture taken by Keyence of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of outer marginal (C) and inner marginal (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A-B, 100 μ m; E, 6 mm.



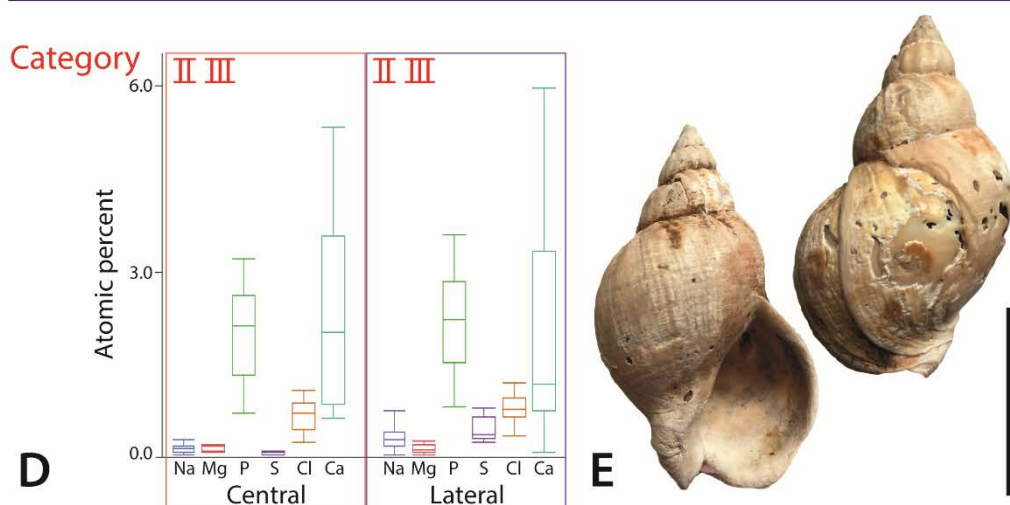
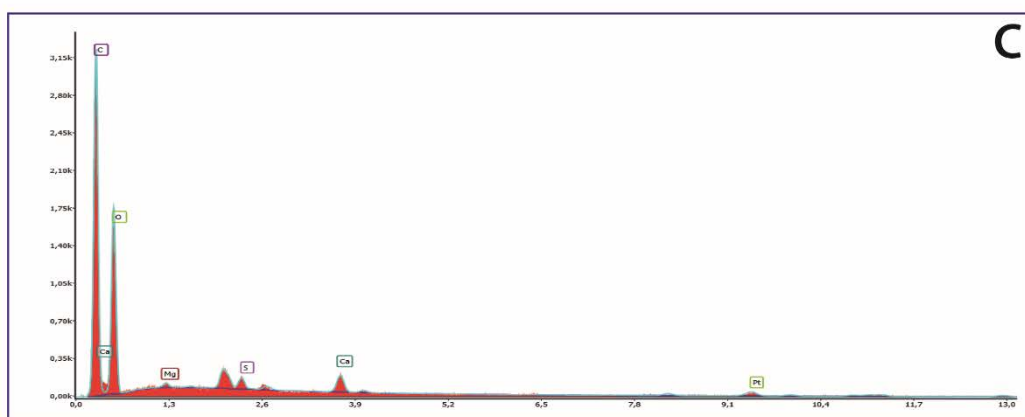
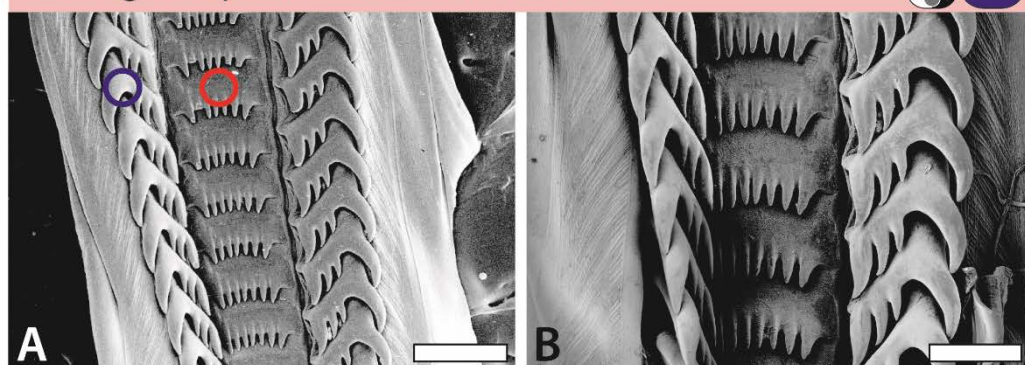
Supplementary Figure 16. *Faunus ater*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: green, outer marginal; blue, inner marginal; yellow, lateral; red, central teeth. C-D. Representative EDX spectra of outer marginal (C) and inner marginal (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, inner marginal, lateral, and outer marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 200 µm; B, 60 µm; E, 2 cm.



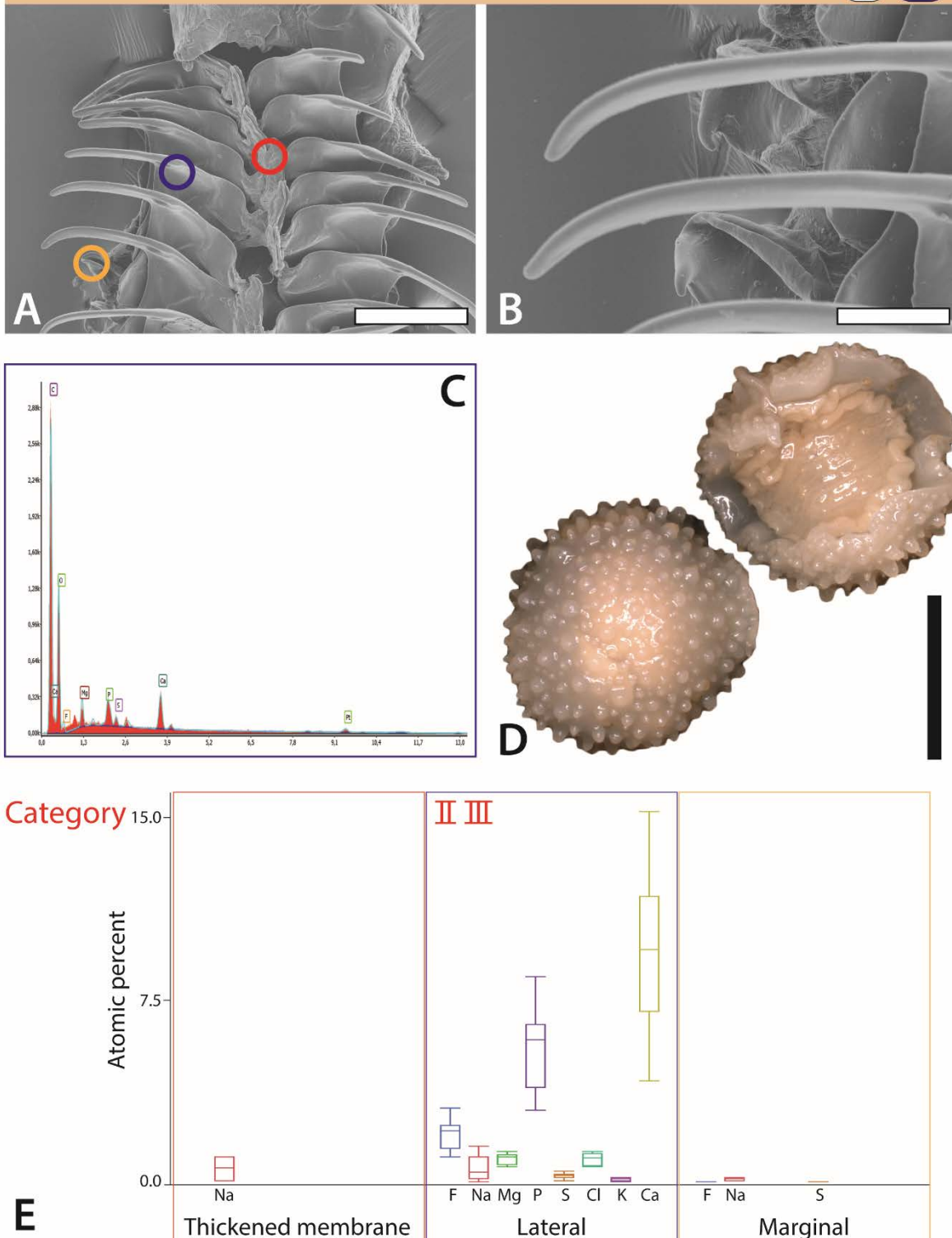
Supplementary Figure 17. *Littorina littorea*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: yellow, marginal; blue, lateral; red, central teeth. C-D. Representative EDX spectra of central (C) and lateral (D) teeth. E. Habitus from one representative specimen in dorsal and ventral views. F. Results from EDX analyses: elemental proportions in atomic percent for central, lateral, and marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A-B, 80 μ m; E, 1 cm.



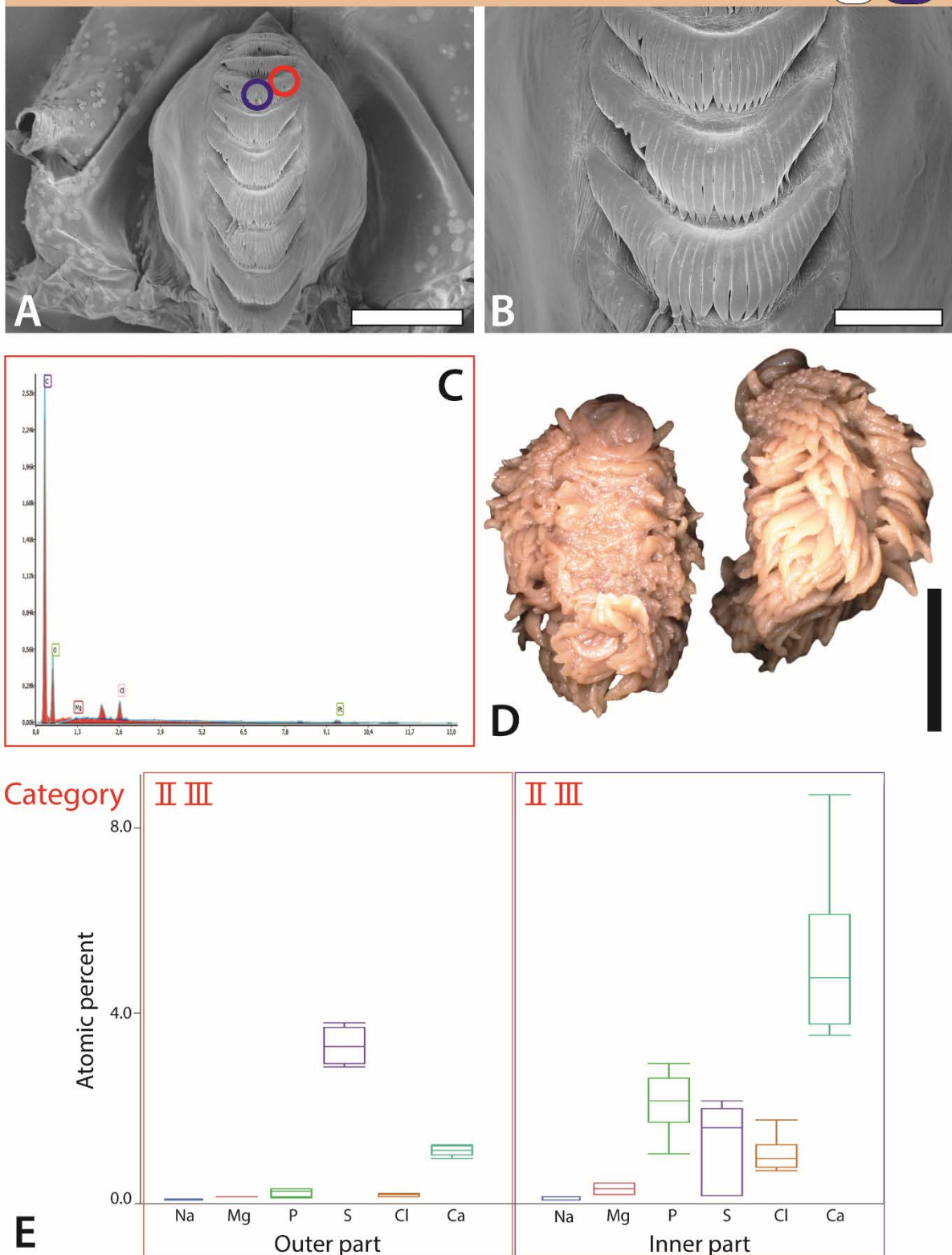
Supplementary Figure 18. *Anentome helena*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: blue, lateral; red, central teeth. C. Representative EDX spectrum of the lateral tooth. D. Results from EDX analyses: elemental proportions in atomic percent for central and lateral teeth. Proposed biomineralization categories for each tooth type are written in red. E. Habitus from one representative specimen in dorsal and ventral views. Scale bars: A-B, 40 μ m; E, 1 cm.



