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introduction

Cephalopod research across scales: from molecules to ecosystems

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Cephalopod research across scales: from molecules to ecosystems

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The nine contributions included in this special issue originated from the Cephalopod International Advisory Council (CIAC) conference held in St. Petersburg, Florida in 2018. The theme of this special edition is "Cephalopod research across scales: from molecules to ecosystems." Manuscripts presented here all have a natural history theme. Additional papers from the 2018 conference will be published later this year in *Fisheries Research* and *Frontiers: Invertebrate Physiology*. The CIAC team is thrilled that over thirty papers will be highlighted from the conference among these three journals.

Cephalopods are a unique group of invertebrates including over 700 species (Jereb and Roper 2006, 2010, 2016) with many life history details still relatively unknown to science (Hoving et al. 2014). Conferences and their subsequent publications bring together the expanding knowledge of squids, octopods, and their relatives. This issue samples the diversity of research on cephalopod natural history conducted around the world.

Paralarval cephalopods remain a difficult group to study due to their small size and lack of fully developed characteristics. Those under 2 mm ML are particularly hard to identify. Sweeney et al. (1992) created a manual for the identification of larval and juvenile cephalopods, which has since been used by many researchers. There have been paralarval-focused efforts through the years (e.g., Shea, 1995, Collins et al. 2002, Erickson et al. 2017) and much remains to be determined. In this special

issue, Taite et al. (2020) explore paralarval abundance patterns in the North Atlantic eddies while Carrasco et al. (2020) examine their diversity in the southeast Pacific.

Many techniques have been used to improve the identification of new cephalopod species. DNA barcoding and the field of genomics has allowed for confirmations and sometimes new questions regarding cephalopod species (i.e., Allcock et al. 2015, Sosnowski 2017, Timm et al. 2020). Three papers included in this special issue (Judkins et al. 2020, Pratt et al. 2020, Shea et al. 2020) describe new species of squids and octopus. The need for such taxonomic work will increase as research moves deeper into the oceans.

Cephalopod distribution and abundance patterns are continually being examined and updated (e.g., Roper and Young 1975, Judkins 2009, Judkins and Vecchione 2020), and this issue adds two contributions to this work. Voight et al. (2020) discuss a depth cline in deep-sea octopods of the northeast Pacific Ocean and Richards and Vecchione (2020) examine both vertical and horizontal distribution patterns of cephalopods in the Charlie-Gibbs Fracture Zone of the Mid-Atlantic Ridge.

Many aspects of cephalopod ecology are in need of further investigation. Age studies, diet composition analysis, predator/prey interactions, and mating behaviors are areas where future studies will be beneficial. Perales-Raya et al. (2020) tackle the question of age determination in *Architeuthis dux* and Haselmann Apostólico and Marian (2020) investigate cephalopod mating systems as possible models for sexual selection.

Through the varied work shared here, the editors hope readers are enlightened by the types of cephalopod research being conducted and become inspired to tackle any of the numerous questions that still lay before us in this exciting field. The editors would like to thank the *Bulletin of Marine Science* for their continued support of special issues such as this. If interested in learning further about cephalopods, the next triennial CIAC conference will be held in Portugal in October 2021 titled "Cephalopods in the Anthropocene: multiple challenges in a changing ocean". We look forward to meeting our established colleagues in the field as well as new researchers coming into this fascinating line of work.

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