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Major contribution of prokaryotes to carbon fluxes in the pelagic microbial food webs of the Mediterranean Sea

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SUPPLEMENTARY MATERIAL

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INTRODUCTION

Details of the dilution experiments analysed for the samples from the sub-surface and in mesopelagic and bathypelagic layers.

Samples V1, V2, V3, V4, V6, V7, V10, VA and VIERA were taken during the Transmed oceanographic cruise on board of the *R.V. Urania* and the *R.V. Universitatis*, with analyses published in Fonda Umani *et al.* (2010) and Di Poi *et al.* (2013). The cruise was part of the Vector (Vulnerability of Coasts and Marine Italian Ecosystems to Climate Change and Their Role in the Mediterranean Carbon Cycles) project.

Samples O_36, O_37B, CF_16, MS_03A and OL_107 were taken during Obama oceanographic cruise on board of the *R.V. Urania*; the cruise was part of the Obama (Osservatorio off-shore per ricerche ecologiche a lungo termine (L-TER) sulla Biodiversità e funzionamento degli ecosistemi marini profondi in Mar Mediterraneo) project.

All of the remaining samples were collected at station C1 (13.710 E, 45.701 N; depth, 17 m) in the Gulf of Trieste (northern Adriatic Sea) from autumn 1998 to summer 2005. These data were analysed in Fonda Umani and Beran (2003) and Fonda Umani *et al.* (2012).

SUPPLEMENTARY TAB. 1. Chlorophyll *a* and biomasses data for all of the dilution experiments carried out at the sub-surface. The stations are grouped according to the trophic conditions, and ordered according to the chlorophyll *a* levels.

Trophic condition	Station code	Sampling date (dd/mm/yy)	Chl <i>a</i> (mg L ⁻¹)	Biomass (µg C L ⁻¹)				
				Microzooplankton	Microphytoplankton	Nanoplankton	Heterotrophic prokaryotes	Autotrophic prokaryotes
Oligotrophic	VIERA	24/6/07	0.04	0.46 ±0.08	-	1.40 ±0.37	4.87 ±0.22	0.42 ±0.06
	C1	15/12/99	0.46	3.48 ±0.57	0.13 ±0.02	1.59 ±0.03	21.02 ±1.45	0.57 ±0.11
	C1	10/3/04	0.60	1.23 ±0.07	0.12 ±0.28	13.35 ±0.35	5.84 ±0.12	0.94 ±0.04
	V3	5/6/07	0.08	0.42 ±0.20	0.57 ±0.18	5.00 ±0.79	10.85 ±0.30	0.44 ±0.05
	MS_03A	1/4/11	0.04	0.72 ±0.03	0.15 ±0.02	8.04 ±1.16	4.71 ±0.51	2.60 ±0.10
	C1	5/4/04	1.37	8.79 ±0.47	1.01 ±0.65	9.81 ±0.57	5.13 ±0.19	1.86 ±0.09
	V4	1/6/07	0.11	0.39 ±0.07	0.50 ±0.11	5.72 ±1.39	11.70 ±0.08	0.82 ±0.09
	V1	6/6/07	0.22	0.32 ±0.10	1.06 ±0.24	8.70 ±1.07	13.15 ±0.69	0.70 ±0.05
	V2	8/6/07	0.10	0.24 ±0.12	0.52 ±0.07	2.47 ±0.75	9.84 ±0.16	0.88 ±0.09
	VA	30/5/07	0.07	0.84 ±0.27	1.46 ±0.27	4.59 ±1.01	11.70 ±0.39	0.62 ±0.19
	V10	22/6/07	0.06	0.50 ±0.09	-	1.05 ±0.19	6.14 ±0.01	0.64 ±0.12
	O_37B	27/3/11	0.08	1.17 ±0.28	0.08 ±0.01	5.19 ±0.66	5.80 ±0.41	3.91 ±0.22
	V6	14/6/07	0.06	0.54 ±0.12	-	1.28 ±0.39	7.49 ±0.56	0.49 ±0.09
	O_36	26/3/11	0.08	3.73 ±2.17	0.28 ±0.07	4.39 ±0.86	6.32 ±0.41	4.43 ±0.15
	CF_16	2/4/11	0.06	0.96 ±0.24	0.16 ±0.01	4.45 ±0.20	4.49 ±0.07	4.71 ±0.51
V7	16/6/07	0.05	0.88 ±0.03	-	2.04 ±0.53	5.89 ±0.67	0.45 ±0.12	
Meso-eutrophic	C1	29/9/03	0.67	7.21 ±0.41	0.41 ±0.10	6.24 ±0.20	32.07 ±2.35	14.91 ±0.90
		20/11/00	0.80	3.48 ±0.38	15.00 ±0.81	2.86 ±0.06	23.93 ±1.21	0.69 ±0.07
		15/11/01	0.74	5.41 ±0.28	11.51 ±0.28	2.63 ±0.06	19.71 ±1.22	5.76 ±0.13
		9/8/05	0.19	1.98 ±0.30	3.27 ±0.24	6.53 ±0.30	24.41 ±1.47	15.37 ±0.48

