

Ivana Silva *et al.*, Isotopic trophic discrimination factors ( $\Delta^{13}\text{C}$ ,  $\Delta^{15}\text{N}$ ) and their determinants in a subtropical macroinvertebrate food chain. *Limnetica* 44 (2), 2025

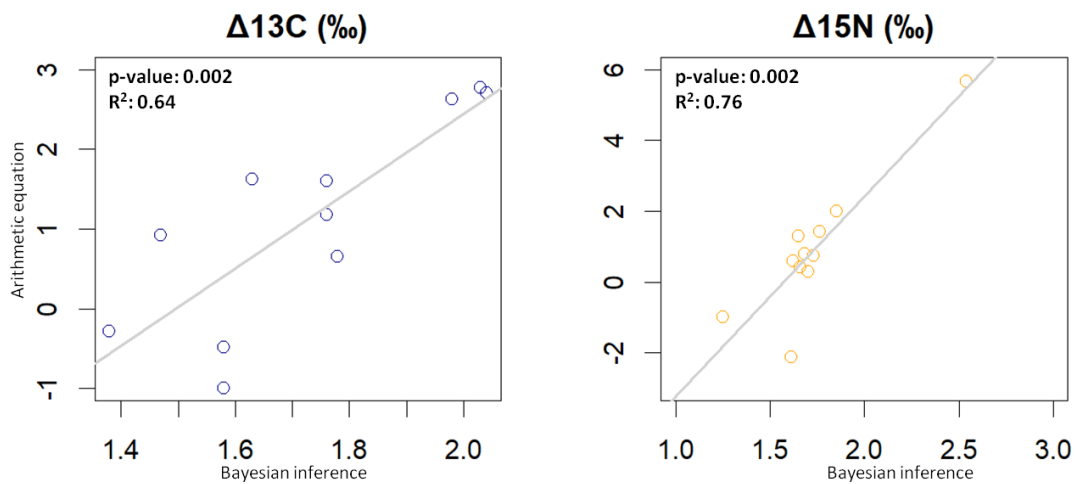
Supplementary material

**Appendix 1.** Isotopic values of C and N for the study organisms (means and standard deviation; sd), mean values of C:N ( $\pm$  sd) and the number of samples analyzed for each mesocosm. *Valores isotópicos de C y N para los organismos de estudio (medias y desviación estándar; sd), valores medios de C:N ( $\pm$  sd) y el número de muestras analizadas para cada mesocosmo.*

