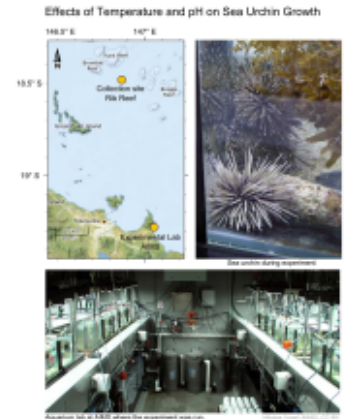


Interactive effects of near-future temperature increase (28/31°C) and ocean acidification (7.8/8.1 pH) on physiology and gonad development in adult Pacific sea urchin, *Echinometra* sp. A (NERP TE 5.2, AIMS)



[Metadata](#) | [Metadata \(XML\)](#)

Title	Interactive effects of near-future temperature increase (28/31°C) and ocean acidification (7.8/8.1 pH) on physiology and gonad development in adult Pacific sea urchin, <i>Echinometra</i> sp. A (NERP TE 5.2, AIMS)
Date	2014-05-30T20:20:00
Date type	Publication
Abstract	<p>This experiment grew adult <i>Echinometra</i> sp. A sea urchins under four temperature and pH treatments 28 / 7.9, 28 / 8.1, 31 / 7.9, 31 / 8.1 (degrees C, pH) to investigate the interactive effects of warming and acidification on their physiology. These treatments were chosen to match those that may be experienced in the near-future (2100) due to climate change. Each treatment was replicated across 3 aquaria, each with 6 individuals for a total of 72 sea urchins.</p> <p>Method:</p> <p>The adult <i>Echinometra</i> sp. A used in this experiment (32–54 mm diameter, 16–68 g wet weight) were collected on the 7th of September 2011 at 2–5 m water depth at Rib Reef (146 deg 52.49' E, 18 deg 28.86' S), a midshelf reef in the central section of the Great Barrier Reef. They represent 'intermediate-sized' adult animals at Rib Reef, omitting the smallest and largest specimens. The experiment started three weeks after individuals were collected.</p> <p>The growth rate of the urchins was measured over 70 days and expressed as a percentage increase of the original weight. Sea urchins were placed into the aquaria on the 21 September 2011 (Day 0) and feed over the life of the experiment on brown macroalgae and coral rubble encrusted with crustose coralline algae was offered as an additional food source.</p> <p>To reduce the influence of gut contents on weight measurements were taken after a 24 hour starvation period. The six individuals in each aquarium were distinguished based on colour patterns and size, which allowed each of their individual growth rates to be measured.</p> <p>At the end of the experiment (Day 77) all <i>Echinometra</i> sp. A were dissected and the coelomic fluid carefully drained and its pH measured. The gonads were dried, weighed and sections were examined.</p> <p>The experiment and its results are described in more detail in: S. Uthicke, M. Liddy, H. D. Nguyen, M. Byrne (2014), Interactive effects of near-future temperature increase and ocean acidification on physiology and gonad development in adult Pacific sea urchin, <i>Echinometra</i> sp. A., Coral Reefs. DOI 10.1007/s00338-014-1165-y</p> <p>Data Dictionary:</p>

Echinometra_Growth_righting.csv:

- wt_weight_initial: Initial wet weight (grams) of the sea urchins after blotting on day 1 after 24 hour starvation.
- diameter_initial: Initial diameter (mm) after blotting on day 1 after 24 hour starvation.
- wt_weight_final: Final wet weight (grams) after 70 days of treatment
- diameter_final: Final diameter (mm) after 70 days of treatment
- righting time: Time (seconds) for the individual to right itself after being turned upside down on day 10
- weight difference: Difference between the weight before and after 70 days of treatment
- growth_perc_BW: Percentage change in the weight
- diameter difference: Change in the diameter of each individual after 70 days of treatment.
- Aquaria: ID of the aquarium that each sea urchin was kept in.
- N_pH-temp: Number of pH and temperature measurements
- Temp_real: Average of measured temperatures of the aquarium over the experimental period. These were measured manually on most days (N=55) to confirm the performance of the automated temperature control.
- SD_Temp_real: Standard deviation of the measured temperatures.
- pH_real: Average of the measured pH of the aquarium over the experimental period. These were manually measured using a temperature-corrected pH meter (OAKTON, USA) and pH probe (EUTECH, USA).
- SD_pH_real: Standard deviation of the measured pH.