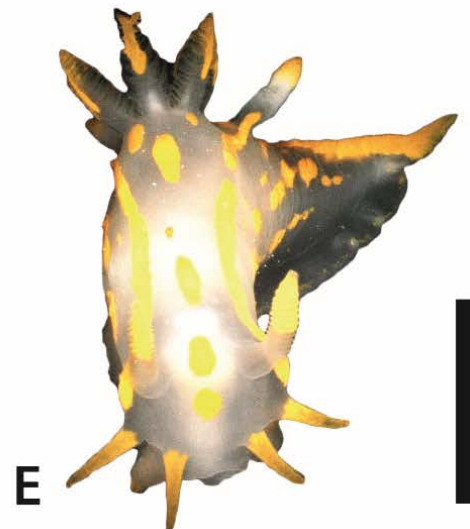
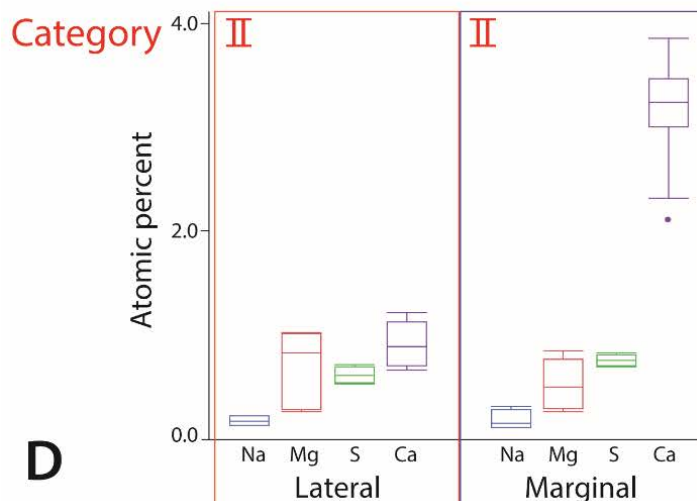
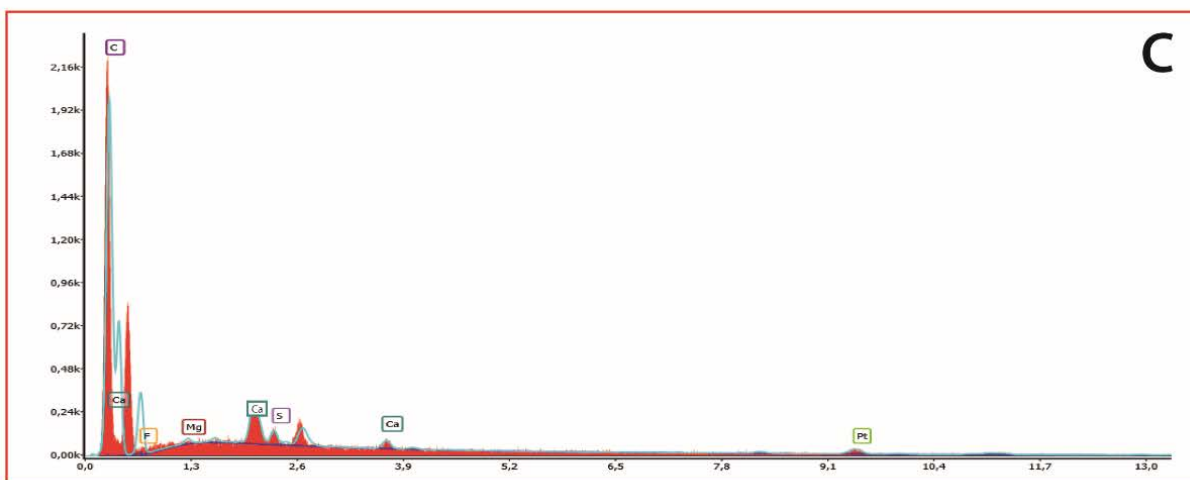
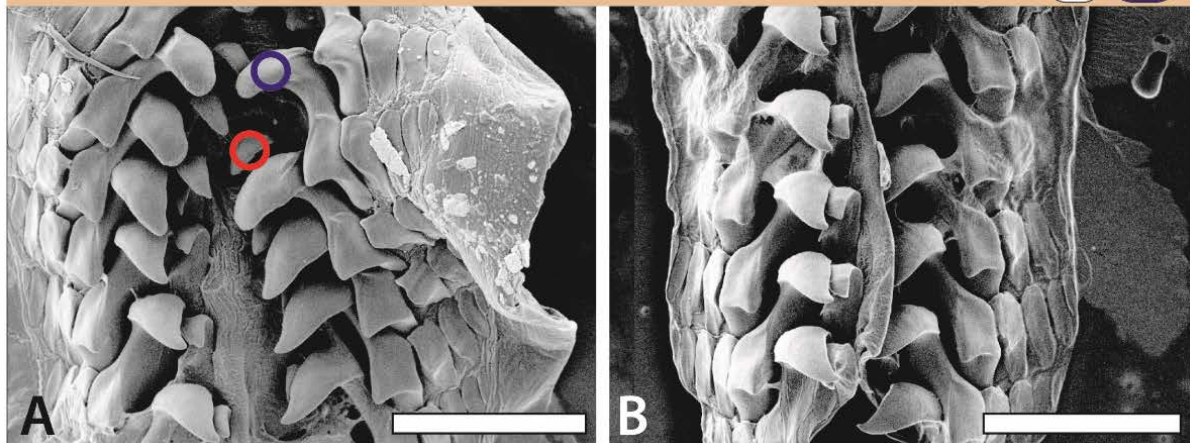
Supplementary Figure 19. *Buccinum undatum*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: blue, lateral; red, central teeth. C. Representative EDX spectrum of the lateral tooth. D. Results from EDX analyses: elemental proportions in atomic percent for central and lateral teeth. Proposed biomineralization categories for each tooth type are written in red. E. Habitus from one representative specimen in dorsal and ventral views. Scale bars: A, 500 μm ; B, 300 μm ; E, 3 cm.



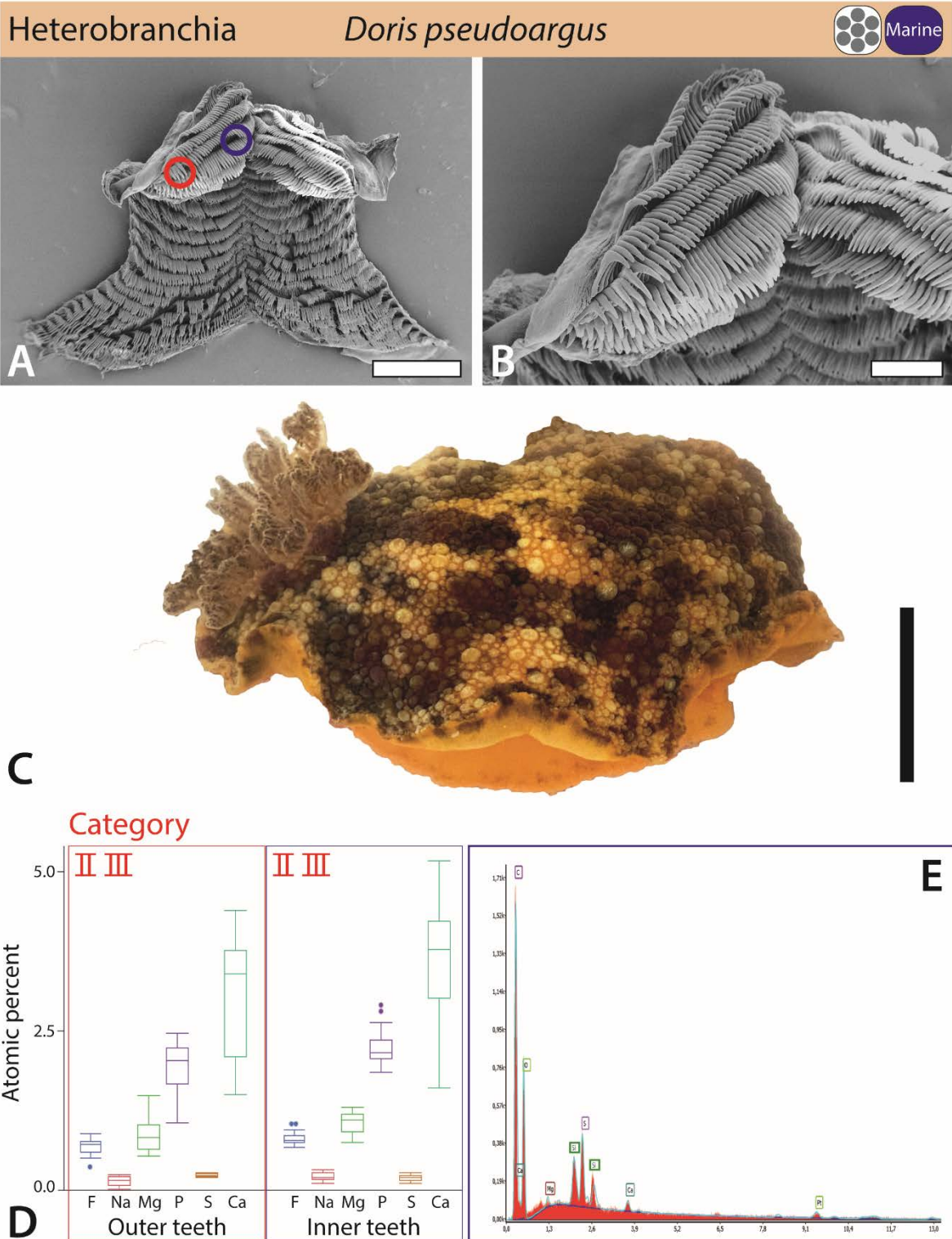
Supplementary Figure 20. *Onchidoris bilamellata*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: yellow, marginal; blue, lateral; red, central teeth. C. Representative EDX spectrum of the lateral tooth. D. Habitus from one representative individual in dorsal and ventral views (images of living gastropods). E. Results from EDX analyses: elemental proportions in atomic percent for central, lateral, and marginal teeth. Proposed biomineralization categories for each tooth type are written in red. Scale bars: A, 150 μ m; B, 40 μ m; D, 5 mm.