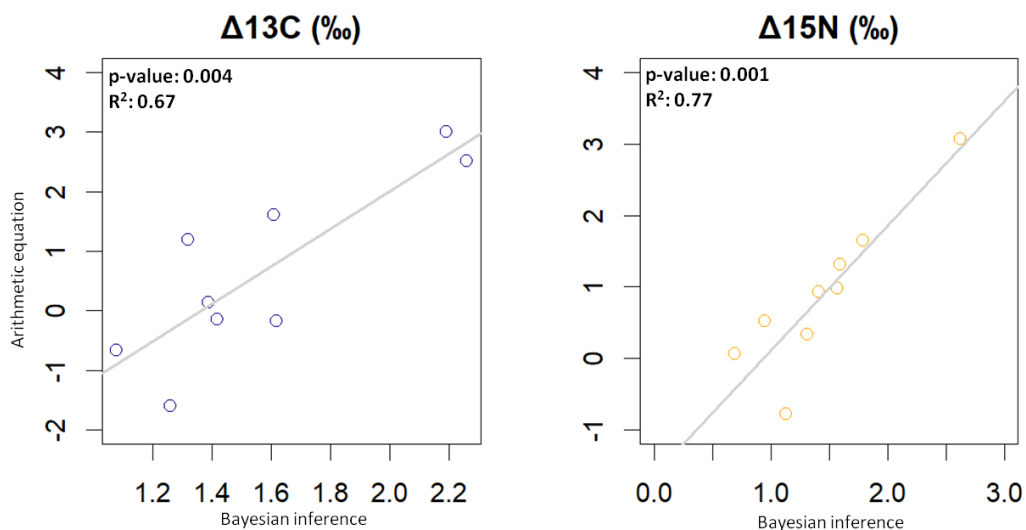
Mesocosm	Taxa	$\delta^{13}\text{C}$ (‰) (mean $\pm$ sd)	$\delta^{15}\text{N}$ (‰) (mean $\pm$ sd)	C:N (mean $\pm$ sd)	n
1	Periphyton	-17.04 $\pm$ 0.86	2.21 $\pm$ 0.77	15.06 $\pm$ 0.85	3
	Chironomini	-14.41 $\pm$ 0.14	2.50 $\pm$ 0.28	4.65 $\pm$ 0.72	2
	<i>Perithemis sp.</i>	-14.55 $\pm$ 0.31	3.81 $\pm$ 0.03	4.26 $\pm$ 0.57	2
2	Periphyton	-18.03 $\pm$ 0.57	5.99 $\pm$ 0.76	10.94 $\pm$ 2.77	4
	Chironomini	-17.37 $\pm$ 0.63	6.74 $\pm$ 0.26	4.56 $\pm$ 0.51	2
	<i>Perithemis sp.</i>	-	-	-	-
3	Periphyton	-19.33 $\pm$ 1.34	4.78 $\pm$ 0.85	10.65 $\pm$ 0.95	3
	Chironomini	-18.15 $\pm$ 0.83	5.56 $\pm$ 0.28	4.63 $\pm$ 0.08	2
	<i>Perithemis sp.</i>	-16.97 $\pm$ 1.68	5.63 $\pm$ 0.99	4.46 $\pm$ 0.79	6
4	Periphyton	-18.61 $\pm$ 1.67	4.71 $\pm$ 0.43	9.95 $\pm$ 3.30	4
	Chironomini	-15.90 $\pm$ 0.21	6.72 $\pm$ 0.00	4.74 $\pm$ 0.10	2
	<i>Perithemis sp.</i>	-16.57 $\pm$ 0.26	7.25 $\pm$ 0.29	4.14 $\pm$ 0.26	3
5	Periphyton	-15.81 $\pm$ 0.21	3.03 $\pm$ 1.22	12.25 $\pm$ 0.89	3
	Chironomini	-14.19 $\pm$ 0.00	2.05 $\pm$ 0.00	5.30 $\pm$ 0.00	1
	<i>Perithemis sp.</i>	-	-	-	-
6	Periphyton	-20.61 $\pm$ 1.93	6.37 $\pm$ 1.45	9.66 $\pm$ 1.34	3
	<i>Chironomini</i>	-17.83 $\pm$ 0.97	6.97 $\pm$ 0.62	4.72 $\pm$ 0.62	2
	<i>Perithemis sp.</i>	-19.44 $\pm$ 0.00	7.91 $\pm$ 0.00	4.21 $\pm$ 0.00	1
7	Periphyton	-21.13 $\pm$ 2.58	6.34 $\pm$ 1.92	8.64 $\pm$ 2.28	5
	<i>Chironomini</i>	-21.61 $\pm$ 0.00	7.78 $\pm$ 0.00	5.35 $\pm$ 0.00	1
	<i>Perithemis sp.</i>	-18.61 $\pm$ 0.65	8.12 $\pm$ 0.01	3.68 $\pm$ 0.21	2
8	Periphyton	-20.12 $\pm$ 0.37	5.35 $\pm$ 1.86	10.87 $\pm$ 0.26	2
	<i>Chironomini</i>	-19.20 $\pm$ 0.40	5.78 $\pm$ 1.36	4.39 $\pm$ 0.44	2
	<i>Perithemis sp.</i>	-19.06 $\pm$ 0.24	7.43 $\pm$ 0.26	4.73 $\pm$ 0.84	2
9	Periphyton	-17.25 $\pm$ 1.44	3.26 $\pm$ 0.32	12.78 $\pm$ 0.35	3
	<i>Chironomini</i>	-17.53 $\pm$ 0.00	1.14 $\pm$ 0.00	4.15 $\pm$ 0.00	1
	<i>Perithemis sp.</i>	-15.02 $\pm$ 0.31	4.21 $\pm$ 0.21	4.29 $\pm$ 0.79	3
10	Periphyton	-19.79 $\pm$ 0.99	5.07 $\pm$ 0.51	8.21 $\pm$ 0.41	3
	<i>Chironomini</i>	-18.20 $\pm$ 1.83	6.38 $\pm$ 0.91	4.65 $\pm$ 0.85	2
	<i>Perithemis sp.</i>	-18.37 $\pm$ 0.38	7.36 $\pm$ 0.07	4.08 $\pm$ 0.23	2
11	Periphyton	-18.87 $\pm$ 2.50	2.47 $\pm$ 1.05	15.00 $\pm$ 3.88	4
	<i>Chironomini</i>	-19.87 $\pm$ 0.03	8.16 $\pm$ 0.02	4.74 $\pm$ 0.31	2
	<i>Perithemis sp.</i>	-18.26 $\pm$ 2.37	7.38 $\pm$ 2.51	4.43 $\pm$ 0.74	5

