



Figure S1. Plot of $\delta^{15}\text{N}$ versus $\delta^{13}\text{C}$ values of *Cassiopea andromeda* umbrella tissue from shrimp farm (Sf) and mangroves (M) in Ceará State (Brazil, SW Atlantic). (N=18). In January and April (2019), no *C. andromeda* jellyfish were found in the mangrove ecosystem.

Table S1. Dunn's post hoc of AFDW from *Cassiopea andromeda* from shrimp farm (Sf) and mangroves (M) in Southwestern Atlantic (Brazil). Sample size (N)=18. In January and April (2019), there were no occurrences of *Cassiopea andromeda* in the mangrove ecosystem. Bold means significant difference.

	Shrimp-Jul	Mangrove-Jul	Shrimp-Oct	Mangrove-Oct	Shrimp-Jan
Mangrove-Jul		0.00330	0.00002	0.00432	0.00018
Mangrove-Oct	0.00330		0.33430	0.95060	0.55240
Shrimp-Jul	0.00002	0.33430		0.30420	0.71040
Shrimp-Oct	0.00432	0.95060	0.30420		0.51180
Shrimp-Jan	0.00018	0.55240	0.71040	0.51180	

Table S2. Dunn's post hoc of total carbohydrate content of *Cassiopea andromeda* oral arm and umbrella tissue from shrimp farm (Sf) and mangroves (M) in Southwestern Atlantic (Brazil). In January and April (2019), there were no occurrences of *Cassiopea andromeda* in the mangrove ecosystem. Bold means significant difference.

	July-Shrimp-umbr	July-Shrimp-OA	July-Mangr-umbr	July-Mangr-OA	Oct-Shrimp-umbr	Oct-Shrimp-OA	Oct-Mangr-umbr	Oct-Mangr-OA	Jan-Shrimp-umbr	Jan-Shrimp-OA	Apr-Shrimp-umbr	Apr-Shrimp-OA
July-Shrimp-umbrella	-	0.4697	0.0475	0.0540	0.3218	0.3210	0.5937	0.1424	0.0733	0.2300	0.4691	0.9090
July-Shrimp-oral arm	0.4697	-	0.2522	0.0119	0.0975	0.7983	0.2202	0.5092	0.3343	0.6828	0.1599	0.5384
July-Mangrove-umbrella	0.0475	0.2522	-	0.0001	0.0029	0.3812	0.0119	0.6070	0.8489	0.4347	0.0068	0.0618
July-Mangrove-oral arm	0.0540	0.0119	0.0001	-	0.3210	0.0056	0.1546	0.0009	0.0003	0.0022	0.2135	0.0419
Oct-Shrimp-umbrella	0.3218	0.0975	0.0029	0.3210	-	0.0540	0.6475	0.0139	0.0054	0.0284	0.7897	0.2692
Oct-Shrimp-oral arm	0.3210	0.7983	0.3812	0.0056	0.0540	-	0.1348	0.6960	0.4864	0.8893	0.0939	0.3763

Oct-Mangrove-umbrella	0.5937	0.2202	0.0119	0.1546	0.6475	0.1348	-	0.0454	0.0201	0.0829	0.8489	0.5171
Oct-Mangrove-oral arm	0.1424	0.5092	0.6070	0.0009	0.0139	0.6960	0.0454	-	0.7460	0.7897	0.0284	0.1762
Jan-Shrimp-umbrella	0.0733	0.3343	0.8489	0.0003	0.0054	0.4864	0.0201	0.7460	-	0.5548	0.0119	0.0936
Jan-Shrimp-oral arm	0.2300	0.6828	0.4347	0.0022	0.0284	0.8893	0.0829	0.7897	0.5548	-	0.0543	0.2775
Apr-Shrimp-umbrella	0.4691	0.15990	0.0068	0.2135	0.7897	0.0939	0.8489	0.0284	0.0119	0.0543	-	0.4019
Apr-Shrimp-oral arm	0.909	0.5384	0.0619	0.0419	0.2692	0.3763	0.5171	0.1762	0.0936	0.2775	0.4019	-

Table S3. Dunn's post hoc of total lipid content (μg lipid/mg AFDW) of *Cassiopea andromeda* in gonad tissue from shrimp farm and mangroves in Southwestern Atlantic (Brazil). In January and April (2019), there were no occurrences of *Cassiopea andromeda* in the mangrove estuary system. Bold means significant difference.