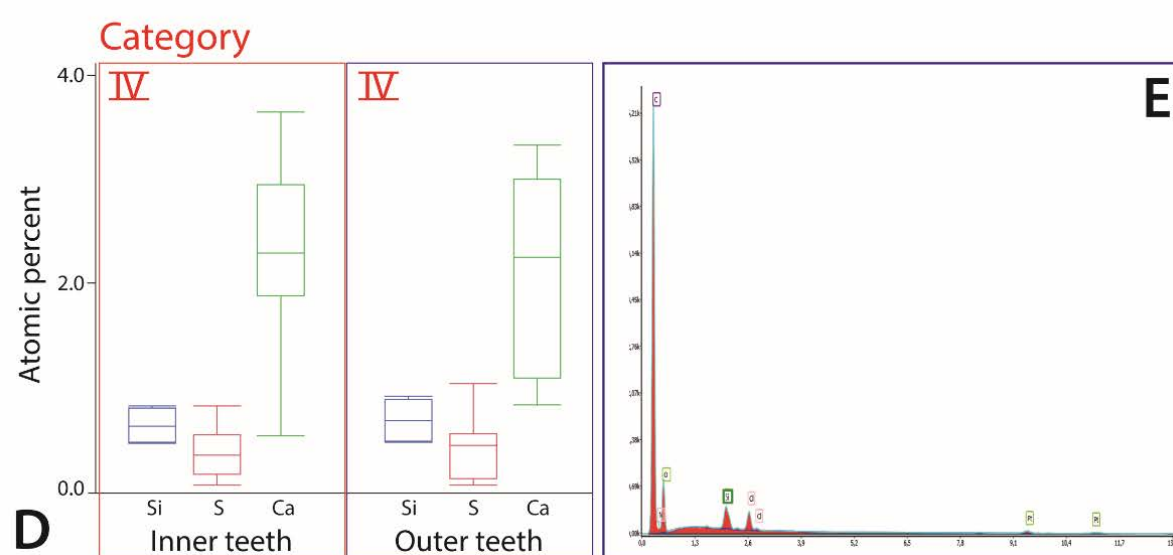
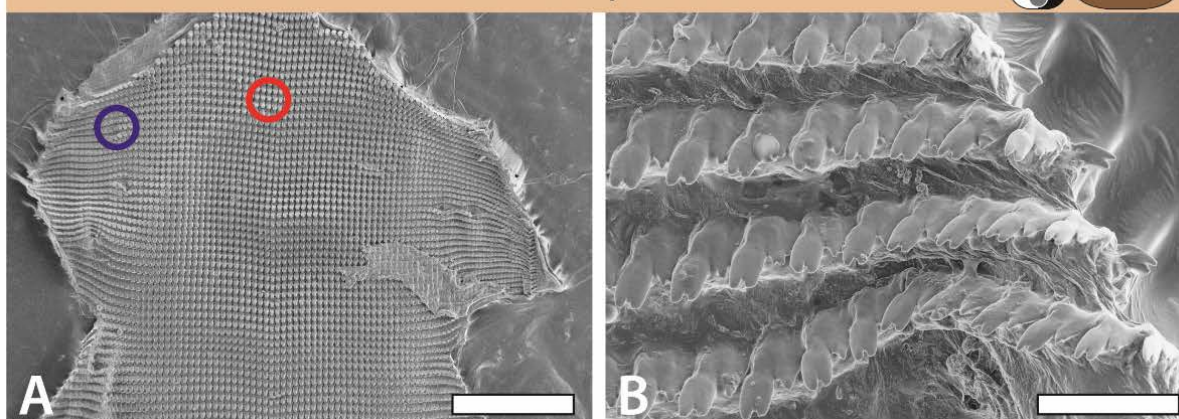
Supplementary Figure 21. *Aeolidia papillosa*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: blue, inner part; red, outer part. C. Representative EDX spectrum of the outer tooth part. D. Habitus from one representative specimen in dorsal and ventral views. E. Results from EDX analyses: elemental proportions in atomic percent for outer and inner tooth part. Proposed biomineralization categories for each tooth part are written in red. Scale bars: A, 400 μ m; B, 150 μ m; D, 7 mm.



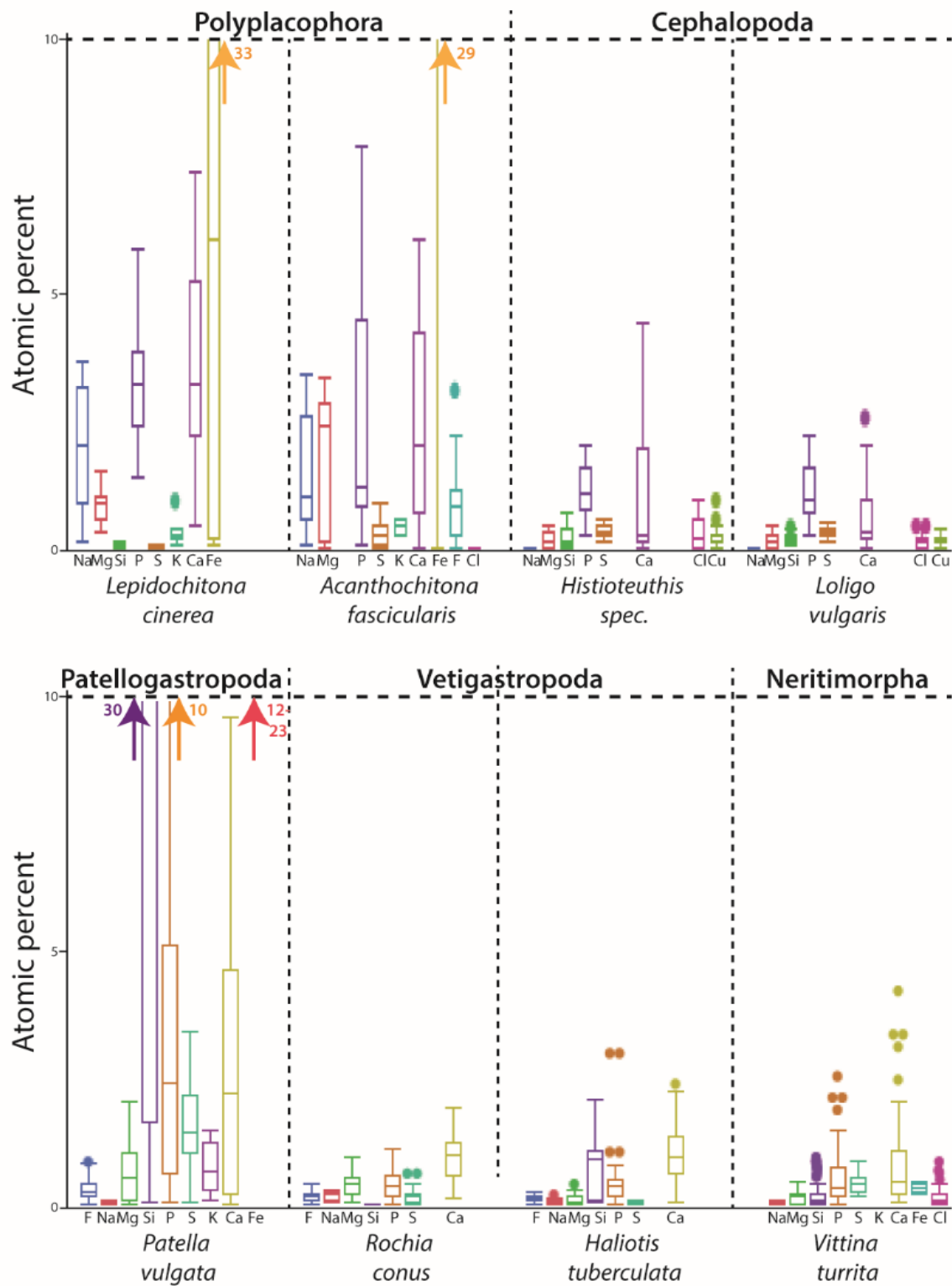
Supplementary Figure 22. *Polycera quadrilineata*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: red, lateral; blue, marginal teeth. C. Representative EDX spectrum of the lateral tooth. D. Results from EDX analyses: elemental proportions in atomic percent for lateral and marginal teeth. Proposed biomineralization categories for each tooth type are written in red. E. Habitus from one representative individual (image of the living animal). Scale bars: A-B, 400 μ m; E, 1 cm.



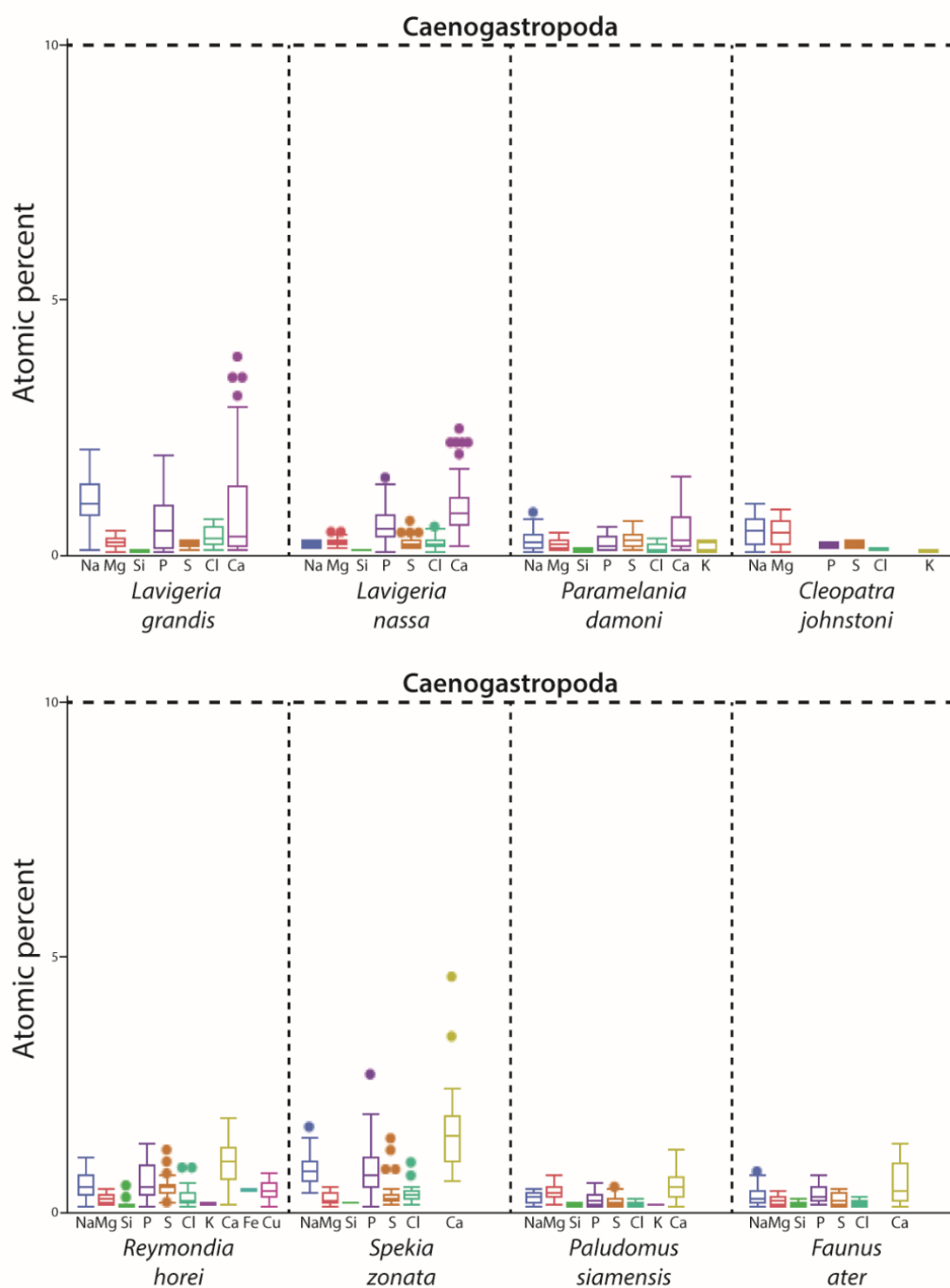
Supplementary Figure 23. *Doris pseudoargus*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: red, outer teeth; blue, inner teeth. C. Habitus from one representative individual (image of the living animal). D. Results from EDX analyses: elemental proportions in atomic percent for outer and inner teeth. Proposed biomineralization categories for each tooth type are written in red. E. Representative EDX spectrum of the inner teeth. Scale bars: A, 900 μ m; B, 300 μ m; C, 1 cm.



