

# Scyphozoan jellyfish provide short-term reproductive habitat for hyperiid amphipods in a temperate near-shore environment

Nicholas E. C. Fleming<sup>1,2,\*</sup>, Chris Harrod<sup>1,3,4</sup>, Donal C. Griffin<sup>1</sup>, Jason Newton<sup>5</sup>, Jonathan D. R. Houghton<sup>1,2</sup>

<sup>1</sup>School of Biological Sciences, Queen's University Belfast, Medical Biology Centre, 97 Lisburn Road, Belfast BT9 7BL, UK

<sup>2</sup>Queen's University Belfast Marine Laboratory, 12-13 The Strand, Portaferry, Co. Down, BT22 1PF, UK

<sup>3</sup>Instituto de Ciencias Naturales Alexander Von Humboldt, Universidad de Antofagasta, Avenida Angamos 601, Antofagasta, Chile

<sup>4</sup>School of Biological and Chemical Sciences, Queen Mary University of London, Mile End Road, London E1 4NS, UK

<sup>5</sup>NERC Life Sciences Mass Spectrometry Facility, Scottish Universities Environmental Research Centre, Scottish Enterprise, Technology Park, East Kilbride G75 0QF, UK

\*Corresponding author: n Fleming05@qub.ac.uk

Marine Ecology Progress Series 510: 229–240 (2014)

**Supplement.** This supplementary information provides isotopic bi-plots showing the location of isotope ratio values from *Hyperia galba* adjusted for trophic fractionation against putative food sources (Fig. S1). Values used in the SIAR mixing model runs including trophic enrichment factors (TEFs) and basal dietary source input values are presented in Table S1

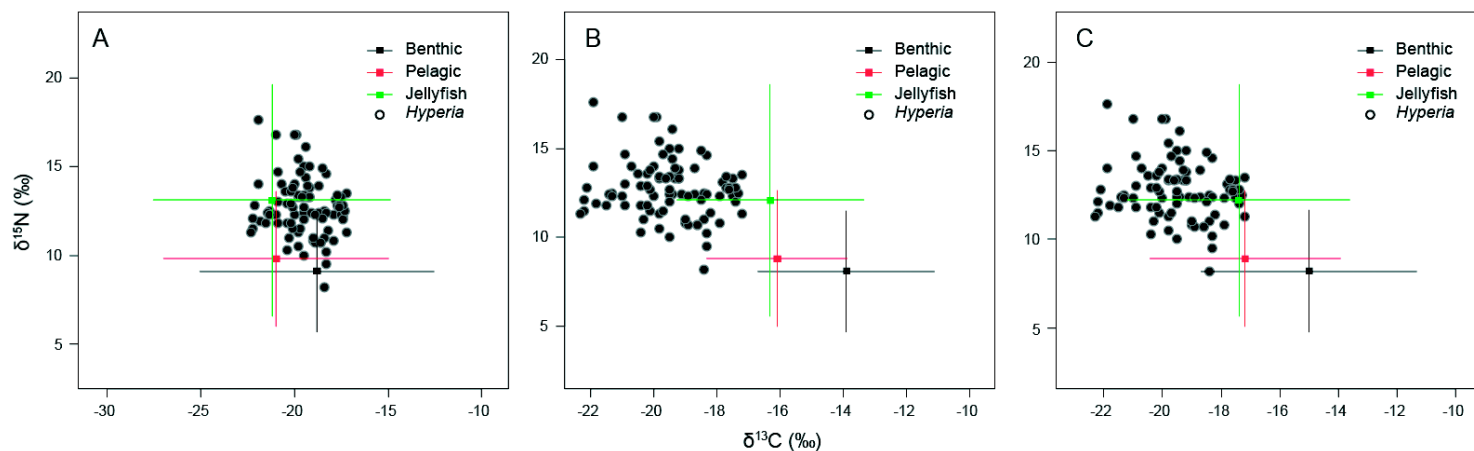


Fig. S1. Location within the mixing polygon of *Hyperia galba* isotope ratios adjusted for trophic fractionation using (A) marine amphipod literature-derived trophic enrichment factors, (B) Post (2002) and (C) McCutchan et al. (2003)

Table S1. Trophic enrichment factors (TEFs), sample sizes, isotopic values and elemental concentrations of basal dietary source inputs into SIAR mixing models. GZ: gelatinous zooplankton

