

REPORTS

Ecology, 87(10), 2006, pp. 2411–2417
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CONSUMER–RESOURCE BODY-SIZE RELATIONSHIPS IN NATURAL FOOD WEBS

ULRICH BROSE,^{1,2,20} TOMAS JONSSON,³ ERIC L. BERLOW,^{1,2,4} PHILIP WARREN,⁵ CAROLIN BANASEK-RICHTER,¹
LOUIS-FÉLIX BERSIER,⁶ JULIA L. BLANCHARD,⁷ THOMAS BREY,⁸ STEPHEN R. CARPENTER,⁹
MARIE-FRANCE CATTIN BLANDENIER,¹⁰ LARA CUSHING,² HASSAN ALI DAWAH,¹¹ TONY DELL,¹² FRANCOIS EDWARDS,¹³
SARAH HARPER-SMITH,¹⁴ UTE JACOB,⁸ MARK E. LEDGER,¹³ NEO D. MARTINEZ,² JANE MEMMOTT,¹⁵
KATJA MINTENBECK,⁸ JOHN K. PINNEGAR,⁷ BJÖRN C. RALL,¹ THOMAS S. RAYNER,¹² DANIEL C. REUMAN,¹⁶
LILIANE RUESS,¹⁷ WERNER ULRICH,¹⁸ RICHARD J. WILLIAMS,^{2,21} GUY WOODWARD,¹⁹ AND JOEL E. COHEN¹⁶

¹*Department of Biology, Darmstadt University of Technology, Darmstadt, Germany*

²*Pacific Ecoinformatics and Computational Ecology Lab, Berkeley, California 94703 USA*

³*Systems Biology Group, School of Life Sciences, University of Skövde, Skövde, Sweden*

⁴*University of California, Merced, Sierra Nevada Research Institute, Yosemite National Park, California 95389 USA*

⁵*Department of Animal and Plant Sciences, University of Sheffield, Sheffield, UK*

⁶*Department of Biology, Unit of Ecology and Evolution, Fribourg, Switzerland*

⁷*The Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Suffolk, UK*

⁸*Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany*

⁹*Center for Limnology, University of Wisconsin, Madison, Wisconsin 53706 USA*

¹⁰*Zoological Institute, C.P. 2, Neuchatel, Switzerland*

¹¹*King Khalid University, College of Science, Department of Biology, Abha, Saudi Arabia*

¹²*Department of Zoology and Tropical Ecology, James Cook University, Townsville, Australia*

¹³*School of Geography, Earth and Environmental Sciences, University of Birmingham, UK*

¹⁴*Department of Biology, Western Washington University, Bellingham, USA*

¹⁵*School of Biological Sciences, Woodland Road, Bristol, UK*

¹⁶*Laboratory of Populations, Rockefeller and Columbia Universities, New York, New York, 10021 USA*

¹⁷*Institute of Soil Science, University of Hohenheim, Stuttgart, Germany*

¹⁸*Department of Animal Ecology, Nicolaus Copernicus University, Torun, Poland*

¹⁹*School of Biological and Chemical Sciences, Queen Mary University of London, UK*

Abstract. It has been suggested that differences in body size between consumer and resource species may have important implications for interaction strengths, population dynamics, and eventually food web structure, function, and evolution. Still, the general distribution of consumer–resource body-size ratios in real ecosystems, and whether they vary systematically among habitats or broad taxonomic groups, is poorly understood. Using a unique global database on consumer and resource body sizes, we show that the mean body-size ratios of aquatic herbivorous and detritivorous consumers are several orders of magnitude larger than those of carnivorous predators. Carnivorous predator–prey body-size ratios vary across different habitats and predator and prey types (invertebrates, ectotherm, and endotherm vertebrates). Predator–prey body-size ratios are on average significantly higher (1) in freshwater habitats than in marine or terrestrial habitats, (2) for vertebrate than for invertebrate predators, and (3) for invertebrate than for ectotherm vertebrate prey. If recent studies that relate body-size ratios to interaction strengths are general, our results suggest that mean consumer–resource interaction strengths may vary systematically across different habitat categories and consumer types.

Key words: allometry; body length; body mass; body-size ratio; food webs; parasitoid–host; predation; predator–prey.