	Shrimp-Jul	Mangrove-Jul	Shrimp-Oct	Mangrove-Oct
Shrimp-Jul		0.07376	0.2833	0.04007
Mangrove-Jul	0.07376		0.002409	0.7787
Shrimp-Oct	0.2833	0.002409		0.000915
Mangrove-Oct	0.04007	0.7787	0.000915	

Table S4. Dunn's post hoc of total lipid content (μg lipid/mg AFDW) of *Cassiopea andromeda* umbrella tissue from shrimp farm and mangroves in Southwestern Atlantic (Brazil). In January and April (2019), there were no occurrences of *Cassiopea andromeda* in the mangrove estuary system. Bold means significant difference.

	Shrimp-Jul	Mangrove-Jul	Shrimp-Oct	Mangrove-Oct
Shrimp-Jul		0.0008968	0.2936	0.2076
Mangrove-Jul	0.0008968		0.02683	0.0463
Shrimp-Oct	0.2936	0.02683		0.8336
Mangrove-Oct	0.2076	0.0463	0.8336	

Table S5. Dunn's post hoc of isotope values $\delta^{13}\text{C}$ of *Cassiopea andromeda* umbrella tissue from shrimp farm (Sf) and mangrove (M) in Southwestern Atlantic (Brazil). Sample size (N)=18. In January and April (2019), there were no occurrences of *Cassiopea andromeda* in the mangrove ecosystem. Bold means significant difference.

	Mangrove-Jul	Mangrove-Oct	Shrimp-Jul	Shrimp-Oct	Shrimp-Jan
Mangrove-Jul		0.00094	0.02008	0.00584	0.00038
Mangrove-Oct	0.00094		0.47680	0.68980	0.53450
Shrimp-Jul	0.02008	0.47680		0.75480	0.84120
Shrimp-Oct	0.00584	0.68980	0.75480		0.87260
Shrimp-Jan	0.00038	0.53450	0.84120	0.87260	

Fatty acids methodology

The total fatty acids (FA) of jellyfish from the two habitats were analyzed only in the last sampling time in which both populations were present (October 2018, Thé et al., 2020b), integrating the last potential energy sources prior to the complete jellyfish disappearance of *Cassiopea andromeda* in the mangrove area (see Thé et al., 2020b). Fatty acids were analyzed separately in 10 gonadal samples (5 from the shrimp farm, 5 from the mangrove area, October 2018) (Table 2). Approximately 5–7 mg DW was used for each sample analysis. Samples were re-dissolved in a DCM/MeOH solution (3:1) and D27 and 5- α -cholestanone were added as internal standards. Sonication of samples was carried out for 30 minutes at 60 °C. The extraction process was carried out twice. The extracts were then dried with a centrifugal vacuum concentrator at 60 °C and redissolved in 0.5 mL of chloroform.

In the next step, 300 μ L of BF₃/MeOH was added to an aliquot (200 μ L) of the sample. After heating for 1 hour at 90 °C, 1 mL of NaCl-saturated water and 1 mL of hexane were added. The organic phase was collected, dried at 60 °C and then recovered in 80 μ L of isooctane. Methyl esters were analyzed with gas chromatography–mass spectrometry (GC-MS). GC–MS was performed using a Bruker SCION-456 gas chromatograph equipped with a PAL autosampler and coupled to a Bruker SCION triple quadrupole mass spectrometer that had a Restek Rxi 5Sil MS capillary column (30 m with a 10 m “built-in” guard column, inner diameter 250 μ m, and film thickness 0.25 μ m). The carrier gas (He, purity 99.9995%) was used in the constant flow mode at 1.0 mL/min. Samples (1 μ L) were injected at 280 °C in splitless mode (split vent opened after 1 min). The GC oven was programmed from 60 °C (1 min) to 325 °C (held 10 min) at 5 °C/min. The mass detector was operated at 70 eV in full scan mode (m/z 50–600). The ion source and transfer line temperature were 230 °C and 280 °C, respectively. The total fatty acids were quantified using both a mixture of oleic, linoleic, palmitic, stearic, myristic, and lauric acid and FAME37 CRM (TraceCERT, Supelco) as external standards. The proportion of each fatty acid was then expressed as percentage over total fatty acids. Average

unsaturation was computed as well as the trophic marker EPA/DHA, which reflects the different biochemical composition between host and symbiont and gives information about mixotrophy (Djeghri et al., 2021).

Fatty acid results

The total FA concentration ($\mu\text{g}/\text{mg}$ AFDW) in the gonadal tissues of *C. andromeda* collected from the two different habitats (shrimp farm vs. mangrove) were not significantly different ($F = 0.12$, $df = 7,5$, $p = 0.75$) (Figure S3). However, the proportion of the different categories of fatty acids was different (Figure 4). The proportion of saturated fatty acids (% SFAs) was higher in tissues from the shrimp farm, with nearly 46% SFAs from shrimp farm tissues and 35,7% in mangrove-related jellyfish tissues. The dominant SFA in both the shrimp farm and the mangroves was methyl octadecenoate (C18:0), with up to 40.6% and 29.9%, respectively.