**Appendix 2.** Relationships between TDF for consumer and prey estimated by Arithmetic Equation and Bayesian Inference, in each case the p value and the R<sup>2</sup> value are shown, highlighting that the relationship between the values calculated by both methodologies is significant. *Relaciones entre los TDF para consumidor y presa estimados por Ecuación aritmética e Inferencia Bayesiana, en cada caso se muestra el p valor y el valor de R<sup>2</sup>, destacando que la relación entre los valores calculados por ambas metodologías es significativa.*

Relationship among TDF for **Chironomini-Periphyton** estimated by arithmetic equation and Bayesian Inference



Relationship among TDF for **Perithemis sp.-Chironomini** estimated by arithmetic equation and Bayesian Inference



**Appendix 3.** Summary of the fitted linear models in this study. The response variable, predictors, degrees of freedom, F and p value, and R<sup>2</sup> are indicated if the relationship is significant. All response variables were fitted to a normal distribution. The TDF considered were estimated by arithmetic equation. *Resumen de los modelos lineales ajustados en este estudio. La variable de respuesta, los predictores, los grados de libertad, los valores F y p y de R<sup>2</sup> se indican si la relación es significativa. Todas las variables de respuesta se ajustaron a una distribución normal. Los TDFs considerados fueron estimados mediante ecuación aritmética.*

Linear Model ( $\alpha=0,05$ )	Response variable	Predictor variable	df	F value	P value	R <sup>2</sup>
1	$\delta^{13}\text{C}$ Chironomini	$\delta^{13}\text{C}$ Periphyton	9	16.97	<0.01	0.62
2	$\delta^{13}\text{C}$ <i>Perithemis sp.</i>	$\delta^{13}\text{C}$ Chironomini	7	6.81	0.03	0.42
3	$\delta^{15}\text{N}$ Chironomini	$\delta^{15}\text{N}$ Periphyton	9	4.93	0.05	0.28
4	$\delta^{15}\text{N}$ <i>Perithemis sp.</i>	$\delta^{15}\text{N}$ Chironomini	7	38.52	<<0.01	0.82
5	$\Delta^{13}\text{C}$ Chironomini- Periphyton	Periphyton C:N	9	0.32	0.58	-
6	$\Delta^{13}\text{C}$ Chironomini- Periphyton	Chironomini C:N	9	0.24	0.63	-
7	$\Delta^{13}\text{C}$ Chironomini- Periphyton	Stoichiometric imbalance of Chironomini- Periphyton C:N	9	0.37	0.55	-
8	$\Delta^{15}\text{N}$ Chironomini- Periphyton	Periphyton C:N	9	0.14	0.71	-
9	$\Delta^{15}\text{N}$ Chironomini- Periphyton	Chironomini C:N	9	0.20	0.66	-
10	$\Delta^{15}\text{N}$ Chironomini- Periphyton	Stoichiometric imbalance of Chironomini- Periphyton C:N	9	0.08	0.77	-
11	$\Delta^{13}\text{C}$ <i>Perithemis sp.</i> - Chironomini	Chironomini C:N	7	0.13	0.73	-
12	$\Delta^{13}\text{C}$ <i>Perithemis sp.</i> - Chironomini	<i>Perithemis sp.</i> C:N	7	0.42	0.53	-
13	$\Delta^{13}\text{C}$ <i>Perithemis sp.</i> - Chironomini	Stoichiometric imbalance of <i>Perithemis sp.</i> - Chironomini C:N	7	0.01	0.90	-
14	$\Delta^{15}\text{N}$ <i>Perithemis sp.</i> - Chironomini	Chironomini C:N	7	2.96	0.12	-
15	$\Delta^{15}\text{N}$ <i>Perithemis sp.</i> - Chironomini	<i>Perithemis sp.</i> C:N	7	0.10	0.75	-
16	$\Delta^{15}\text{N}$ <i>Perithemis sp.</i> - Chironomini	Stoichiometric imbalance of <i>Perithemis sp.</i> - Chironomini C:N	7	1.33	0.28	-
17	$\delta^{13}\text{C}$ Periphyton	Diatom biomass	9	6.17	0.03	0.34
18	$\delta^{13}\text{C}$ Periphyton	Cyanophyte biomass	9	7.55	0.02	0.40
19	$\delta^{13}\text{C}$ Periphyton	Chlorophyte biomass	9	0.17	0.68	-
20	$\delta^{15}\text{N}$ Periphyton	Diatom biomass	9	6.84	0.03	0.38
21	$\delta^{15}\text{N}$ Periphyton	Cyanophyte biomass	9	9.64	0.01	0.46
22	$\delta^{15}\text{N}$ Periphyton	Chlorophyte biomass	9	0.25	0.63	-
23	$\Delta^{13}\text{C}$ Chironomini- Periphyton	Diatom biomass	9	0.21	0.65	-
24	$\Delta^{13}\text{C}$ Chironomini- Periphyton	Cyanophyte biomass	9	0.52	0.49	-
25	$\Delta^{13}\text{C}$ Chironomini- Periphyton	Chlorophyte biomass	9	<<0.01	0.96	-
26	$\Delta^{15}\text{N}$ Chironomini- Periphyton	Diatom biomass	9	<<0.01	0.97	-
27	$\Delta^{15}\text{N}$ Chironomini- Periphyton	Cyanophyte biomass	9	<<0.01	0.95	-
28	$\Delta^{15}\text{N}$ Chironomini- Periphyton	Chlorophyte biomass	9	0.03	0.86	-

