

Search Results – Molluscs

Used ProQuest & Google Scholar

Search terms: (n= ~160)

ocean acidification AND mollusk* OR mollusc* AND ...

- Reproduction
- Gametogenesis
- Spawning
- Fertilization
- Gamete
- Sex
- Fecundity
- Reproduction
- Maternal investment

Weeded down by hand to include reviews & studies that include reproduction (up to fertilization success): *36 total*

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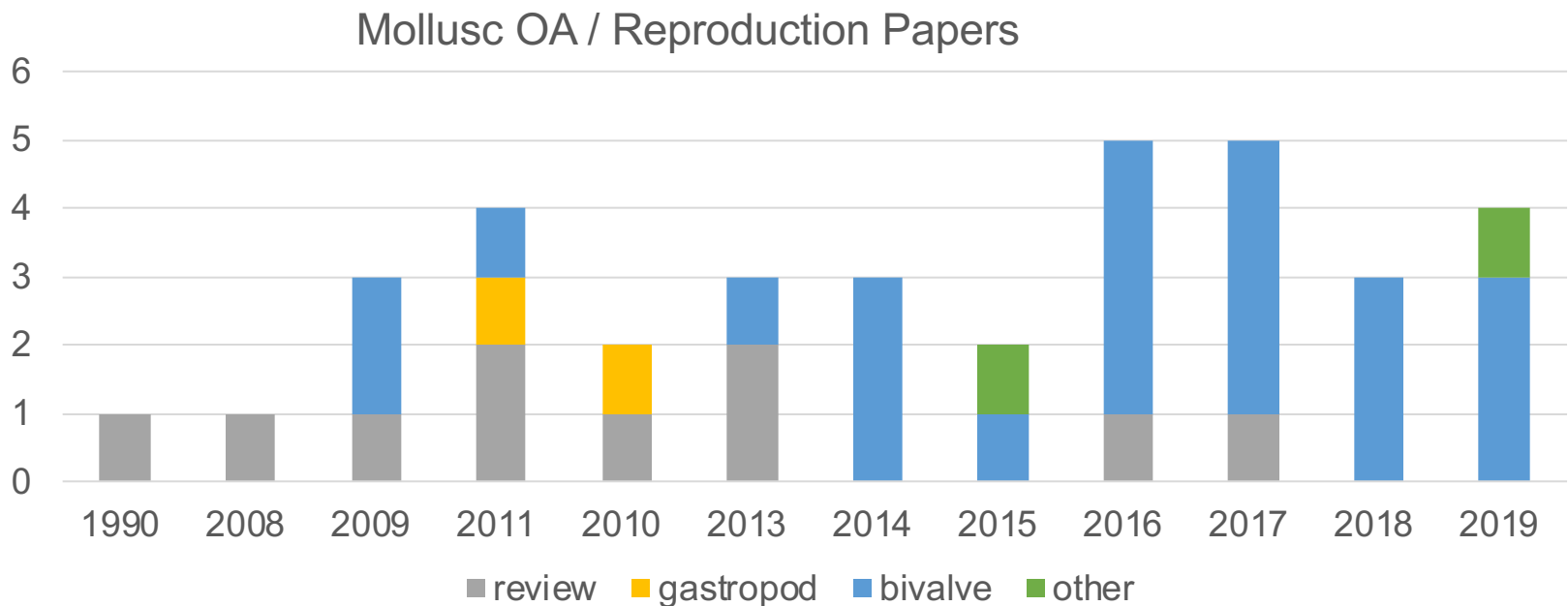
Notes:

- Selected peer reviewed and marine only
- ‘Early development’ not = ‘early life stages’
- Transgenerational studies can include reproduction data
- ProQuest = lots of duplicates in results
- Synonyms for ocean acidification (?)

Search Results – Molluscs

<u>Species</u>	<u># papers</u>
review	10
bivalve	22
pteropod	1
gastropod	2
cephalopod	1

<u>Topic</u>	<u># papers</u>
general	6
fertilization	18
sperm	6
sex	3
TGP	1
fecundity	4
eggs	2
gametes	1
maturation	3
pre-fertilization	3



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Most recent review:

- ***Marine gametes in a changing ocean: Impacts of climate change stressors on fecundity and the egg***, Shawna Foo & Maria Byrne, 2017.
- Focuses on maternal exposure and eggs. Very few molluscan papers referenced.

Class manuscript focus?:

- A review to highlight **need for more research**
- Bivalves (most of the research to date)
- Updated summary of fertilization, sperm motility in OA
- Overview of other areas of study to date, and gaps:
 - Sex ratio / determination (hermatphroditic species?)
 - Maternal effects (lipid, maternal RNAs, egg size)
 - Fecundity (total production)
 - Reproduction data in TGP studies
 - Ontogenetic shifts / spawn triggers (?)