Echinometra_Gonad Index_noNA_actual_temps_ph.csv:

- Treat: Temperature / pH treatment
- Aquarium: ID of the aquarium
- Urchin No: Number of the sea urchin in each tank
- Sex: m - male, f - female
- Temp: Temperature treatment (degrees)
- pH: pH treatment
- Test_diam: (cm) final diameter (mm) after blotting on day 1 after 24 hour starvation
- Drained_wt with tray: Final wet weight (grams) after 70 days of treatment, including weight of tray
- Gonad_wet_wt_w_tray: : Wet weight of the dry gonad plus the measuring tray.
- Test_wt_weight: test-weight after subtracting tray weight.
- Gonad_wt_weight: Gonad wet weight after subtracting measuring tray weight.
- GI_wet: gonad index (the gonad weight as a percentage of total wet weight)
- Gonad_dry total wt: Weight of the dry gonad plus the measuring tray.
- Gonad_tray_wt: Weight of the measuring tray used to weight the dry gonads
- Gonad_dry_wt: Weight of the dry gonad (grams) after extraction and oven drying for 48 hours at 60 degrees C. (Gonad_dry total wt-Gonad_tray_wt)
- Test_dry_weight: Weight of the urchin test in grams (Test_dry_with_tray - Tray_wt)
- GI_dry: gonad index (gonad weight expressed as % of total dry weight)
- Test_dry_with_tray: Weight of the urchin test + weight of the tray (grams)
- Tray_wt: Weight of the tray used to take measurements of Test_dry_with_tray.
- CF_pH: pH in coelomic fluid measured within 2 min of the dissection.
- Gonad_dry_5 gonads: total gonad weight extrapolated to 5 gonads (only 3 were weighed for other measures because tissues were kept for other purposes)
- GI_5_gonads_dry: total gonad weight extrapolated to 5 gonads (only 3 were weighed for other measures because tissues were kept for other purposes)
- Temp_real: Average of measured temperatures of the aquarium over the experimental period. These were measured manually on most days (N=55) to confirm the performance of the automated temperature control.
- pH_real: Average of the measured pH of the aquarium over the experimental period. These were manually measured using a temperature-corrected pH meter (OAKTON, USA) and pH probe (EUTECH, USA).

Metadata language	eng
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Character set	UTF8
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Hierarchy level	Dataset
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OnLine resource

Linkage	https://eatlas.org.au/data/uuid/917c772b-974b-4c71-a4a1-8481596eb1a5
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Protocol	WWW:LINK-1.0-http--metadata-URL
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Linkage	https://eatlas.org.au/pydio/data/public/gbr_nerp-te-5.2_aims_s-uthicke_effect-temp-ph-on-sea-urchins-2011-csv-zip.php
Protocol	WWW:LINK-1.0-http--downloaddata
Linkage	http://dx.doi.org/10.1007/s00338-014-1165-y
Protocol	WWW:LINK-1.0-http--related
Linkage	https://eatlas.org.au/nerp-te/gbr-aims-combined-water-quality-climate-effects-5-2
Protocol	WWW:LINK-1.0-http--related

Point of contact

Individual name	Uthicke, Sven, Dr
Organisation name	Australian Institute of Marine Science
Role	Point of contact
Topic category	Biota

Keyword

Keyword	Biosphere Zoology Echinoderms
Keyword	Climate Change
Keyword	Ocean Acidification
Keyword	NERP TE
Type	Theme
Keyword	marine
Type	Theme

Extent

Description	AIMS Aquarium Laboratory
Description	Collection site (Rib Reef)

Geographic bounding box

West bound	147.0555
East bound	147.0555
South bound	-19.2678
North bound	-19.2678
West bound	146.87483
East bound	146.87483
South bound	-18.481
North bound	-18.481

File identifier	917c772b-974b-4c71-a4a1-8481596eb1a5
Metadata language	eng
Character set	UTF8

Metadata author

Individual name	eAtlas Data Manager
Organisation name	Australian Institute of Marine Science (AIMS)
Role	metadataContact
Date stamp	2016-06-09T14:50:12