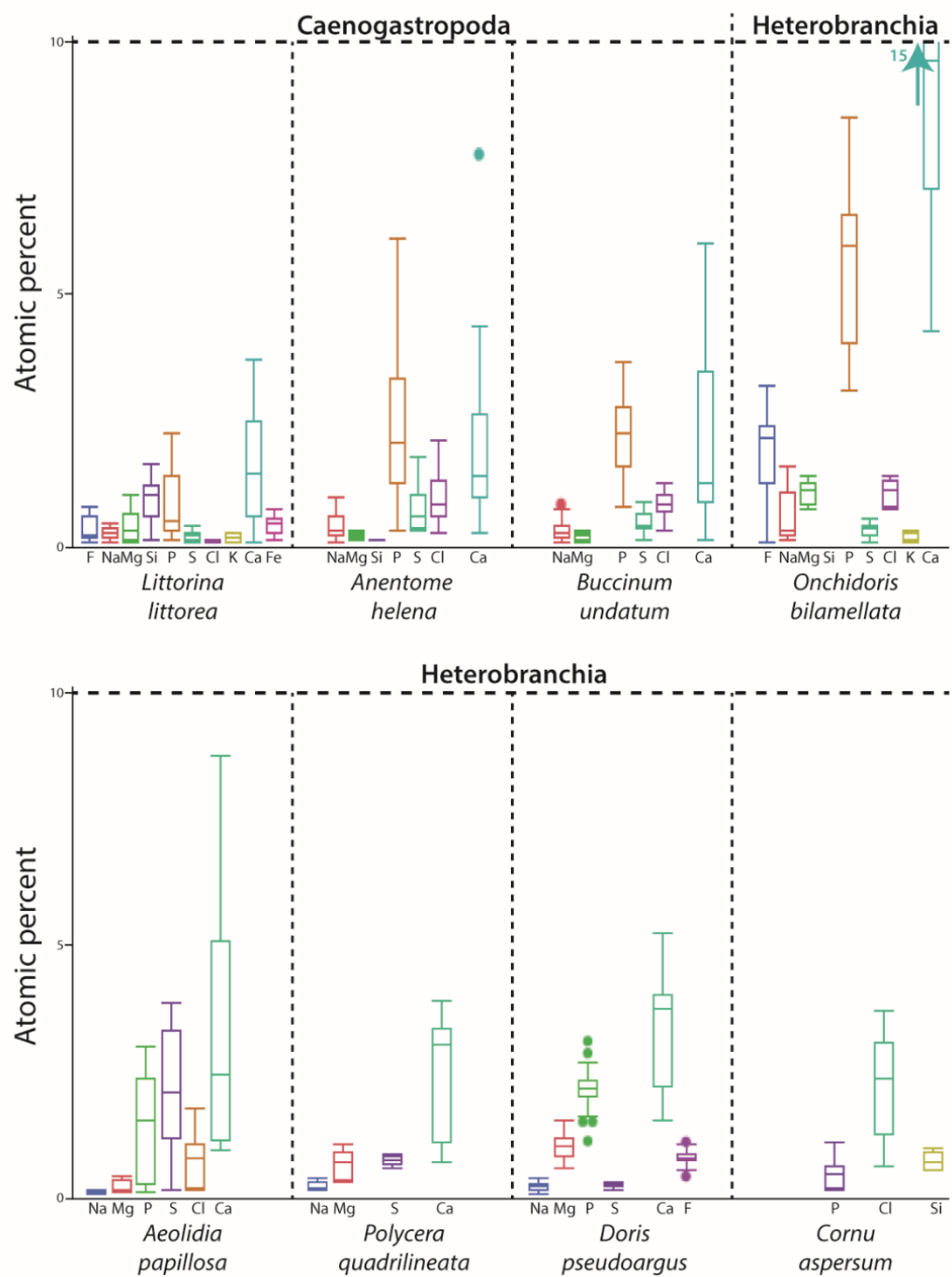
Supplementary Figure 24. *Cornu aspersum*: A-B. SEM images of the working zone of one representative radula. The circles indicate the area of the EDX analysis: red, inner teeth; blue, outer teeth. C. Habitus from one representative individual (image of the living animal). D. Results from EDX analyses: elemental proportions in atomic percent for inner and outer teeth. Proposed biomineralization categories for each tooth type are written in red. E. Representative EDX spectrum of outer teeth. Scale bars: A, 800 μm ; B, 60 μm ; C, 1 cm.



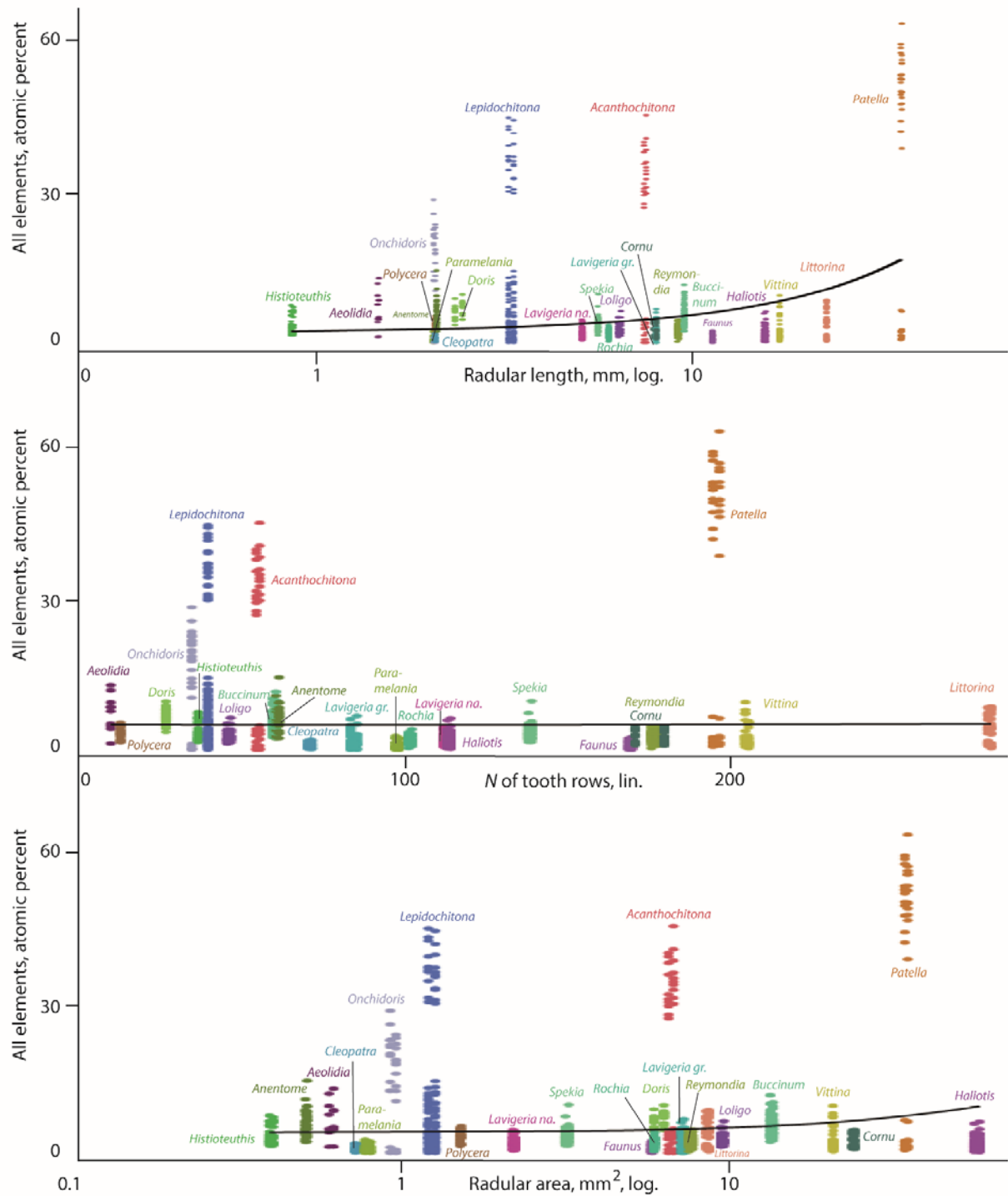
Supplementary Figure 25. Results from EDX analyses in atomic percent summarized for each species. To enable comparison, the scale is identical to the scales in Supplementary Figures 26 and 27.



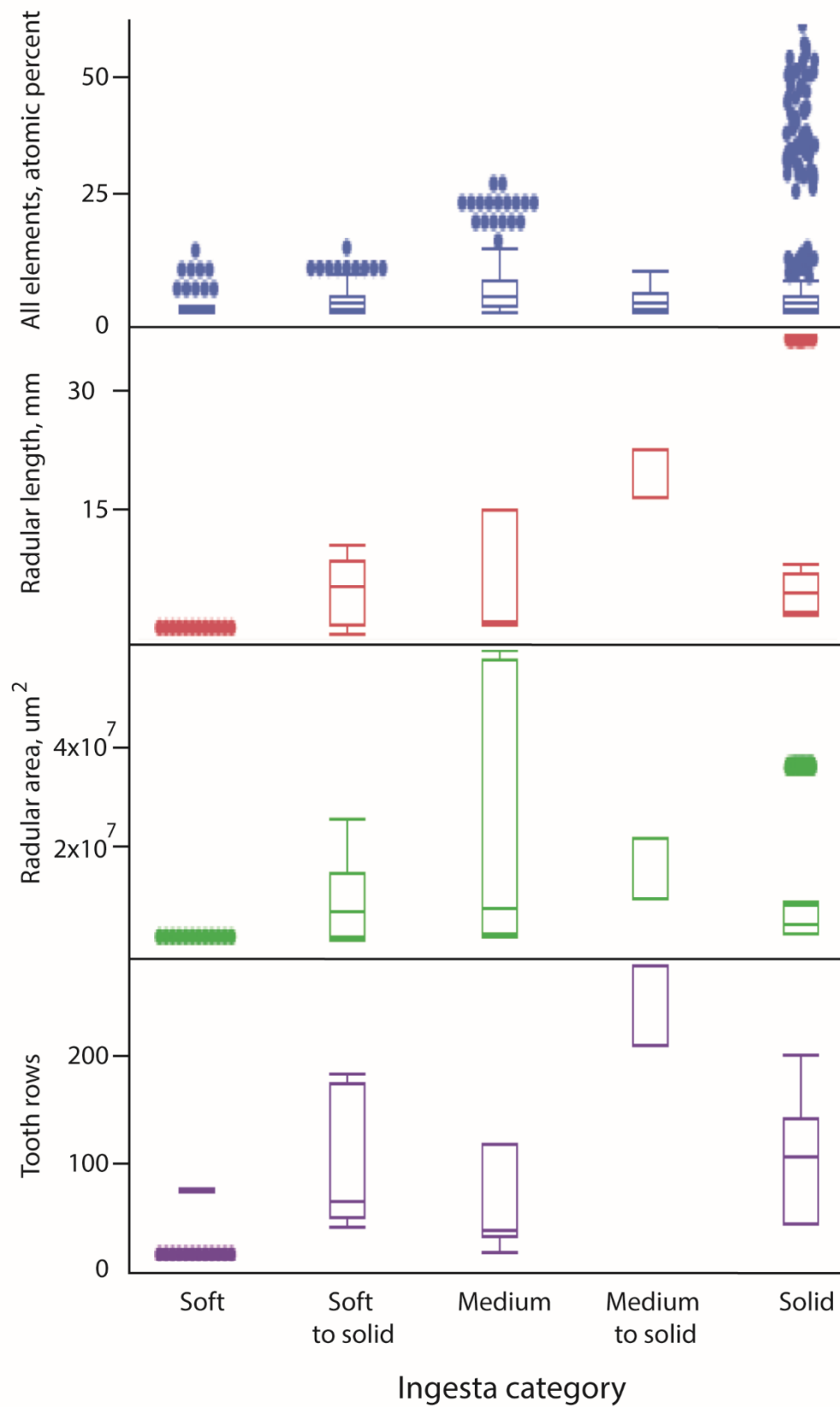
Supplementary Figure 26. Results from EDX analyses in atomic percent summarized for each species. To enable comparison, the scale is identical to the scales in Supplementary Figures 25 and 27.