Title	YEAR	TOPIC	SPECIES	Effect	Authors
Effects and mechanisms of action of acidification on fish and benthic organisms	1990	general	review	NA	Moreau, G
Effects of CO sub(2)-driven ocean acidification on the early developmental stages of invertebrates	2008	general	review	NA	Kurihara, Haruko
The effect of ocean acidification and temperature on the fertilization and embryonic development of the Sydney rock oyster <i>Saccostrea glomerata</i> (Gould 1850)	2009	fertilization	bivalve	Negative	Parker, Laura M;Ross, Pauline M;O'Connor, Wayne A
Physiological basis for high CO sub(2) tolerance in marine ectothermic animals: pre-adaptation through lifestyle and ontogeny?	2009	gametes	review	NA	Melzner, F;Gutowska, MA;Langenbuch, M;Dupont, S;Lucassen, M;Thorndyke, M C;Bleich, M;Poertner, H-O
Near-future levels of ocean acidification do not affect sperm motility and fertilization kinetics in the oyster <i>Crassostrea gigas</i>	2009	sperm	bivalve	Neutral	Havenhand, J N;Schlegel, P
Effects of Ocean Acidification on Early Life Stages of Shrimp (<i>Pandalus borealis</i>) and Mussel (<i>Mytilus edulis</i>)	2011	fertilization	bivalve	Neutral	Bechmann, Renée Katrin;Taban, Ingrid Christina;Westerlund, Stig;Godal, Brit Fjone;Arnberg, Maj;Vingen, Sjur;Ingvarsdottir, Anna;Baussant, Thierry
Effects of elevated pCO2 on the early development of the commercially important gastropod, Ezo abalone <i>Haliotis discus hannai</i>	2011	fertilization	gastropod	Negative	Kimura, Ryo;Takami, Hideki;Ono, Tsuneo;Onitsuka, Toshihiro;Nojiri, Yukihiko
Meta-analysis reveals negative yet variable effects of ocean acidification on marine organisms	2010	general	review	NA	
Fertilization in a suite of coastal marine invertebrates from SE Australia is robust to near-future ocean warming and acidification	2010	fertilization	gastropod	Neutral	Byrne, Maria;Soars, Natalie A;Ho, Melanie A;Wong, Eunice;McElroy, David;Selvakumaraswamy, Paulina;Dworjanyn, Symon A;Davis, Andrew R
Impact of ocean warming and ocean acidification on marine invertebrate life history stages: vulnerabilities and potential for persistence in a changing ocean	2011	general	review	NA	Byrne, M
Impacts of ocean acidification on marine shelled molluscs	2013	general, fertilization	review	NA	Gazeau, Frédéric;Parker, Laura M;Comeau, Steeve;Gattuso, Jean-pierre;O'connor, Wayne A;Martin, Sophie;Pörtner, Hans-otto;Ross, Pauline M
Multistressor Impacts of Warming and Acidification of the Ocean on Marine Invertebrates' Life Histories	2013	general, fertilization	review	NA	Byrne, Maria;Przeslawski, Rachel
Mixed Effects of Elevated pCO2 on Fertilisation, Larval and Juvenile Development and Adult Responses in the Mobile Subtidal Scallop <i>Mimachlamys asperima</i> (Lamarck, 1819): e93649	2014	fertilization	bivalve	Negative	Scanes, Elliot;Parker, Laura M;O'Connor, Wayne A;Ross, Pauline M
The Impact of Ocean Acidification on Reproduction, Early Development and Settlement of Marine Organisms	2011	fertilization	review	NA	Ross, Pauline M;Parker, Laura;O'Connor, Wayne A;Bailey, Elizabeth A
¹ H NMR Metabolomics Reveals Contrasting Response by Male and Female Mussels Exposed to Reduced Seawater pH, Increased Temperature, and a Pathogen	2014	sex-specific response	bivalve	Negative	Ellis, Robert P;Spicer, John I;Byrne, Jonathan J;Sommer, Ulf;Viant, Mark R;White, Daniel A;Widdicombe, Steve
Elevated pCO sub(2) exposure during fertilization of the bay scallop <i>Argopecten irradians</i> reduces larval survival but not subsequent shell size	2014	fertilization	bivalve	Negative	White, Meredith M;Mullineaux, Lauren S;McCorkle, Daniel C;Cohen, Anne L
Effects of Ocean Acidification and Warming on Sperm Activity and Early Life Stages of the Mediterranean Mussel (<i>Mytilus galloprovincialis</i>)	2013	sperm, fertilization	bivalve	Negative	Mikko Vihtakari, Iris E. Hendriks, Johnna Holding, Paul E. Renaud, Carlos M. Duarte and Jon N. Havenhand
Fertilisation and larval development in an Antarctic bivalve, <i>Laternula elliptica</i> , under reduced pH and elevated temperatures	2015	fertilization	bivalve	Neutral	Bylenga, Christine H;Cummings, Vonda J;Ryan, Ken G

Title	YEAR	TOPIC	SPECIES	Effect	Authors
Transgenerational responses of molluscs and echinoderms to changing ocean conditions	2016	TGP	review	NA	Ross, Pauline M;Parker, Laura;Byrne, Maria
Life cycle and early development of the thecosomatous pteropod <i>Limacina retroversa</i> in the Gulf of Maine, including the effect of elevated CO2 levels	2015	ontogeny	pteropod	NA	Thabet, Ali A;Maas, Amy E;Lawson, Gareth L;Tarrant, Ann M
Variable Individual- and Population- Level Responses to Ocean Acidification	2016	sperm, fertilization	bivalve	Negative, Neutral	Vihtakari, Mikko;Havenhand, Jon;Renaud, Paul E;Hendriks, Iris E
The Carbonate Chemistry of the "Fattening Line," Willapa Bay, 2011-2014	2017	spawning	bivalve	NA	Hales, Burke
Interactive effects of ocean warming and acidification on sperm motility and fertilization in the mussel <i>Mytilus galloprovincialis</i>	2016	sperm, fertilization	bivalve	Negative, Neutral	Eads, Angela R;Kennington, W Jason;Evans, Jonathan P
The influence of pH and waterborne metals on egg fertilization of the blue mussel (<i>Mytilus edulis</i>), the oyster (<i>Crassostrea gigas</i>) and the sea urchin (<i>Paracentrotus lividus</i>)	2016	fertilization	bivalve	Negative	Riba, Inmaculada;Gabrielyan, Bardukh;Khosrovyan, Alla;Luque, Angel;Del Valls, T Angel
Effects of reduced pH and elevated pCO2 on sperm motility and fertilisation success in blood clam, <i>Tegillarca granosa</i>	2017	sperm, fertilization	bivalve	Negative	Shi, Wei;Zhao, Xinguo;Han, Yu;Guo, Cheng;Liu, Saixi;Su, Wenhao;Wang, Yichen;Zha, Shanjie;Chai, Xueliang;Fu, Wandong;Yang, Huicheng;Liu, Guangxu
Marine gametes in a changing ocean: Impacts of climate change stressors on fecundity and the egg	2017	fecundity, egg	review	NA	Foo, Shawna A;Byrne, Maria
Ocean acidification hampers sperm-egg collisions, gamete fusion, and generation of Ca ^{sup 2+} oscillations of a broadcast spawning bivalve, <i>Tegillarca granosa</i>	2017	sperm, fertilization	bivalve	Negative	Wei ShiYu HanCheng GuoXinguo ZhaoSaixi LiuWenhao SuYichen WangShanjie ZhaXueliang ChaiGuangxu Liu
Oyster reproduction is compromised by acidification experienced seasonally in coastal regions	2017	maturation, sex, fecundity	bivalve	Negative	Myrina Boulais, Kyle John Chenevert, Ashley Taylor Demey, Elizabeth S. Darrow, Madison Raine Robison, John Park Roberts & Aswani Voley
Seawater acidification affects the physiological energetics and spawning capacity of the Manila clam <i>Ruditapes philippinarum</i> during gonadal maturation	2016	spawning	bivalve	Negative	Xu, Xian
Ocean acidification but not warming alters sex determination in the Sydney rock oyster <i>Saccostrea glomerata</i>	2018	sex, fecundity	bivalve	Negative, positive (?)	Parker, Laura M;O'Connor, Wayne A;Byrne, Maria;Dove, Michael;Coleman, Ross A;Hans-O, Portner;Scanes Elliot;Virtue Patti;Gibbs, Mitchell;Ross, Pauline M
Copper and ocean acidification interact to lower maternal investment, but have little effect on adult physiology of the Sydney rock oyster <i>Saccostrea glomerata</i>	2018	eggs	bivalve	Negative	Scanes, Elliot;Parker, Laura M;Gibbs, Mitchell C;Ross, Pauline M;Wayne A. O'Connor
Impact of environmental hypercapnia on fertilization success rate and the early embryonic development of the clam <i>Limecola balthica</i> (Bivalvia, Tellinidae) from the southern Baltic Sea – A potential CO ₂ leakage case study	2018	fertilization	bivalve	Negative	Świeżak, Justyna;Borrero-Santiago, Ana R;Sokołowski, Adam;Olsen, Anders J
Transgenerational effects of short-term exposure to acidification and hypoxia on early developmental traits of the mussel <i>Mytilus edulis</i>	2019	fertilization	bivalve	Negative	Kong, Hui;Jiang, Xiaoyu;Clements, Jeff C;Wang, Ting;Huang, Xizhi;Shang, Yueyong;Chen, Jianfang;Hu, Menghong;Wang, Youji
Adult low pH exposure influences larval abundance in Pacific oysters (<i>Crassostrea gigas</i>)	2019	pre-fertilization, maturation	bivalve	Neutral	Venkataraman, Spencer & Roberts
Carry-over effects of temperature and pCO2 in multiple Olympia oyster populations	2019	pre-fertilization, fecundity, maturation	bivalve	Neutral	Spencer, Venkataraman, Crim, Ryan, Horwith & Roberts
Elevated seawater pCO2 affects reproduction and embryonic development in the pygmy squid, <i>Idiosepius pygmaeus</i>	2019	fecundity, egg	cephalopod	Negative	Spady, B., Munday, P. L. & Watson, S-A.