		12/3/03	0.70	12.04 ±1.44	18.42 ±0.83	3.64 ±0.22	3.66 ±0.18	3.93 ±0.20
		7/5/01	0.36	2.88 ±0.35	10.17 ±0.38	4.13 ±0.18	24.69 ±0.99	15.97 ±0.48
		7/8/02	0.29	6.10 ±0.16	5.99 ±0.47	2.91 ±0.19	25.41 ±1.80	28.85 ±0.60
		18/8/99	0.35	5.90 ±0.41	23.05 ±0.53	3.25 ±0.09	23.86 ±3.08	23.34 ±0.48
		13/2/02	0.87	14.04 ±0.41	49.38 ±1.09	3.55 ±0.16	25.29 ±1.07	2.78 ±0.11
		14/5/02	1.15	7.49 ±0.82	53.35 ±2.45	10.11 ±0.52	15.81 ±1.64	2.79 ±0.17
		7/8/01	0.45	5.86 ±0.31	21.37 ±0.96	3.81 ±0.13	28.67 ±2.17	40.56 ±1.20
Eutrophicated	C1	17/11/98	1.64	6.43 ±1.01	124.95 ±7.54	0.86 ±0.08	45.34 ±1.25	5.79 ±0.12
		12/5/99	1.15	8.46 ±1.66	145.25 ±4.41	3.33 ±0.23	10.18 ±0.69	2.79 ±0.23
		12/2/01	3.39	4.40 ±0.33	157.17 ±3.17	2.83 ±0.16	23.98 ±0.75	7.70 ±0.16
		15/5/00	0.61	4.72 ±0.12	201.17 ±10.33	10.71 ±0.59	10.23 ±0.39	2.47 ±0.15
		7/8/00	-	4.87 ±0.76	255.09 ±7.72	3.79 ±0.08	23.51 ±3.43	6.66 ±0.95
		7/2/00	2.90	8.48 ±0.47	300.68 ±9.05	4.20 ±0.18	4.21 ±0.32	0.02 ±0.00
		8/2/99	5.94	9.63 ±0.86	1104.25 ±23.42	2.75 ±0.18	6.99 ±0.33	0.15 ±0.01

Data are means ±standard deviation (n = 3; for prokaryotes n = 9); -, not detected.

SUPPLEMENTARY TAB. 2. Overview of the ingestion rates and potential production rates estimated for the microzooplankton dilution experiments and the potential ingestion rates estimated in nanoplankton dilution experiments. The stations are grouped and ordered according to Supplementary Tab. 1.