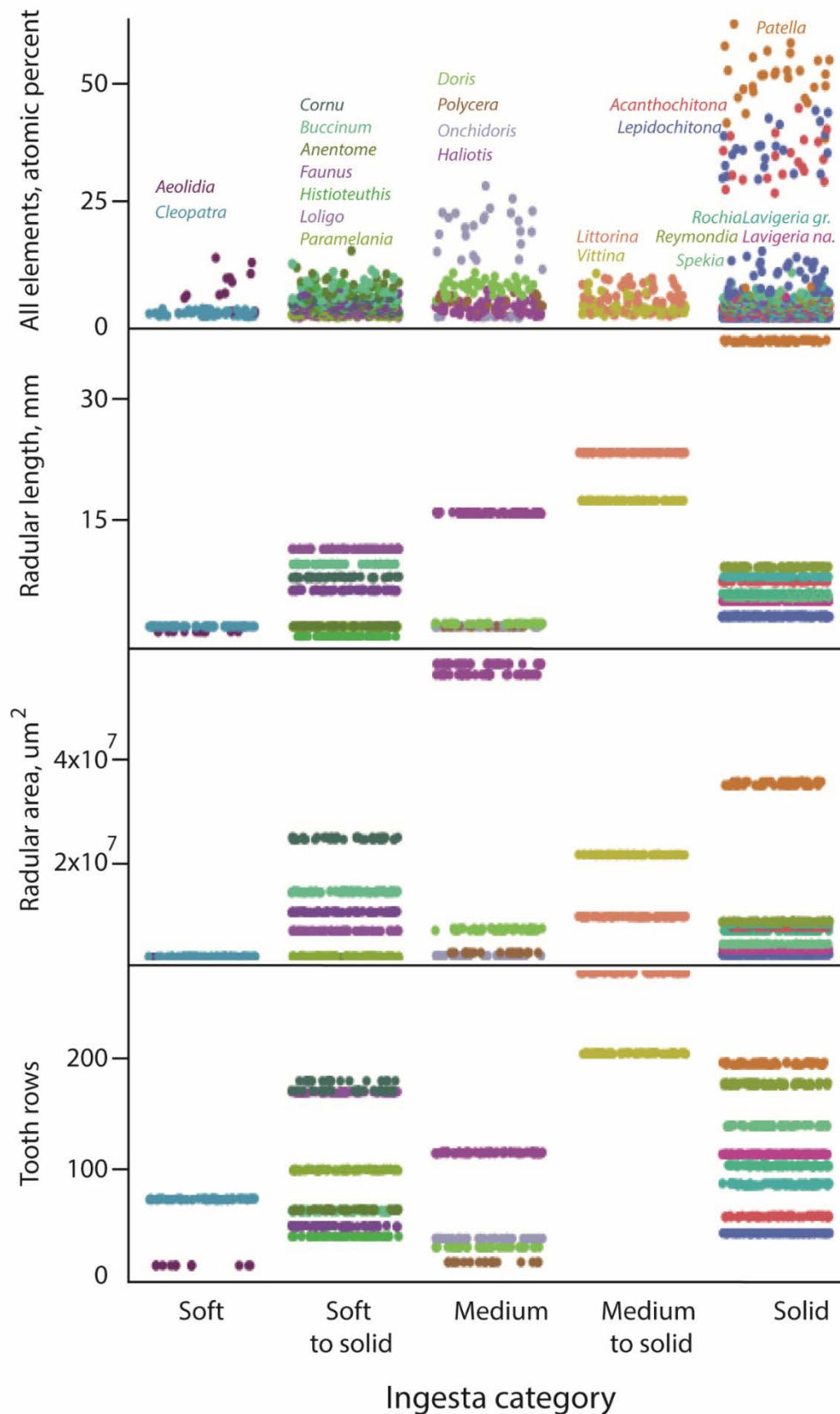
Supplementary Figure 27. Results from EDX analyses in atomic percent summarized for each species. To enable comparison, the scale is identical to the scales in Supplementary Figures 25 and 26.



Supplementary Figure 28. Radular parameters (area, length, quantity of tooth rows) plotted against the proportions of all elements studied.



Supplementary Figure 29. Ingesta categories plotted against radular parameters (area, length, quantity of tooth rows) and the proportions of all elements studied.



Supplementary Figure 30. Ingesta categories plotted against radular parameters (area, length, quantity of tooth rows) and the proportions of all elements studied. Here, the data on individual species can be seen.

Supplementary Table 1. Proportions of elements for each species and tooth type. N, quantity of teeth that contain the element.

Species	Tooth	N measurements total	Element																																			
			All elements			F			Na			Mg			Si			P			S			Cl			K			Ca			Fe			Cu		
			Mean	Sd.	Sum of means	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N	Mean	Sd.	N			
<i>Lepidochitona cinerea</i>	All teeth	212	6.21	11.05	21.75	0.00	0.00	0	1.96	1.21	11	0.86	0.34	10	0.10	0.03	5	3.37	1.39	11	0.05	0.02	6	0.00	0.00	0	0.32	0.20	14	3.64	1.84	128	11.45	11.91	68	0.00	0.00	0
	Central	23			4.09	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.56	0.51	2	1.88	0.94	16	1.65	0.00	1	0.00	0.00	0
	Lateral I	47			2.74	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.10	0.00	1	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	2.64	1.33	20	0.00	0.00	0	0.00	0.00	0
	Lateral II	71			23.24	0.00	0.00	0	1.96	1.21	11	0.86	0.34	10	0.09	0.05	3	3.37	1.39	11	0.05	0.02	6	0.00	0.00	0	0.29	0.13	10	4.68	1.42	71	11.94	11.96	65	0.00	0.00	0
	Marginal	71			3.22	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.12	0.00	1	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.25	0.00	2	2.40	1.74	21	0.45	0.04	2	0.00	0.00	0
<i>Acanthochitona fascicularis</i>	All teeth	58	12.40	16.04	28.04	0.90	0.75	36	1.44	1.21	20	1.65	1.26	39	0.00	0.00	0	2.62	2.25	34	0.32	0.29	26	0.02	0.00	2	0.44	0.17	4	2.34	1.97	39	18.31	7.60	22	0.00	0.00	0
	Central	10			0.79	0.01	0.01	5	0.00	0.00	0	0.03	0.02	5	0.00	0.00	0	0.70	0.05	2	0.04	0.02	4	0.00	0.00	0	0.00	0.00	0	0.01	0.01	3	0.00	0.00	0	0.00	0.00	0
	Lateral I	12			3.54	0.79	0.34	12	0.54	0.28	6	0.64	0.43	12	0.00	0.00	0	0.67	0.43	12	0.09	0.03	4	0.00	0.00	0	0.00	0.00	0	0.78	0.36	12	0.03	0.00	2	0.00	0.00	0
	Lateral II	20			35.22	1.21	0.84	19	2.12	0.92	12	2.81	0.26	20	0.00	0.00	0	3.98	1.99	20	0.43	0.28	18	0.00	0.00	0	0.44	0.17	4	4.09	1.00	20	20.14	5.01	20	0.00	0.00	0
	Marginal	16			0.28	0.00	0.00	0	0.06	0.00	2	0.15	0.01	2	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0	0.02	0.00	2	0.00	0.00	0	0.05	0.01	4	0.00	0.00	0	0.00	0.00	0
<i>Histioteuthis spec.</i>	All teeth	46	3.41	1.73	3.48	0.00	0.00	0	0.02	1.12	15	0.19	0.15	46	0.26	0.21	36	1.14	0.47	46	0.34	0.11	46	0.32	0.29	46	0.00	0.00	0	1.01	1.31	46	0.00	0.00	0	0.20	0.15	46
	Central	8			3.36	0.00	0.00	0	0.02	0.00	2	0.13	0.19	8	0.16	0.13	8	1.09	0.46	8	0.32	0.11	8	0.21	0.17	8	0.00	0.00	0	1.07	0.85	8	0.00	0.00	0	0.36	0.28	8
	Lateral	12			2.56	0.00	0.00	0	0.02	0.01	5	0.08	0.08	12	0.18	0.06	3	1.06	0.46	12	0.45	0.08	12	0.34	0.26	12	0.00	0.00	0	0.26	0.13	12	0.00	0.00	0	0.17	0.03	12
	Outer Marginal	26			3.91	0.00	0.00	0	0.02	0.01	8	0.25	0.12	26	0.30	0.23	25	1.19	0.48	26	0.30	0.10	26	0.34	0.33	26	0.00	0.00	0	1.34	1.58	26	0.00	0.00	0	0.17	0.09	26
<i>Loligo vulgaris</i>	All teeth	48	2.82	1.10	2.83	0.00	0.00	0	0.02	0.01	15	0.17	0.15	48	0.20	0.08	48	1.16	0.54	48	0.33	0.10	48	0.14	0.11	48	0.00	0.00	0	0.63	0.54	48	0.00	0.00	0	0.18	0.10	48
	Central	6			2.41	0.00	0.00	0	0.02	0.01	2	0.09	0.12	6	0.27	0.07	6	0.81	0.27	6	0.23	0.03	6	0.12	0.06	6	0.00	0.00	0	0.69	0.39	6	0.00	0.00	0	0.18	0.13	6
	Lateral	12			2.28	0.00	0.00	0	0.02	0.01	4	0.03	0.01	12	0.14	0.06	12	0.99	0.50	12	0.40	0.07	12	0.12	0.14	12	0.00	0.00	0	0.42	0.52	12	0.00	0.00	0	0.16	0.05	12
	Inner marginal	14			3.25	0.00	0.00	0	0.02	0.01	5	0.25	0.13	14	0.24	0.08	14	1.38	0.54	14	0.33	0.10	14	0.15	0.13	14	0.00	0.00	0	0.69	0.70	14	0.00	0.00	0	0.19	0.10	14
	Outer marginal	16			3.05	0.00	0.00	0	0.02	0.01	4	0.23	0.14	16	0.19	0.06	16	1.23	0.56	16	0.32	0.09	16	0.17	0.08	16	0.00	0.00	0	0.70	0.44	16	0.00	0.00	0	0.19	0.11	16
<i>Patella vulgata</i>	All teeth	50	29.64	25.11	40.95	0.32	0.21	50	0.03	0.01	25	0.64	0.58	49	15.28	10.20	40	3.16	2.86	50	1.56	0.87	36	0.00	0.00	0	0.72	0.54	12	2.77	2.77	50	16.47	2.79	28	0.00	0.00	0
	Lateral	14			52.49	0.40	0.24	14	0.02	0.01	6	0.90	0.34	14	21.47	4.19	14	5.00	2.56	14	2.04	0.65	14	0.00	0.00	0	0.47	0.45	6	4.68	2.22	14	17.51	2.89	14	0.00	0.00	0
	Dominant tooth	14			51.12	0.40	0.21	14	0.05	0.02	7	1.20	0.51	14	21.33	4.98	14	5.23	2.28	14	1.66	0.77	14	0.00	0.00	0	0.96	0.54	6	4.87	2.07	14	15.42	2.33	14	0.00	0.00	0
	Marginal	22			2.79	0.21	0.12	22	0.03	0.02	12	0.10	0.06	21	1.01	1.11	12	0.67	0.42	22	0.55	0.52	8	0.00	0.00	0	0.00	0.00	0	0.22	0.17	22	0.00	0.00	0	0.00	0.00	0
<i>Rochia</i>	All teeth	70	2.04	0.68	2.32	0.17	0.09	70	0.19	0.02	14	0.42	0.22	70	0.02	0.01	4	0.40	0.25	70	0.17	0.15	29	0.00	0.00	0	0.00	0.00	0	0.95	0.44	70	0.00	0.00	0	0.00	0.00	0