Unsaturated fatty acids prevailed in tissues from the mangroves. Monounsaturated fatty acids (MUFAs) comprised 5.6% in mangroves and 4.8% in the shrimp farm, with the most dominant being elaidic acid (C18:1t) in mangroves (2.2%) and oleic acid (C18:1c) in the shrimp farm. The polyunsaturated fatty acid (PUFA) content in *C. andromeda* tissues was 45.1% in mangroves and 26.4% in the shrimp farm with a predominance of C20:4 (mangroves: 19.2%; shrimp farm: 9.3%). The values of fatty acids (in %) and their standard deviations (SD) are organized in Table S6. The EPA/DHA was significantly different (Mann–Whitney U Test, $p < 0.05$) between the mangroves (0.26 ± 0.13) and the shrimp farm (0.40 ± 0.14). There was no significant difference between average unsaturation (Mann–Whitney U Test, $p > 0.05$) for *C. andromeda* in mangroves (3.91 ± 0.09) and the shrimp farm (3.39 ± 0.67).

Table S6. List of fatty acids found in *Cassiopea andromeda* gonads in the two contrasted habitats (shrimp farm and mangroves) in October 2018. Fatty acid composition data are expressed as percentage of the total fatty acids \pm Standard Deviation. Saturated fatty acids (SFAs); Monounsaturated fatty acids (MUFAs); polyunsaturated fatty acids (PUFAs).

FA	Shrimp Farm	Mangrove
	%	
<i>Saturated FA (SFA)</i>		
C12:0	0.03 ± 0.02	0.01 ± 0.00
C13:0	0.02 ± 0.02	0.01 ± 0.01

C14:0	0.12 ± 0.25	0.01 ± 0.01
C15:0	0.10 ± 0.11	0.08 ± 0.14
palmitic acid C16:0	22.79 ± 14.99	13.58 ± 6.75
C17:0	1.06 ± 0.17	2.03 ± 0.61
stearic acid C18:0	40.63 ± 21.86	29.87 ± 6.99
C19:0	1.01 ± 0.43	1.40 ± 0.51
C20:0	1.26 ± 1.01	0.74 ± 0.35
C21:0	0.13 ± 0.13	0.08 ± 0.03
C22:0	0.50 ± 0.50	0.37 ± 0.13
C23:0	0.41 ± 0.47	0.32 ± 0.17
C24:0	0.72 ± 0.85	0.75 ± 0.23
Total SFAs	68.8	49.2
<i>Monounsaturated FA</i>		
C14:1	0.02 ± 0.03	0.01 ± 0.01
C16:1	0.88 ± 0.34	0.91 ± 0.59
C17:1	0.12 ± 0.10	0.03 ± 0.04
C18:1c	1.78 ± 0.79	1.74 ± 0.23
C18:1t	0.90 ± 0.32	2.18 ± 0.40
C20:1c	0.34 ± 0.16	0.18 ± 0.10
C20:1t	0.33 ± 0.24	0.42 ± 0.18
C22:1c	0.10 ± 0.12	0.04 ± 0.02
C24:1	0.31 ± 0.32	0.12 ± 0.09
Total MUFAs	4.8	5.6
<i>Polyunsaturated FA (PUFA)</i>		
C18:4	0.40 ± 0.16	0.81 ± 0.29
C18:3n6	0.31 ± 0.10	0.16 ± 0.06
C18:3n3	0.51 ± 0.21	3.03 ± 1.62
Linoleic acid C18:2c (ω6)	3.21 ± 1.48	1.45 ± 0.49
C18:2t	0.00 ± 0.01	0.00 ± 0.00
Eicosapentaenoic acid C20:5 (ω3) (EPA)	1.44 ± 1.08	2.20 ± 1.22
Eicosatetraenoic acid C20:4 (ω3) (ARA)	9.25 ± 5.23	19.19 ± 2.14
C20:3a	0.19 ± 0.05	0.51 ± 0.12
C20:2	0.26 ± 0.20	0.18 ± 0.05
Docosahexaenoic acid C22:6 (ω6) (DHA)	4.04 ± 3.65	5.73 ± 1.40
Docosapentaenoic C22:5 (ADP)	2.87 ± 2.24	7.65 ± 1.88
C22:4c	2.14 ± 1.79	2.18 ± 0.32
C24:4	0.15 ± 0.05	0.40 ± 0.14
C24:5	0.44 ± 0.31	0.51 ± 0.15
C24:2	1.21 ± 0.47	1.15 ± 0.41
Total PUFAs	26.4	45.1