Model, Inputs	n	$\Delta^{15}\text{N}$ (‰)	$\Delta^{13}\text{C}$ (‰)	%N	%C	Source
<b>SIAR Model run 1</b>						
TEF	–	$-1.5 \pm 3.0$	$1.4 \pm 1.3$	–	–	Macko et al. (1982)
<b>Source 1:</b> Benthic algae	55	$7.7 \pm 1.1$	$-17.8 \pm 1.7$	–	–	Stephenson et al. (1986)
<b>Source 2:</b> Pelagic (phytoplankton >200 mm)	3	$8.4 \pm 1.4$	$-19.5 \pm 0.5$	$2.6 \pm 0.8$	$14.9 \pm 4.6$	Crawley et al. (2007)
<b>Source 3:</b> GZ: <i>Aurelia aurita</i>	9	$11.5 \pm 1.21$	$-18.5 \pm 0.8$	$1.47 \pm 0.9$	$5.34 \pm 3.3$	Farlin et al. (2010)
<i>Cyanea lamarckii</i>	8	$12.3 \pm 1.0$	$-20.5 \pm 0.79$	$4.1 \pm 2.5$	$14.4 \pm 8.9$	
<i>Cyanea capillata</i>	16	$13.8 \pm 1.5$	$-19.8 \pm 1.5$	$3.7 \pm 1.9$	$11.4 \pm 5.8$	
<b>SIAR Model run 2</b>						
TEF	–	$3.4 \pm 1.0$	$0.4 \pm 1.3$	–	–	Post (2002)
<b>Source 1:</b> Benthic algae	55	$7.7 \pm 1.1$	$-17.8 \pm 1.7$	–	–	
<b>Source 2:</b> Pelagic (phytoplankton >200 mm)	3	$8.4 \pm 1.4$	$-19.5 \pm 0.5$	$2.6 \pm 0.8$	$14.9 \pm 4.6$	
<b>Source 3:</b> GZ: <i>Aurelia aurita</i>	9	$11.5 \pm 1.21$	$-18.5 \pm 0.8$	$1.47 \pm 0.9$	$5.34 \pm 3.3$	
<i>Cyanea lamarckii</i>	8	$12.3 \pm 1.0$	$-20.5 \pm 0.79$	$4.1 \pm 2.5$	$14.4 \pm 8.9$	
<i>Cyanea capillata</i>	16	$13.8 \pm 1.5$	$-19.8 \pm 1.5$	$3.7 \pm 1.9$	$11.4 \pm 5.8$	
<b>SIAR Model run 3</b>						
TEF	–	$2.3 \pm 1.54$	$0.5 \pm 1.31$	–	–	McCutchan et al. (2003)
<b>Source 1:</b> Benthic algae	55	$7.7 \pm 1.1$	$-17.8 \pm 1.7$	–	–	
<b>Source 2:</b> Pelagic (phytoplankton >200 mm)	3	$8.4 \pm 1.4$	$-19.5 \pm 0.5$	$2.6 \pm 0.8$	$14.9 \pm 4.6$	
<b>Source 3:</b> GZ: <i>Aurelia aurita</i>	9	$11.5 \pm 1.21$	$-18.5 \pm 0.8$	$1.47 \pm 0.9$	$5.34 \pm 3.3$	
<i>Cyanea lamarckii</i>	8	$12.3 \pm 1.0$	$-20.5 \pm 0.79$	$4.1 \pm 2.5$	$14.4 \pm 8.9$	
<i>Cyanea capillata</i>	16	$13.8 \pm 1.5$	$-19.8 \pm 1.5$	$3.7 \pm 1.9$	$11.4 \pm 5.8$	

## LITERATURE CITED

- Crawley KR, Hyndes GA, Vanderklift MA (2007) Variation among diets in discrimination of  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  in the amphipod *Allorchestes compressa*. *J Exp Mar Biol Ecol* 349:370–377
- Farlin JP, Lewis LS, Anderson TW, Lai CT (2010) Functional diversity in amphipods revealed by stable isotopes in an eelgrass ecosystem. *Mar Ecol Prog Ser* 420:277–281
- Macko SA, Lee WY, Parker PL (1982) Nitrogen and carbon isotope fractionation by two species of marine amphipods: laboratory and field studies. *J Exp Mar Biol Ecol* 63:145–149
- McCutchan JH, Lewis WM, Kendall C, McGrath CC (2003) Variation in trophic shift for stable isotope ratios of carbon, nitrogen, and sulfur. *Oikos* 102:378–390
- Post DM (2002) Using stable isotopes to estimate trophic position: models, methods, and assumptions. *Ecology* 83:703–718
- Stephenson RL, Tan FC, Mann KH (1986) Use of stable carbon isotope ratios to compare plant material and potential consumers in a seagrass bed and a kelp bed in Nova Scotia, Canada. *Mar Ecol Prog Ser* 30:1–7