conus	Central	8			2.49	0.26	0.10	8	0.24	0.04	4	0.43	0.22	8	0.00	0.00	0	0.46	0.44	8	0.13	0.06	4	0.00	0.00	0	0.00	0.00	0	0.97	0.43	8	0.00	0.00	0	0.00	0.00	0
	Lateral	18			2.13	0.13	0.05	18	0.07	0.01	5	0.49	0.11	18	0.00	0.00	0	0.35	0.17	18	0.16	0.10	6	0.00	0.00	0	0.00	0.00	0	0.93	0.35	18	0.00	0.00	0	0.00	0.00	0
	Inner marginal	22			2.65	0.22	0.08	22	0.20	0.02	4	0.43	0.30	22	0.02	0.00	2	0.47	0.28	22	0.13	0.12	9	0.00	0.00	0	0.00	0.00	0	1.18	0.47	22	0.00	0.00	0	0.00	0.00	0
	Outer marginal	22			2.04	0.12	0.06	22	0.27	0.02	2	0.35	0.19	22	0.01	0.00	2	0.34	0.19	22	0.23	0.22	10	0.00	0.00	0	0.00	0.00	0	0.72	0.39	22	0.00	0.00	0	0.00	0.00	0
Haliotis tuberculata	All teeth	66	1.91	1.30	2.49	0.13	0.06	66	0.05	0.08	24	0.09	0.10	30	0.74	0.58	24	0.44	0.50	66	0.05	0.03	23	0.00	0.00	0	0.00	0.00	0	0.99	0.58	66	0.00	0.00	0	0.00	0.00	0
	Central	18			3.52	0.14	0.06	18	0.07	0.04	7	0.12	0.09	18	0.80	0.62	18	0.69	0.85	18	0.07	0.02	5	0.00	0.00	0	0.00	0.00	0	1.63	0.41	18	0.00	0.00	0	0.00	0.00	0
	Lateral	10			2.68	0.14	0.06	10	0.07	0.02	3	0.04	0.02	4	0.58	0.41	6	0.48	0.31	10	0.06	0.06	4	0.00	0.00	0	0.00	0.00	0	1.31	0.22	10	0.00	0.00	0	0.00	0.00	0
	Inner marginal	20			1.13	0.13	0.05	20	0.07	0.06	8	0.09	0.17	5	0.00	0.00	0	0.25	0.17	20	0.02	0.02	6	0.00	0.00	0	0.00	0.00	0	0.57	0.31	20	0.00	0.00	0	0.00	0.00	0
	Outer marginal	18			1.25	0.13	0.07	18	0.02	0.01	7	0.02	0.01	3	0.00	0.00	0	0.39	0.20	18	0.06	0.02	8	0.00	0.00	0	0.00	0.00	0	0.63	0.36	18	0.00	0.00	0	0.00	0.00	0
Vittina turrita	All teeth	64	2.25	1.96	2.69	0.00	0.00	0	0.03	0.04	20	0.16	0.13	27	0.21	0.26	64	0.55	0.56	54	0.42	0.18	64	0.17	0.18	64	0.00	0.00	0	0.82	0.90	64	0.33	0.09	16	0.00	0.00	0
	Lateral I	20			1.75	0.00	0.00	0	0.02	0.01	6	0.04	0.03	5	0.14	0.06	20	0.43	0.30	18	0.33	0.18	20	0.13	0.10	20	0.00	0.00	0	0.66	0.50	20	0.00	0.00	0	0.00	0.00	0
	Lateral II	16			4.8	0.00	0.00	0	0.06	0.01	7	0.25	0.10	16	0.58	0.26	16	1.04	0.78	16	0.46	0.07	16	0.35	0.26	16	0.00	0.00	0	1.73	1.29	16	0.33	0.09	16	0.00	0.00	0
	Inner marginal	12			1.33	0.00	0.00	0	0.01	0.00	3	0.01	0.00	2	0.04	0.02	12	0.28	0.22	7	0.51	0.19	12	0.09	0.07	12	0.00	0.00	0	0.39	0.37	12	0.00	0.00	0	0.00	0.00	0
	Outer marginal	16			1.35	0.00	0.00	0	0.02	0.01	5	0.02	0.01	4	0.06	0.06	16	0.27	0.16	13	0.44	0.20	16	0.09	0.06	16	0.00	0.00	0	0.45	0.28	16	0.00	0.00	0	0.00	0.00	0
Lavigeria grandis	All teeth	58	1.85	1.66	3.12	0.00	0.00	0	0.98	0.02	34	0.19	0.11	38	0.03	0.01	16	0.62	0.61	36	0.14	0.05	26	0.28	0.20	32	0.00	0.00	0	0.88	1.13	36	0.00	0.00	0	0.00	0.00	0
	Central	18			2.58	0.00	0.00	0	0.69	0.34	12	0.18	0.06	18	0.03	0.01	6	0.44	0.29	18	0.16	0.03	8	0.18	0.09	18	0.00	0.00	0	0.90	0.99	18	0.00	0.00	0	0.00	0.00	0
	Lateral	14			4.07	0.00	0.00	0	1.16	0.68	10	0.27	0.09	14	0.03	0.01	9	1.00	0.78	14	0.11	0.06	6	0.41	0.23	14	0.00	0.00	0	1.09	1.39	14	0.00	0.00	0	0.00	0.00	0
	Marginal I	12			1.34	0.00	0.00	0	1.16	0.48	6	0.02	0.01	3	0.02	0.00	1	0.01		2	0.13	0.07	6	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0
	Marginal II	14			1.39	0.00	0.00	0	1.08	0.29	6	0.02	0.01	3	0.00	0.00	0	0.10	0.01	2	0.14	0.05	7	0.00	0.00	0	0.00	0.00	0	0.05	0.03	4	0.00	0.00	0	0.00	0.00	0
Lavigeria nassa	All teeth	104	1.79	0.88	2.08	0.00	0.00	0	0.14	0.51	22	0.19	0.06	98	0.03	0.00	2	0.52	0.33	84	0.18	0.08	98	0.18	0.11	83	0.00	0.00	0	0.84	0.47	104	0.00	0.00	0	0.00	0.00	0
	Central	20			2.56	0.00	0.00	0	0.17	0.01	4	0.17	0.06	20	0.00	0.00	0	0.64	0.31	20	0.17	0.09	18	0.21	0.10	20	0.00	0.00	0	1.20	0.45	20	0.00	0.00	0	0.00	0.00	0
	Lateral	60			2.13	0.00	0.00	0	0.14	0.06	10	0.22	0.07	56	0.03	0.00	2	0.51	0.33	60	0.17	0.07	56	0.18	0.11	60	0.00	0.00	0	0.88	0.44	60	0.00	0.00	0	0.00	0.00	0
	Marginal I	12			1.33	0.00	0.00	0	0.14	0.01	4	0.17	0.02	10	0.00	0.00	0	0.22	0.36	3	0.19	0.09	12	0.12	0.13	2	0.00	0.00	0	0.49	0.25	12	0.00	0.00	0	0.00	0.00	0
	Marginal II	12			0.87	0.00	0.00	0	0.10	0.01	5	0.15	0.04	12	0.00	0.00	0	0.02	0.00	1	0.18	0.07	12	0.01	0.00	1	0.00	0.00	0	0.41	0.16	12	0.00	0.00	0	0.00	0.00	0
Paramelania damoni	All teeth	60	0.71	0.63	1.37	0.00	0.00	0	0.22	0.05	32	0.16	0.09	35	0.03	0.02	10	0.17	0.15	23	0.24	0.14	44	0.08	0.07	20	0.08	0.08	24	0.39	0.39	29	0.00	0.00	0	0.00	0.00	0
	Central	14			0.95	0.00	0.00	0	0.30	0.24	10	0.19	0.10	14	0.02	0.00	2	0.05	0.00	2	0.20	0.10	10	0.02	0.00	2	0.05	0.06	8	0.12	0.06	13	0.00	0.00	0	0.00	0.00	0
	Lateral	16			1.71	0.00	0.00	0	0.22	0.14	8	0.17	0.08	16	0.04	0.01	3	0.19	0.16	16	0.32	0.19	10	0.09	0.08	16	0.06	0.08	8	0.62	0.40	16	0.00	0.00	0	0.00	0.00	0
	Marginal I	18			0.66	0.00	0.00	0	0.04	0.03	6	0.07	0.05	3	0.01	0.00	2	0.26	0.03	2	0.20	0.13	14	0.01	0.00	1	0.07	0.01	4	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0

