JOURNAL OF LIMNOLOGY

DOI: 10.4081/jlimnol.2014.976

Physicochemistry and zooplankton of two karstic sinkholes in the Yucatan Peninsula, Mexico

Adrián CERVANTES-MARTÍNEZ,* Martha A. GUTIÉRREZ-AGUIRRE

Departamento de Ciencias y Humanidades, Universidad de Quintana Roo, Cozumel, Quintana Roo, 77642, México

*Corresponding author: adcervantes@uqroo.edu.mx

Supplementary Tab. 1. Inventory of free-living zooplankton recorded in El Padre, and Minicenote.

	EP	MC
Phyllum: Rotifera		
Subclass: Monogononta		
Order: Ploimida		
Family: Brachionidae		
Anuraeopsis fissa (Gosse, 1851)	+	
Brachionus falcatus Zacharias, 1898	+	+
B. havanaensis Rousselet, 1911	+	+
Plationus patulus (O. F. Müller, 1773)	+	+
Keratella americana Garlin, 1943	+	+
K. lenzi (Hauer, 1953)	+	+
Family: Euchlanidae		
Dipleuchlanis propatula (Gosse, 1886)	+	
Family: Trichotriidae		
Macrochaetus collinsi (Gosse, 1867)	+	
Family: Colurellidae		
Colurella uncinata cf. *bicuspidata* (Ehrenberg, 1832)	+	
Lepadella heterostyla (Murria, 1913)	+	
L. patella (O. F. Müller, 1773)		+
Family: Lecanidae		
Lecane aculeata (Jakubski, 1912)	+	
L. bulla (Gosse, 1851)	+	+
L. halyclista Harring & Myers, 1926	+	+
L. hornemanni (Ehrenberg, 1832)	+	+
L. leontina (Turner, 1892)	+	+
L. lunaris (Ehrenberg, 1836)	+	+
L. signifera (Jennings, 1896)	+	
Family: Trichocercidae		
Trichocerca weberi (Jennings, 1903)	+	+
Order: Flosculariaceae		
Family: Hexarthridae		
Hexarthra intermedia f. *braziliensis* (Hauer, 1953)	+	+
Subclass: Bdelloidea		
Family: Philodinidae		
Dissotrocha aculeata (Ehrenberg, 1832)		+
Superorder: Cladocera		
Order: Anomopoda		
Family: Bosminidae		
Bosmina hagmanni Stingelin, 1904	+	+

	EP	MC
Order: Ctenopoda		
Family: Sididae		
Latonopsis autralis (Sars, 1888)		+
Subclass: Copepoda		
Order: Calanoida		
Family: Diaptomidae		
Mastigodiaptomus nesus Bowman, 1986	+	+
Order: Cyclopoida		
Family: Cyclopidae		
Subfamily: Cyclopinae		
Thermocyclops inversus Kiefer, 1936	+	+
Subfamily: Eucyclopinae		
Tropocyclops prasinus cf. *aztequei* Lindberg, 1955	+	+

EP, El Padre; MC, Minicenote; +, presence of free-living zooplankton.

Supplementary Tab. 2. Two-way ANOVA for environmental and biological variables between seasons, layers, and their interaction (season × layer) in the surveyed systems, (significant P-values underlined) and results of *post-hoc* test.

