

Important pathogens of marine molluscs



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Pathogen		Some host species	Host impact	Geographical distribution	References
Species	Group				
Bonamia ostreae*	Protozoan	<i>Ostrea edulis</i> , <i>O. chilensis</i> , <i>Magallana ariakensis</i>	Parasite of oyster haemocytes (=>all the tissues can be invaded). Sometimes perforation or indentation of host gills. Oyster mortality	Europe, North America, North Africa, Oceania	Arzul et al. 2024; WOA - WAHIS database
Bonamia exitiosa*	Protozoan	<i>Ostrea angasi</i> , <i>O. chilensis</i> , <i>O. edulis</i> , <i>O. puelchana</i> , <i>O. lurida</i> , <i>O. equestris</i> , <i>Crassostrea virginica</i> , <i>Magallana ariakensis</i>	Parasite of oyster haemocytes (=>all the tissues can be invaded). Mortality of Chilean flat oysters. Unknown impact on European flat oysters	Oceania, Europe, North & South America, North Africa	Arzul et al. 2024; WOA - WAHIS database
Haplosporidium costale	Protozoan	<i>Crassostrea virginica</i> , <i>Magallana gigas</i>	Parasites present in connective tissue (mantle, gonads, digestive gland) but not in digestive tubule epithelia. Mortality in May-June. Low prevalence and low mortalities in <i>M. gigas</i> .	North America, Europe, Asia	Reece et al. 2024; Arzul et al. 2022
Haplosporidium nelsoni	Protozoan	<i>Crassostrea virginica</i> , <i>Magallana gigas</i>	Parasites present in gills, connective tissue. Sporulation only in the epithelium of digestive gland in <i>C. virginica</i> , Mortalities in <i>C. virginica</i> . No mortality in <i>M. gigas</i>	North America, Europe, Asia	Reece et al. 2024
Haplosporidium armoricanum	Protozoan	<i>Ostrea edulis</i> , <i>O. angasi</i>	Parasite present in connective tissue. Sometimes, mortality can be observed	Europe	Reece et al. 2024
Haplosporidium edule	Protozoan	<i>Cerastoderma edule</i>	Parasite present in connective tissue. