Observed digestion times of Ocyropsis spp. collected from the Gulf Stream during June 2021 (Ocean Ctenos project)

Website: https://www.bco-dmo.org/dataset/918678
Data Type: Other Field Results
Version: 1
Version Date: 2024-01-26

Project
» Collaborative Research: Quantifying the trophic roles of epipelagic ctenophores (Ocean Ctenos)

Contributors	Affiliation	Role
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Abstract
Oceanic ctenophores are widespread predators on pelagic zooplankton. This data describes the digestion rates of a widespread oceanic ctenophore, Ocyropsis spp. as a component for evaluating trophic impact of this and other oceanic ctenophores in planktonic communities. Collection and in situ imaging of Ocyropsis spp. were made during 2021 via blue-water (daytime) and black-water (nighttime) SCUBA diving from a small boat along the western edge of the Gulf Stream, 5 to 8 km off the coast of West Palm Beach, Florida (26° 43′ 93″ N, 79° 59′ 15″ W). Ctenophores were offered a mixed assemblage of copepods from the genera Acartia, Oncaea, and Microsetella. Ocyropsis spp. digestion times were then recorded.

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Coverage

Location: Gulf Stream, 5 to 8 km off the coast of West Palm Beach, Florida (26° 43′ 93″ N, 79° 59′ 15″ W).
Spatial Extent: **Lat**:26.4393 **Lon**:-79.5915
Temporal Extent: 2021-06 - 2021-06

Methods & Sampling

Method & Sampling

Ctenophores were offered a mixed assemblage of copepods from the genera *Acartia*, *Oncaea*, and *Microsetella*. Digestion time observations were made using a Motic SMZ-171 stereo microscope and began

immediately following the first observation of prey ingestion. The number of prey simultaneously digested varied from 3-9 prey. Ctenophore lobe length as well as digestive tract length were recorded. Observations continued every two minutes until digestion was complete. High resolution image series of digestion were also made for several individual ctenophores using a Nikon 750 DLSR camera coupled to the stereo microscope. Complete digestion was defined as the time at which the only visible remains of the copepod prey were chitinous structures.

BCO-DMO Processing Description

- Removed units from column names
- Spaces removed from column names and replaced with underscores ("_")
- Special characters removed from column names (Prey # changed to Prey_num; Digestive tract (gut) length mm changed to Digestive_tract_length)

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Data Files

File	
918678_v1_oceanic_ctenophore_digestion_times.csv	(Comma Separated Values (.csv), 849 bytes) MD5:1af63e752e17a5fdab3aecfc3806233a
Primary data file for dataset ID 918678, version 1	

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Related Publications

Potter, B., Corrales-Ugalde, M., Townsend, J. P., Colin, S. P., Sutherland, K. R., Costello, J. H., Collins, R., & Gemmell, B. J. (2023). Quantifying the feeding behavior and trophic impact of a widespread oceanic ctenophore. Scientific Reports, 13(1). https://doi.org/10.1038/s41598-023-27955-z
Results

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Related Datasets

IsRelatedTo

Costello, J. H., Colin, S., Gemmell, B. J., Sutherland, K. R. (2024) **Quantified Ocyropsis spp. gut content observations from the Gulf Stream during June 2021 (Ocean Ctenos project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-01-26 doi:10.26008/1912/bco-dmo.918719.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
Species	Species - Ocyropsis spp.	unitless
Date	Sample measurement date	unitless
Latitude	Latitude of observation site in decimal degrees, A positive value indicates a Northern coordinate	decimal degrees
Longitude	Longitude of observation site in decimal degrees; a negative value indicates a Western coordinate	decimal degrees
Prey_num	Counted number of prey digested simultaneously	prey
Digestion_time_in_mins	Total duration of digestion	minutes
Digestion_time_in_seconds	Total duration of digestion	seconds
Max_body_length	Total body length including lobes	millimeters
Digestive_tract_length	Digestive tract (gut) length within an indvidual ctenophore	millimeters

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Instruments

Dataset-specific Instrument Name	Nikon 750 DLSR
Generic Instrument Name	Camera
Dataset-specific Description	High-resolution image series of digestion were also made for several individual ctenophores using a Nikon 750 DLSR camera coupled to the stereo microscope.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	Motic SMZ-171 Stereo Microscope
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Digestion time observations were made using a Motic SMZ-171 stereo microscope and began immediately following the first observation of prey ingestion.
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

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Project Information

Collaborative Research: Quantifying the trophic roles of epipelagic ctenophores (Ocean Ctenos)

NSF Award Abstract:
Ctenophores are gelatinous predators found throughout the world's oceans, and their predatory impacts can

profoundly affect planktonic communities. A variety of methods employed by marine scientists have converged to demonstrate the key roles these animals play in determining planktonic composition and energy flows in coastal systems. The role of oceanic ctenophores, however, is still sparsely documented. Oceanic ctenophores are characterized by more delicate gelatinous bodies that usually do not survive capture by conventional nets and do not perform naturally when transferred from their wall-less oceanic environment to shipboard bottles and containers. The difficulty in obtaining quantitative measurements on feeding by oceanic species has limited the ability to understand the role of these organisms in oceanic systems. This project will transform the capabilities to quantify key processes of oceanic ctenophores with in situ studies. However, ctenophores are not the only delicate oceanic animals that will benefit from developing advanced in situ methods. Similar techniques and approaches can be applied to other groups such as cnidarian siphonophores, pelagic molluscs, marine snow and large protists such as radiolarians. Additionally, successful application of these methods by divers will open the path for applications on Remotely Operated Vehicles (ROVs) and other submersibles that can greatly extend the depth and range of the techniques. Training of new scientists will involve postdoctoral, graduate and undergraduates. The investigators will broaden public science outreach by using contacts with media and aquariums involved in public education to communicate new findings to a wide public audience.

This project will address the challenge of obtaining information about the role and activity of pelagic oceanic ctenophores by adapting methods developed in the laboratory and employing them in a field setting. The investigators have adapted high-speed, high-resolution imaging and fluid-mechanics methods to the animal's in situ environment. These methods are particularly appropriate for field measurements of animals that are intractable for controlled laboratory studies and must be studied in situ, such as oceanic ctenophores. The goal in this project will be to apply high-speed, in situ particle image velocimetry (PIV) and bright field imaging systems to study a suite of oceanic ctenophores possessing distinct morphologies with potentially variable trophic roles to quantify: a) their flow and feeding mechanics; b) their ingestion rates and prey selection; and c) their trophic impacts. The results will enable inclusion of about the activities of these widespread and important animals in models of epipelagic food web dynamics.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1830015
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829945
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829913
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829932

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