Two-way ANOVA						
	El Padre			Minicenote		
	Df	*F*	P-value	Df	*F*	P-value
Water temperature						
Season	2	27.516	0.0000	2	12.126	0.0000
Layer	4	48.375	0.0000	5	7.750	0.0000
Season × layer	8	5.216	0.0001	10	3.338	0.0019
Error	90			108		
Oxygen						
Season	2	13.634	0.0000	2	2.759	0.0423
Layer	4	211.061	0.0000	5	12.870	0.0000
Season × layer	8	2.580	0.0207	10	2.173	0.0338
Error	90			108		
pH						
Season	2	8.119	0.0010	2	9.141	0.0004
Layer	4	9.252	0.0000	5	2.082	0.0318
Season × layer	8	0.146	0.9963	10	0.294	0.9797
Error	90			108		
Conductivity						
Season	2	1.234	0.3008	2	0.412	0.6644
Layer	4	65.196	0.0000	5	42.787	0.0000
Season × layer	8	1.435	0.2085	10	0.618	0.7917
Error	90			108		
Chlorophyll-*a*						
Season	2	5.419	0.0078	2	4.460	0.0161
Layer	4	28.232	0.0000	5	25.995	0.0000
Season × layer	8	4.177	0.0008	10	1.047	0.4187
Error	90			108		
Abundance of rotifers						
Season	2	8.935	0.0005	2	6.274	0.0036
Layer	4	14.977	0.0000	5	3.008	0.0183
Season × layer	8	0.250	0.9784	10	1.329	0.2398
Error	90			108		
Abundance of cladocerans						
Season	2	18.995	0.0000	2	2.736	0.0740
Layer	4	4.068	0.0067	5	7.949	0.0000
Season × layer	8	1.065	0.4043	10	0.235	0.9913
Error	90			108		
Abundance of calanoids						
Season	2	16.165	0.0000	2	16.787	0.0000
Layer	4	1.207	0.3211	5	15.514	0.0000
Season × layer	8	1.603	0.1510	10	0.838	0.5997
Error	90			106		

Abundance of cyclopoids						
Season	2	1.404	0.2562	2	9.331	0.0003
Layer	4	27.857	0.0000	5	31.808	0.0000
Season × layer	8	0.405	0.9121	10	2.189	0.0325
Error	90			108		
Shannon's Index						
Season	2	3.346	0.0242	2	1.312	0.2776
Layer	4	0.135	0.9686	5	1.470	0.2150
Season × layer	8	0.163	0.9947	10	0.384	0.9481
Error	90			108		
Richness						
Season	2	3.969	0.0151	2	3.087	0.0134
Layer	4	2.501	0.0556	5	7.665	0.0000
Season × layer	8	0.313	0.9569	10	0.682	0.7362
Error	90			106		

***Post-hoc* Tukey tests**				
	El Padre		Minicenote	
Factors	Season	Layer	Season	Layer
Water temperature	R* *vs* W, D W* *vs* D	0.5* *vs* 2.5, 5, 10, 15	R* *vs* W, D W* *vs* D	0.5* *vs* 10, 15, 20, 30
Oxygen	W* *vs* R, D	0.5*, 2.5*, 5* *vs* 10, 15	D* *vs* R, W	0.5* *vs* 10, 15, 20, 30
pH	R* *vs* W W* *vs* D	0.5* *vs* 5, 10, 15 2.5* *vs* 10, 15 5* *vs* 15	W* *vs* R, D	0.5* *vs* 10, 15, 20, 30
Conductivity	----------	0.5*, 2.5*, 5* *vs* 10, 15 10* *vs* 15	----------	0.5*, 5* *vs* 10, 15, 20, 30
Chlorophyll-*a*	R* *vs* D	0.5*, 2.5* *vs* 5, 10, 15 5* *vs* 10, 15	D* *vs* W	0.5*, 5* *vs* 10, 15, 20, 30 10* *vs* 15, 20, 30 15* *vs* 30
Abundance of rotifers	R* *vs* D W* *vs* D	0.5* *vs* 5, 10, 15 2.5*, 5* *vs* 10, 15	----------	0.5* *vs* 10, 15, 20
Abundance of cladocerans	W* *vs* R, D	0.5*, 2.5* *vs* 10, 15	R* *vs* D	0.5* *vs* 5, 10, 15, 20, 30
Abundance of calanoids	D* *vs* R, W	----------	D* *vs* R, W	0.5* *vs* 5, 15, 20, 30 5* *vs* 10, 15, 20, 30 10* *vs* 15, 20, 30
Abundance of cyclopoids	----------	0.5*, 2.5*, 5* *vs* 10, 15	R* *vs* W, D	0.5* *vs* 5, 10, 15, 20, 30 5* *vs* 10, 15, 20, 30
Shannon's Index	D* *vs* R, W	----------	----------	----------
Richness	W* *vs* R, D	----------	W* *vs* R, D	0.5* *vs* 10, 15, 20, 30 5* *vs* 15, 20, 30 10* *vs* 30 20* *vs* 30

R, rainy, W, winter storm; D, dry; sampled depths in Arabic numbers. *Significant differences at P<0.05.