	Marginal II	12			1.04	0.00	0.00	0	0.26	0.09	8	0.10	0.04	2	0.04	0.02	4	0.09	0.09	3	0.23	0.12	10	0.11	0.00	1	0.21	0.02	4	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0
<i>Cleopatra johnstoni</i>	All teeth	52	0.80	0.48	1.16	0.00	0.00	0	0.42	0.18	52	0.39	0.24	33	0.00	0.00	0	0.14	0.04	12	0.14	0.04	30	0.05	0.02	18	0.02	0.01	14	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0
	Central	14			1.33	0.00	0.00	0	0.54	0.30	14	0.49	0.27	11	0.00	0.00	0	0.08	0.01	2	0.14	0.06	8	0.06	0.00	4	0.02	0.01	6	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0
	Lateral	16			1.04	0.00	0.00	0	0.37	0.26	16	0.30	0.23	6	0.00	0.00	0	0.17	0.01	2	0.13	0.04	10	0.05	0.02	8	0.02	0.01	4	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0
	Marginal I	10			0.83	0.00	0.00	0	0.32	0.16	10	0.25	0.18	5	0.00	0.00	0	0.14	0.04	4	0.10	0.00	2	0.02	0.00	2	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0
	Marginal II	12			1.18	0.00	0.00	0	0.42	0.26	12	0.40	0.21	11	0.00	0.00	0	0.16	0.03	4	0.15	0.03	10	0.04	0.01	4	0.01	0.00	4	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0
<i>Reymondia horei</i>	All teeth	72	2.46	0.96	3.32	0.00	0.00	0	0.42	0.26	44	0.17	0.09	58	0.06	0.06	14	0.52	0.33	56	0.38	0.15	70	0.19	0.16	67	0.06	0.01	10	0.87	0.38	70	0.32	0.02	2	0.33	0.17	52	0
	Central	8			3.12	0.00	0.00	0	0.58	0.17	6	0.23	0.05	6	0.04	0.00	2	0.34	0.11	8	0.34	0.06	8	0.11	0.04	8	0.07	0.00	2	1.02	0.39	8	0.00	0.00	0	0.39	0.16	8	0
	Lateral	44			3.66	0.00	0.00	0	0.47	0.23	25	0.15	0.09	38	0.07	0.08	8	0.65	0.33	34	0.40	0.17	44	0.24	0.17	44	0.05	0.01	8	0.96	0.39	44	0.32	0.02	2	0.35	0.15	40	0
	Marginal I	8			1.78	0.00	0.00	0	0.02	0.01	3	0.18	0.05	4	0.05	0.00	2	0.44	0.30	3	0.43	0.10	6	0.06	0.04	5	0.04	0.01	4	0.54	0.05	6	0.00	0.00	0	0.02	0.01	2	0
	Marginal II	12			1.98	0.00	0.00	0	0.34	0.30	10	0.23	0.09	10	0.03	0.00	2	0.25	0.23	11	0.32	0.09	12	0.09	0.03	10	0.05	0.00	2	0.64	0.22	12	0.00	0.00	0	0.03	0.01	2	0
<i>Spekia zonata</i>	All teeth	64	3.47	1.34	3.62	0.00	0.00	0	0.73	0.26	60	0.18	0.11	64	0.09	0.01	2	0.68	0.47	64	0.24	0.22	58	0.25	0.13	64	0.00	0.00	0	1.45	0.67	64	0.00	0.00	0	0.00	0.00	0	0
	Central	14			4.33	0.00	0.00	0	0.94	0.26	12	0.24	0.08	14	0.00	0.00	0	0.79	0.71	14	0.31	0.39	14	0.30	0.20	14	0.00	0.00	0	1.75	1.04	14	0.00	0.00	0	0.00	0.00	0	0
	Lateral	12			3.67	0.00	0.00	0	0.55	0.21	10	0.29	0.08	12	0.00	0.00	0	0.65	0.44	12	0.15	0.07	10	0.29	0.08	12	0.00	0.00	0	1.74	0.45	12	0.00	0.00	0	0.00	0.00	0	0
	Marginal I	20			3.4	0.00	0.00	0	0.78	0.30	20	0.14	0.09	20	0.09	0.01	2	0.65	0.33	20	0.23	0.07	20	0.23	0.09	20	0.00	0.00	0	1.28	0.47	20	0.00	0.00	0	0.00	0.00	0	0
	Marginal II	18			3.05	0.00	0.00	0	0.63	0.21	18	0.09	0.05	18	0.00	0.00	0	0.66	0.40	18	0.25	0.21	14	0.22	0.09	18	0.00	0.00	0	1.20	0.46	18	0.00	0.00	0	0.00	0.00	0	0
<i>Faunus ater</i>	All teeth	56	0.98	0.67	1.37	0.00	0.00	0	0.23	0.10	14	0.12	0.09	48	0.06	0.05	12	0.25	0.16	49	0.15	0.12	15	0.09	0.06	44	0.00	0.00	0	0.47	0.40	56	0.00	0.00	0	0.00	0.00	0	0
	Central	16			1.52	0.00	0.00	0	0.16	0.09	5	0.17	0.08	16	0.03	0.02	4	0.22	0.16	16	0.18	0.08	4	0.10	0.07	16	0.00	0.00	0	0.66	0.37	16	0.00	0.00	0	0.00	0.00	0	0
	Lateral	14			1.73	0.00	0.00	0	0.08	0.05	5	0.17	0.05	14	0.03	0.01	4	0.36	0.19	14	0.08	0.01	2	0.14	0.05	14	0.00	0.00	0	0.87	0.24	14	0.00	0.00	0	0.00	0.00	0	0
	Marginal I	14			1.25	0.00	0.00	0	0.49	0.19	4	0.02	0.01	9	0.15	0.01	2	0.17	0.06	12	0.30	0.05	4	0.03	0.01	7	0.00	0.00	0	0.09	0.10	14	0.00	0.00	0	0.00	0.00	0	0
	Marginal II	12			0.78	0.00	0.00	0	0.15	0.01	2	0.04	0.02	9	0.08	0.01	2	0.21	0.08	7	0.03	0.02	5	0.06	0.03	7	0.00	0.00	0	0.21	0.19	12	0.00	0.00	0	0.00	0.00	0	0
<i>Littorina littorea</i>	All teeth	58	3.97	2.50	4.44	0.28	0.24	44	0.19	0.20	44	0.34	0.29	58	0.83	0.42	56	0.71	0.66	58	0.15	0.10	40	0.03	0.03	2	0.09	0.08	6	1.48	1.07	54	0.34	0.16	46	0.00	0.00	0	0
	Central	24			5.46	0.37	0.25	18	0.19	0.09	22	0.50	0.28	24	1.09	0.25	24	0.92	0.71	24	0.09	0.07	24	0.03	0.03	2	0.00	0.00	0	1.87	1.00	24	0.40	0.13	24	0.00	0.00	0	0
	Lateral	16			5.12	0.26	0.22	16	0.26	0.08	16	0.40	0.25	16	0.98	0.23	16	0.79	0.65	16	0.23	0.06	16	0.00	0.00	0	0.13	0.06	4	1.73	0.82	16	0.34	0.16	16	0.00	0.00	0	0
	Marginal	18			1.55	0.15	0.21	10	0.02	0.01	6	0.09	0.13	18	0.29	0.24	16	0.36	0.47	18	0.00	0.00	0	0.00	0.00	0	0.01	0.00	2	0.53	0.91	14	0.10	0.04	6	0.00	0.00	0	0
<i>Paludomus siamensis</i>	All teeth	62	0.98	0.55	1.34	0.00	0.00	0	0.19	0.28	24	0.29	0.14	58	0.05	0.03	22	0.15	0.11	39	0.11	0.09	28	0.06	0.04	35	0.05	0.01	6	0.44	0.29	62	0.00	0.00	0	0.00	0.00	0	0
	Central	18			1.17	0.00	0.00	0	0.16	0.11	12	0.27	0.14	16	0.08	0.01	6	0.09	0.06	18	0.09	0.07	12	0.04	0.03	17	0.00	0.00	0	0.44	0.18	18	0.00	0.00	0	0.00	0.00	0	0
	Lateral	16			1.98	0.00	0.00	0	0.35	0.02	2	0.39	0.10	17	0.05	0.02	8	0.21	0.13	16	0.11	0.07	6	0.08	0.04	16	0.00	0.00	0	0.79	0.21	16	0.00	0.00	0	0.00	0.00	0	0

	Marginal I	12			1.19	0.00	0.00	0	0.20	0.09	4	0.30	0.10	10	0.03	0.00	2	0.25	0.02	2	0.16	0.16	6	0.00	0.00	0	0.00	0.00	0	0.25	0.15	12	0.00	0.00	0	0.00	0.00	0
	Marginal II	16			0.84	0.00	0.00	0	0.17	0.08	6	0.21	0.15	16	0.03	0.02	6	0.11	0.08	3	0.09	0.01	4	0.01	0.00	2	0.00	0.00	0	0.22	0.16	16	0.00	0.00	0	0.00	0.00	0
<i>Anentome helena</i>	All teeth	44	5.68	2.55	6.27	0.00	0.00	0	0.35	0.11	44	0.14	0.05	18	0.07	0.00	2	2.31	1.58	44	0.72	0.51	18	0.89	0.47	44	0.00	0.00	0	1.79	1.39	44	0.00	0.00	0	0.00	0.00	0
	Central	18			4.99	0.00	0.00	0	0.22	0.25	18	0.12	0.05	14	0.00	0.00	0	2.07	1.70	18	0.82	0.45	10	0.98	0.41	18	0.00	0.00	0	0.78	0.34	18	0.00	0.00	0	0.00	0.00	0
	Lateral	26			7.06	0.00	0.00	0	0.43	0.25	26	0.19	0.02	4	0.07	0.00	2	2.47	1.51	26	0.60	0.59	8	0.82	0.50	26	0.00	0.00	0	2.48	1.42	26	0.00	0.00	0	0.00	0.00	0
<i>Buccinum undatum</i>	All teeth	54	5.41	2.10	5.59	0.00	0.00	0	0.24	0.27	54	0.12	0.06	42	0.00	0.00	0	2.11	0.76	54	0.38	0.21	32	0.74	0.23	54	0.00	0.00	0	2.00	1.61	54	0.00	0.00	0	0.00	0.00	0
	Central	16			5.34	0.00	0.00	0	0.13	0.08	16	0.14	0.05	12	0.00	0.00	0	2.02	0.77	16	0.06	0.03	4	0.67	0.26	16	0.00	0.00	0	2.32	1.60	16	0.00	0.00	0	0.00	0.00	0
	Lateral	38			5.62	0.00	0.00	0	0.28	0.18	38	0.12	0.06	30	0.00	0.00	0	2.15	0.77	38	0.43	0.18	28	0.77	0.21	38	0.00	0.00	0	1.87	1.61	38	0.00	0.00	0	0.00	0.00	0
<i>Onchidoris bilamellata</i>	All teeth	38	11.59	9.82	19.59	1.75	0.90	28	0.53	0.17	18	0.99	0.21	24	0.00	0.00	0	5.63	1.59	24	0.24	0.13	22	0.98	0.26	6	0.09	0.08	10	9.38	2.99	24	0.00	0.00	0	0.00	0.00	0
	Thickened membrane	6			0.62	0.02	0.00	2	0.59	0.49	3	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.01	0.00	2	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0
	Lateral	24			20.04	2.03	0.59	24	0.64	0.54	11	0.99	0.21	24	0.00	0.00	0	5.63	1.59	24	0.28	0.10	18	0.98	0.26	6	0.11	0.08	8	9.38	2.99	24	0.00	0.00	0	0.00	0.00	0
	Marginal	8			0.26	0.03	0.00	2	0.16	0.07	4	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.06	0.00	2	0.00	0.00	0	0.01	0.00	2	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0
<i>Aeolidia papillosa</i>	All teeth	12	6.60	3.71	7.4	0.00	0.00	0	0.03	0.49	6	0.16	0.13	8	0.00	0.00	0	1.34	1.11	10	2.06	1.29	10	0.70	0.53	9	0.00	0.00	0	3.11	2.49	12	0.00	0.00	0	0.00	0.00	0
	Inner part	6			9.78	0.00	0.00	0	0.04	0.04	3	0.25	0.13	4	0.00	0.00	0	2.11	0.65	6	1.23	0.90	6	0.99	0.38	6	0.00	0.00	0	5.16	1.88	6	0.00	0.00	0	0.00	0.00	0
	Outer part	6			4.78	0.00	0.00	0	0.02	0.01	3	0.08	0.01	4	0.00	0.00	0	0.18	0.09	4	3.32	0.40	4	0.12	0.04	3	0.00	0.00	0	1.06	0.11	6	0.00	0.00	0	0.00	0.00	0
<i>Polycera quadrilineata</i>	All teeth	18	3.32	1.20	5.89	0.00	0.00	0	0.17	0.03	8	0.58	0.29	18	0.00	0.00	0	2.09	0.35	42	0.68	0.10	8	0.00	0.00	0	0.00	0.00	0	2.37	1.14	18	0.00	0.00	0	0.00	0.00	0
	Lateral	6			2.37	0.00	0.00	0	0.16	0.05	3	0.70	0.35	6	0.00	0.00	0	0.00	0.00	0	0.61	0.08	4	0.00	0.00	0	0.00	0.00	0	0.90	0.21	6	0.00	0.00	0	0.00	0.00	0
	Marginal	12			4.55	0.00	0.00	0	0.18	0.09	5	0.52	0.24	12	0.00	0.00	0	0.00	0.00	0	0.75	0.05	4	0.00	0.00	0	0.00	0.00	0	3.10	0.49	12	0.00	0.00	0	0.00	0.00	0
<i>Doris pseudoargus</i>	All teeth	42	6.54	1.44	8.76	0.74	0.13	42	0.16	0.07	19	0.95	0.23	42	0.00	0.00	0	3.37	1.39	11	0.20	0.05	16	0.00	0.00	0	0.00	0.00	0	3.34	0.99	42	0.00	0.00	0	0.00	0.00	0
	Outer teeth	20			6.91	0.67	0.13	20	0.13	0.08	10	0.86	0.26	20	0.00	0.00	0	1.95	0.37	20	0.22	0.02	6	0.00	0.00	0	0.00	0.00	0	3.08	0.90	20	0.00	0.00	0	0.00	0.00	0
	Inner teeth	22			8.02	0.80	0.10	22	0.20	0.07	9	1.04	0.16	22	0.00	0.00	0	2.22	0.28	22	0.18	0.06	10	0.00	0.00	0	0.00	0.00	0	3.58	1.03	22	0.00	0.00	0	0.00	0.00	0
<i>Cornu aspersum</i>	All teeth	40	2.72	1.20	3.28	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.67	0.18	8	0.00	0.00	0	0.43	0.27	38	0.00	0.00	0	0.00	0.00	0	2.18	0.90	40	0.00	0.00	0	0.00	0.00	0
	Inner teeth	20			3.32	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.65	0.17	4	0.00	0.00	0	0.40	0.25	18	0.00	0.00	0	0.00	0.00	0	2.27	0.90	20	0.00	0.00	0	0.00	0.00	0
	Outer teeth	20			3.25	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.70	0.22	4	0.00	0.00	0	0.46	0.30	20	0.00	0.00	0	0.00	0.00	0	2.09	0.92	20	0.00	0.00	0	0.00	0.00	0

Supplementary Table 2. Summary of the literature on radular chemistry sorted by phylogeny. Methodology of elemental analyses, the analysed zone of the radula and the tooth type are listed.