Trophic condition	Station code	Sampling date (dd/mm/yy)	Microzooplankton dilution experiments ($\mu\text{g C L}^{-1} \text{d}^{-1}$)								NP dilution experiments ($\mu\text{g C L}^{-1} \text{d}^{-1}$)		
			Ingestion rates				Potential production rates				Ingestion rates		
			MPP	NP	HP	AP	MPP	NP	HP	AP	HP	AP	
Oligotrophic	VIERA	24/6/07	-	-	1.19	-	-	-	11.63	-	2.88	-	
	C1	15/12/99	0.08	-	-	-	0.08	-	-	-	15.13	-	
	C1	10/3/04	0.05	0.89	2.72	0.94	0.01	0.54	4.28	0.85	5.41	0.81	
	V3	5/6/07	0.44	-	3.36	0.33	0.40	-	0.47	0.26	0.07	0.09	
	MS_03A	1/4/11	0.20	13.93	-	1.15	0.57	9.28	-	0.84	-	-	
	-	C1	5/4/04	-	4.65	1.80	0.61	-	5.22	2.44	0.68	2.31	2.03
	V4	1/6/07	0.26	6.77	23.86	-	0.24	3.48	2.74	-	4.24	1.06	
	V1	6/6/07	0.53	16.71	-	-	0.48	11.59	-	-	4.79	-	
	V2	8/6/07	0.62	-	23.75	0.33	0.43	-	22.29	0.14	2.01	-	
	VA	30/5/07	0.56	0.77	4.48	0.43	0.19	0.15	1.22	0.75	8.33	-	
	V10	22/6/07	-	0.85	13.20	-	-	0.56	16.60	-	3.97	-	
	O_37B	27/3/11	0.18	2.22	5.70	3.83	0.14	1.63	1.16	4.67	14.71	-	
	V6	14/6/07	-	1.79	8.65	-	-	q.11	13.76	-	6.20	0.14	
	O_36	26/3/11	0.19	-	-	-	0.42	-	-	-	3.62	4.39	
CF_16	2/4/11	0.73	-	-	3.50	0.11	-	-	2.95	2.78	0.42		
V7	16/6/07	-	1.26	9.42	-	-	1.87	11.17	-	3.08	0.36		
Meso-eutrophic	C1	29/9/03	-	0.79	44.04	10.48	-	0.33	28.60	6.71	28.67	8.30	
		20/11/00	10.52	-	40.12	-	3.01	-	49.58	-	33.49	-	
		15/11/01	3.38	-	11.34	-	2.20	-	4.11	-	9.95	1.45	
		9/8/05	2.60	3.65	29.82	12.87	8.53	2.17	16.10	8.38	21.98	6.69	
		12/3/03	9.39	1.86	4.59	-	4.71	0.70	4.70	-	3.42	-	
		7/5/01	2.43	1.09	32.17	7.21	4.02	0.39	35.60	2.27	-	-	
		7/8/02	4.53	4.68	37.77	18.01	5.93	9.33	24.22	7.06	31.88	10.75	
		18/8/99	0.56	-	39.43	-	0.33	-	46.14	-	18.63	-	
		13/2/02	6.06	-	35.47	1.55	1.69	-	23.38	0.85	28.06	1.78	
		14/5/02	23.78	2.25	27.64	1.59	49.53	1.65	30.28	0.83	21.19	1.19	
	7/8/01	18.22	0.99	53.54	28.18	36.25	3.58	47.14	13.13	36.80	37.66		

Eutrophicated	C1	17/11/98	72.82	0.58	-	-	45.05	0.30	-	-	19.50	0.38
		12/5/99	69.93	0.88	10.47	-	99.15	0.33	24.06	-	11.01	0.61
		12/2/01	83.63	1.71	9.83	3.02	59.52	0.74	2.99	2.86	-	0.38
		15/5/00	156.08	7.43	23.71	1.43	330.87	5.71	42.33	0.93	8.65	-
		7/8/00	177.90	-	66.90	5.58	72.32	-	64.53	1.12	23.38	0.42
		7/2/00	113.78	1.01	2.25	-	206.88	0.48	1.55	-	-	0.01
		8/2/99	-	1.27	5.16	0.08	-	0.43	9.79	0.04	11.46	-

Data are means \pm standard deviation (n = 3; for prokaryotes n = 9); MPP, microphytoplankton; NP, nanoplankton; HP, heterotrophic prokaryotes; AP, autotrophic prokaryotes; -, not detected.

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SUPPLEMENTARY TAB. 3. Biomass, ingestion rates and potential production rates estimated in the nanoplankton dilution experiments carried out for the mesopelagic and bathypelagic layers.

Station code	Biomass ($\mu\text{g C L}^{-1}$)		Ingestion rates ($\mu\text{g C L}^{-1} \text{d}^{-1}$)	Potential production rates ($\mu\text{g C L}^{-1} \text{d}^{-1}$)
	Nanoplankton	Heterotrophic prokaryotes	Heterotrophic prokaryotes	Heterotrophic prokaryotes
O_36	0.08	0.57	0.19	-
O_37B	0.11	0.75	1.02	0.84
CF_16	0.31	7.24	16.74	10.61
MS_03A	0.30	0.97	1.10	1.49
OL_107	0.19	6.45	13.29	9.94
VA	0.32	0.14	0.05	0.00
V4	0.24	0.16	0.20	0.14
V3	0.38	0.23	0.91	0.87
V1	0.34	0.17	1.00	1.22
V2	1.35	0.89	3.20	2.57
V6	0.36	0.18	0.59	1.52
V7	0.65	0.14	1.27	2.96
VIERA	0.26	0.38	2.51	8.90
V10	0.30	0.41	1.18	2.28

Data are means \pm standard deviation (n = 3 for nanoplankton and n = 9 for heterotrophic prokaryotes); -, not detected.