

**Table S1. Sampling details and isotopic compositions in brittle stars species.** Samples were collected in three regions in the Canadian Arctic Ocean: the Canadian Arctic Archipelago (CAA), the North Water Polynya (NOW), and the Baffin Bay (BB).

Species	Station	Region	Depth (m)	Date (dd/mm/yyyy)	Latitude (N)	Longitude (W)	$\delta^{13}\text{C}$ (‰)	$\delta^{15}\text{N}$ (‰)
<b><i>Ophiacantha</i></b>								
<i>O. bidentata</i>	312	CAA	67	19/08/2018	69.17	-100.70	-19.42	14.73
<i>O. bidentata</i>	312	CAA	67	19/08/2018	69.17	-100.70	-19.38	14.35
<i>O. bidentata</i>	312	CAA	67	19/08/2018	69.17	-100.70	-18.69	14.40
<i>O. bidentata</i>	312	CAA	67	19/08/2018	69.17	-100.70	-18.74	14.60
<i>O. bidentata</i>	312	CAA	67	19/08/2018	69.17	-100.70	-19.04	13.94
<i>O. bidentata</i>	312	CAA	67	19/08/2018	69.17	-100.70	-18.54	15.10
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.48	14.08
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.51	13.96
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-19.19	13.29
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.90	13.75
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.88	12.98
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.48	12.27
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.84	12.81
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.26	13.20
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-23.36	12.84
<i>O. bidentata</i>	115	NOW	663	29/08/2018	76.33	-71.18	-18.25	12.23
<i>O. bidentata</i>	177	BB	694	01/09/2018	67.48	-63.68	-19.70	14.02
<i>O. bidentata</i>	177	BB	694	01/09/2018	67.48	-63.68	-19.68	13.74
<i>O. bidentata</i>	177	BB	694	01/09/2018	67.48	-63.68	-19.09	14.12
<i>O. bidentata</i>	177	BB	694	01/09/2018	67.48	-63.68	-19.58	15.15
<i>O. bidentata</i>	177	BB	694	01/09/2018	67.48	-63.68	-19.31	13.71
<i>O. bidentata</i>	177	BB	694	01/09/2018	67.48	-63.68	-18.72	12.75
<b><i>Ophiocten</i></b>								
<i>O. sericeum</i>	312	CAA	67	19/08/2018	69.17	-100.70	-20.33	11.55
<i>O. sericeum</i>	312	CAA	67	19/08/2018	69.17	-100.70	-19.57	11.48
<i>O. sericeum</i>	312	CAA	67	19/08/2018	69.17	-100.70	-19.79	11.29
<i>O. sericeum</i>	312	CAA	67	19/08/2018	69.17	-100.70	-20.35	11.20
<i>O. sericeum</i>	312	CAA	67	19/08/2018	69.17	-100.70	-20.09	11.51
<i>O. sericeum</i>	QMG1	CAA	39	21/08/2018	68.49	-99.89	-20.41	10.21
<i>O. sericeum</i>	QMG1	CAA	39	21/08/2018	68.49	-99.89	-20.93	10.05
<i>O. sericeum</i>	QMG1	CAA	39	21/08/2018	68.49	-99.89	-20.46	10.25
<i>O. sericeum</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-24.35	10.25
<i>O. sericeum</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-24.22	10.24
<i>O. sericeum</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-24.35	10.26
<i>O. sericeum</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-24.85	10.23
<i>O. sericeum</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-24.70	10.08
<i>O. sericeum</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-24.43	10.20
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-20.60	10.50
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-20.85	10.91
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-20.40	11.68
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-20.33	11.86
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-19.52	12.47
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-19.63	12.89
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-20.37	11.23
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-20.02	11.67
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-19.95	12.24
<i>O. sericeum</i>	101	NOW	373	28/08/2018	76.38	-77.41	-20.25	10.61
<i>O. sericeum</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.63	14.65
<i>O. sericeum</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.34	14.52
<i>O. sericeum</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.52	14.56
<i>O. sericeum</i>	115	NOW	662	29/08/2018	76.33	-71.18	-20.37	11.09
<i>O. sericeum</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.74	14.26
<i>O. sericeum</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.78	13.71
<i>O. sericeum</i>	115	NOW	662	29/08/2018	76.33	-71.18	-20.21	13.56