**Appendix 4.** Environmental variables (means per mesocosms and standard deviations) recorded on April 13. Temperature (Temp.), pH, conductivity (Cond.), dissolved oxygen (DO; in mg/L and %), concentration of phosphorus and nitrogen ([P] and [N]) and biomass of each group of algae (selecting three bricks at random from each mesocosm). *Variables ambientales (medias por mesocosmo y desviaciones estándar registradas el día 13 de abril. Se indican Temperatura (Temp.), pH, conductividad (Cond.), oxígeno disuelto (DO; en mg/L y %), concentración de fósforo y nitrógeno ([P] y [N]) y biomasa de cada grupo de algas (seleccionando tres ladrillos al azar de cada mesocosmo).*

Mesocosm	Temp. (°C)	pH	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	DO (%)	[P] (ug/l)	[N] (ug/l)	Diatom biomass ( $\mu\text{g}/\text{cm}^2$ )	Cyanophyte biomass ( $\mu\text{g}/\text{cm}^2$ )	Clorophyte biomass ( $\mu\text{g}/\text{cm}^2$ )
1	15.80	7.74	309	0.38	8.52	86.00	197.67	581.98	0.68 ± 0.19	0.43 ± 0.08	2.39 ± 0.92
2	15.40	7.93	275	0.34	9.30	93.10	149.43	372.20	0.73 ± 0.10	0.41 ± 0.11	2.25 ± 0.87
3	15.55	7.73	294	0.36	8.22	82.50	253.95	460.95	0.75 ± 0.13	0.43 ± 0.23	1.19 ± 0.47
4	15.83	8.08	291	0.35	9.37	94.80	97.98	509.36	3.04 ± 0.37	1.03 ± 0.23	0.16 ± 0.27
5	15.67	8.60	279	0.34	9.77	98.30	69.03	388.34	0.61 ± 0.23	0.50 ± 0.25	1.76 ± 0.35
6	15.87	8.54	291	0.35	9.25	93.50	115.66	622.32	2.30 ± 0.24	1.41 ± 0.37	1.08 ± 0.64
7	16.77	8.18	309	0.37	7.86	80.70	101.19	291.52	3.98 ± 1.58	1.86 ± 0.29	0.16 ± 0.28
8	16.03	8.86	274	0.33	9.58	97.20	102.80	436.75	1.52 ± 0.63	0.66 ± 0.39	3.88 ± 0.73
9	15.69	8.33	263	0.32	9.03	91.00	112.45	541.64	0.98 ± 0.72	0.22 ± 0.13	0.99 ± 0.48
10	16.30	8.04	290	0.35	9.09	92.80	184.81	299.59	2.01 ± 0.67	1.02 ± 0.46	1.84 ± 1.67
11	15.63	8.06	279	0.35	9.48	95.40	155.86	339.93	0.10 ± 0.17	0.05 ± 0.02	1.80 ± 0.88