Taxa		Family	Species	Reference	Method	Radular zone	Tooth type and part	Comment	Elements											
									F	Na	Mg	Si	P	S	Cl	K	Ca	Fe	Cu	
Aplacophora	Chaetodermatida	Chaetodermatidae	<i>Falcidens spec.</i>	Cruz et al., 1998	EDXA, ESI	Not defined	Axial plate, denticles					x	x	x			x	x	x	
		Prochaetodermatidae	<i>Chevroderma turnerae</i>	Tillier & Cuif, 1986	X-ray diffraction, X-ray microanalysis	Not defined	Not defined				x		x				x	x		
Gastropoda	Caenogastropoda	Charoniidae	<i>Charonia lampas</i>	Bergh from 'Konigl. Danske Videnskabernes Selkabs Skrifur' 5th Raekke, 3 Bind; translation in Troschel, 1863 (termed by Bergh <i>Buccinum antiquorum</i> and by Troschel <i>Triton nodiferum</i>)	Acid treatments and boiling	Whole radula	Not defined, but probably all						x				x	x		
		Strombidae	<i>Gibberulus gibberulus</i>	Bergh from 'Konigl. Danske Videnskabernes Selkabs Skrifur,' 5th Raekke, 3 Bind; translation in Troschel, 1863 (termed <i>Strombus gibberulus</i>)	Acid treatments and boiling	Whole radula	Not defined, but probably all		?	?	?	?	?	?	?	?	?	?	?	
		Tateidae	<i>Potamopyrgus antipodarum</i>	Jones et al., 1935 (termed <i>Hydrobia jenkinsi</i>)	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-						-		
		Aporrhaidae	<i>Aporrhais pespelecani</i>	Jones et al., 1935 (termed <i>Hydrobia jenkinsi</i>)	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-						-		
		Littorinidae	<i>Littorina littorea</i>	Sollas, 1907	Ashing and acid treatment	Whole radula	All				x		x					x	x	
				Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-							-	
			<i>Lacuna vincta</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-							-	
		Velutinidae	<i>Lamellaria perspicua</i>	Bergh from 'Konigl. Danske Videnskabernes Selkabs Skrifur,' 5th Raekke, 3 Bind; translation in Troschel, 1863 (termed <i>Marsenia perspicua</i>)	Acid treatments and boiling	Whole radula	Not defined, but probably all					-								
		Tonnidae	<i>Tonna galea</i>	Troschel, 1863 (termed <i>Dolium galea</i>)	Ashing and acid treatment	Whole radula	All						x					x	x	

		Muricidae	? <i>Termed Murex branchialis</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-							-	
			<i>Nucella lapillus</i>	Sollas, 1907	Not defined	Whole radula	All					x	?					x	?	x
				Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-							-	
		Buccinidae	<i>Buccinum undatum</i>	Sollas, 1907	Not defined	Whole radula	All					x	?					x	?	x
				Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-							-	
		Heterobranchia	Helicidae	<i>Cornu aspersum</i>	Sollas, 1907 (termed <i>Helix aspersa</i>)	Ashing and acid treatment	Whole radula	All	spring				x							
					Krings et al., 2019b	EDX	Working zone	Central and lateral teeth	winter									x		
				<i>Helix nemoralis</i>	Troschel, 1863	Ashing and acid treatment	Whole radula	All					x					x	x	
			Scaphandridae	<i>Scaphander lignarius</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-						-	
			Aplysiidae	<i>Aplysia punctata</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-						-	
			Discodorididae	<i>Jorunna tomentosa</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-						-	
	Vetigastropoda	Fissurellidae	<i>Megathura crenulata</i>	Mikovari et al., 2015	EDX	Working zone	All				x	x	x				x		x	x
				Ukmar-Godec et al., 2015	Inductively coupled plasma-optical emission spectrometry	Not defined	Dominant lateral teeth												x	
				Ukmar-Godec et al., 2017	EDX	Not defined	Dominant lateral teeth					x				x		x		
			<i>Emarginula fissura</i>	Sollas, 1907	Ashing, acid treatment, boiling, staining, refractive index, diffusion column	Whole radula	All						x					x	x	
				Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all						-						-	
		Calliostomatidae	<i>Calliostoma ziziphinum</i>	Sollas, 1907 (termed <i>Trochus ziziphinus</i>)	Ashing, acid treatment, boiling, staining, refractive index, diffusion column	Whole radula	All						x					x	x	

				Jones et al., 1935 (termed <i>Calliostoma zizyphynum</i>)	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-						-	
		Haliotidae	<i>Haliotis</i>	Sollas, 1907	Ashing, acid treatment, boiling, staining, refractive index, diffusion column	Whole radula	All					x					x	x	
	Neritimorpha	Neritidae	<i>Nerita atramentosa</i>	Macey et al., 1997	EDS	Not defined	Dominant lateral tooth and marginal teeth				x	x		x	x	x	x	x	
	Patello-gastropoda	Lepetidae	<i>Lepeta caeca</i>	Sollas, 1907	Not defined	Not defined, but probably whole radula	Not defined, but probably all					x							
			<i>Lepeta concentrica</i>	Sollas, 1907 (termed <i>Cryptobranchia concentrica</i>)	Not defined	Not defined, but probably whole radula	Not defined, but probably all					x							
		Lottiidae	<i>Nipponacmea schrenckii</i> (termed by Hua and Li: <i>Notoacmea schrenckii</i>)	Hua & Li, 2007	EDX	Radular sack and maturation zone	Dominant lateral teeth					x						x	
			<i>Patella ulyssiponensis</i>	Jones et al., 1935 (termed by <i>Patella athletica</i>)	Ashing and acid treatment	Whole radula	All			x	x	x	x		x	x	x	x	x
			<i>Patelloida alticostata</i>	Shaw et al., 2008	Dissolving and ICP-AES	Whole radula	All			x	x	x	x	x		x	x	x	x
				Liddiard et al., 2004	EDX, Raman and infrared spectroscopies	Ontogeny	Dominant lateral teeth					x					x	x	
			<i>Patelloida striata</i>	Huang et al., 1992 (termed <i>Acmaea striata</i>)	X-ray diffraction	Ontogeny	Dominant lateral teeth					x						x	
			<i>Tectura virginea</i>	Sollas, 1907 (termed <i>Acmaea virginea</i>)	Ashing, acid treatment, boiling, staining, refractive index, diffusion column	Whole radula	All					x							
			<i>Lottia gigantea</i>	Rinkevich, 1993	EDX	Ontogeny	Dominant lateral teeth					x					x	x	
		Neolepetopsidae	<i>Paralepetopsis ferrugivora</i>	Cruz & Farina, 2005	EDXA	Maturation zone	Dominant lateral teeth					x	x	x	x			x	
		Patellidae	<i>Patella pellucida</i>	Jones et al., 1935 (termed <i>Patella coeruleata</i> and <i>Patina pellucida</i>)	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					x						x	
												x						x	
			<i>Patella rustica</i>	Jones et al., 1935 (termed <i>Patella lusitanica</i>)	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					x						x	
			<i>Scutellastra laticostata</i>	Liddiard et al., 2004	EDX, Raman and infrared spectroscopies	Ontogeny	Dominant lateral teeth					x					x	x	
			<i>Patella caerulea</i>	Sone et al., 2007	Raman spectroscopy	Ontogeny	Dominant lateral teeth											x	

Polyplacophora	Chitonida		<i>Patella pellucida</i>	Sollas, 1907	Ashing, acid treatment, boiling, staining, refractive index, diffusion column	Whole radula	All					x	x	x					x	x	
			<i>Patella vulgata</i>	Grime et al., 1985	Scanning proton microprobe	Not defined	Dominant lateral teeth						x	x					x	x	x
				Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all						x							x	
				Mann et al., 1986	EDXA and acid treatment	Ontogeny	Dominant lateral teeth						x	x					x	x	
				St Pierre et al., 1986	Mössbauer spectroscopy and transmission electron microscopy	Ontogeny	Dominant lateral teeth													x	
				Runham, 1961	Ashing and acid treatment	Ontogeny	Dominant lateral teeth						x							x	
				Runham et al., 1969	Electron microprobe analyses	Ontogeny	Dominant lateral teeth						x		x					x	
				Sollas, 1907	Ashing, acid treatment, boiling, staining, refractive index, diffusion column	Whole radula	All						x	x	x				x	x	
				van der Wal, 1989	EDX	Not defined	Lateral tooth cusp							x		x				x	
				Troschel, 1863	Ashing and acid treatment	Whole radula	All							x					x	x	
				Davies et al., 2005	Atomic absorption spectrophotometer	Not defined	Not defined					x	x						x	x	
		Acanthochitonidae	<i>Acanthochitona discrepans</i>	Jones et al., 1935 (termed <i>Chiton discrepans</i>)	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all						-							x	
			<i>Cryptochiton stelleri</i>	Grunenfelder et al., 2014	EDS	Working zone	Dominant lateral teeth							x						X	
				Towe & Lowenstam, 1967	Electron microprobe analysis	Not defined	Dominant lateral teeth							x					x	x	
				Weaver et al., 2010	EDS	Working zone	Dominant lateral teeth				x	x	x	x				x	x	x	
				Herrera et al., 2015	EDS	Working zone	Dominant lateral teeth							x	x				x	x	
				Pohl et al., 2020	EDS	Working zone	Dominant lateral teeth				x	x	x	x	x	x	x	x	x	x	
				Stegbauer et al., 2021	EDS	Working zone	Dominant lateral teeth							x						x	
		Chaetopleuridae	<i>Chaetopleura apiculata</i>	Gordon & Joester, 2011	Atom probe tomography	Working zone	Dominant lateral teeth							x					x	x	
		Chitonidae	<i>Acanthopleura brevispinosa</i>	Brooker & Macey, 2001	EDS	Ontogeny	Dominant lateral teeth													x	

			<i>Sypharochiton pelliserpentis</i>	Evans & Alvarez, 1999 (termed <i>Chiton pelliserpentis</i>)	FT-IR, Raman, XRD	Not defined	Dominant lateral teeth											x		
				Brooker et al., 2006	EDS and Raman spectroscopy	Working zone	Dominant lateral teeth				x		x					x	x	
		Cryptoplacidae	<i>Cryptoplax striata</i>	Macey & Brooker, 1996	EDS	Ontogeny	Dominant lateral teeth				x	x	x	x	x		x	x	x	
		Ischnochitonidae	<i>Ischnochiton australis</i>	Brooker & Macey, 2001	EDS	Ontogeny	Dominant lateral teeth				x		x	x	x		x	x		
				Brooker et al., 2006	EDS and Raman spectroscopy	Working zone	Dominant lateral teeth				x		x				x	x		
		Mopaliidae	<i>Mopalia muscosa</i>	Emmanuel et al., 2014	Mass spectrometry	Whole radula	All											x		
			<i>Plaxiphora albida</i>	Brooker & Macey, 2001	EDS	Ontogeny	Dominant lateral teeth				x		x	x	x		x	x		
				Lee et al., 2003a	Raman spectroscopy	Not defined	Dominant lateral teeth					x	x				x	x		
				Brooker et al., 2006	EDS and Raman spectroscopy	Working zone	Dominant lateral teeth				x		x				x	x		
				Shaw et al., 2008	Dissolving and ICP-AES	Whole radula	All				x	x	x	x	x		x	x	x	x
		Tonicellidae	<i>Tonicella lineata</i>	Emmanuel et al., 2014	Mass spectrometry	Whole radula	All											x		
			<i>Tonicella marmorea</i>	Emmanuel et al., 2014	Mass spectrometry	Whole radula	All											x		
		?	?	<i>Chiton emarginata</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-					x		
		?	?	<i>Chiton olivarius</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-					x		
		?	?	<i>Craspedocheilus cinereus</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-					x		
Scaphopoda	Dentaliida	Dentaliidae	<i>Dentalium spec.</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					x						x		
Cephalopoda	Octopoda	Argonautidae	<i>Argonauta spec.</i>	Jones et al., 1935	Ashing and acid treatment	Not defined, but probably whole radula	Not defined, but probably all					-						-		