<i>O. sericeum</i>	177	BB	694	01/09/2018	67.48	-63.68	-21.26	11.91
<i>O. sericeum</i>	177	BB	694	01/09/2018	67.48	-63.68	-20.38	13.52
<i>O. sericeum</i>	177	BB	694	01/09/2018	67.48	-63.68	-19.79	14.28
<i>O. sericeum</i>	177	BB	694	01/09/2018	67.48	-63.68	-20.70	12.62
<i>O. sericeum</i>	177	BB	694	01/09/2018	67.48	-63.68	-20.71	11.78
<i>O. sericeum</i>	177	BB	694	01/09/2018	67.48	-63.68	-20.08	12.17
<b><i>Ophiopleura</i></b>								
<b><i>borealis</i></b>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-23.54	14.42
<i>O. borealis</i>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-23.61	14.97
<i>O. borealis</i>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-23.64	14.27
<i>O. borealis</i>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-24.13	13.06
<i>O. borealis</i>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-23.94	14.59
<i>O. borealis</i>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-23.85	13.94
<i>O. borealis</i>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-24.01	12.51
<i>O. borealis</i>	QMGM	CAA	112	22/08/2018	68.30	-101.74	-24.03	12.31
<i>O. borealis</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-23.88	13.46
<i>O. borealis</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-23.32	14.33
<i>O. borealis</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-23.38	14.95
<i>O. borealis</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-23.70	14.01
<i>O. borealis</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-23.35	14.17
<i>O. borealis</i>	QMG4	CAA	70	22/08/2018	68.48	-103.43	-23.81	13.25
<i>O. borealis</i>	108	NOW	447	22/07/2019	76.26	-74.60	-19.87	13.74
<i>O. borealis</i>	108	NOW	447	22/07/2019	76.26	-74.60	-20.39	12.85
<i>O. borealis</i>	108	NOW	447	22/07/2019	76.26	-74.60	-19.76	13.77
<i>O. borealis</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.61	14.08
<i>O. borealis</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.77	11.34
<i>O. borealis</i>	115	NOW	662	29/08/2018	76.33	-71.18	-20.22	12.17
<i>O. borealis</i>	115	NOW	662	29/08/2018	76.33	-71.18	-20.20	12.74
<i>O. borealis</i>	115	NOW	662	29/08/2018	76.33	-71.18	-20.26	11.18
<i>O. borealis</i>	115	NOW	662	29/08/2018	76.33	-71.18	-19.64	11.21
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-20.44	12.17
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-19.66	12.59
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-20.81	11.95
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-20.39	12.60
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-20.77	13.20
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-20.42	12.59
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-19.87	12.39
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-19.93	12.44
<i>O. borealis</i>	E1	BB	447	23/08/2019	68.28	-65.14	-20.45	12.63

**Table S2.** Summary of main effects and significant two-way interaction effects on  $\delta^{13}\text{C}$  values of ophiuroids.

Main effects and significant interaction effects	Model				Post-hoc		
	Degrees of freedom	F-value	p-value	Effect size (slope)	Significant effect	p-value	Effect size
Depth	1	36.04	<0.0001	8.113e-04			
SIC	1	89.27	<0.0001	2.944e-01			
Region	2	70.61	<0.0001		NOW > CAA BB > CAA	<0.0001 <0.0001	11.580 11.222
Species	2	8.19	0.0006		<i>O. bidentata</i> > <i>O. borealis</i> <i>O. bidentata</i> > <i>O. sericeum</i>	0.0024 0.0005	1.105 1.108
Depth x SIC*	1	4.56	0.0356		( $\delta^{13}\text{C} \sim \text{Depth}$ ) SIC 0-3 > SIC 32-45		

\*Sea-ice concentration (SIC)

**Table S3.** Summary of main effects and significant two-way interaction effects on  $\delta^{15}\text{N}$  values of ophiuroids.

Main effects and significant interaction effects	Model				Post-hoc		
	Degrees of freedom	F-value	p-value	Effect size (slope)	Significant effect	p-value	Effect size
Depth	1	7.94	0.0060	0.0023			
Species	2	38.23	<0.0001		<i>O. bidentata</i> > <i>O. borealis</i> <i>O. bidentata</i> > <i>O. sericeum</i> <i>O. borealis</i> > <i>O. sericeum</i>	0.0006 <0.0001 <0.0001	0.960 1.970 1.010
Depth x SIC*	1	12.81	0.0006		( $\delta^{15}\text{N} \sim \text{Depth}$ ) SIC 0-3 > SIC 32-45		
Depth x Species	2	40.57	<0.0001		( $\delta^{15}\text{N} \sim \text{Depth}$ ) <i>O. sericeum</i> > <i>O. bidentata</i> ( $\delta^{15}\text{N} \sim \text{Depth}$ ) <i>O. sericeum</i> > <i>O. borealis</i>	<0.0001 <0.0001	0.006 0.007

\*Sea-ice concentration (SIC)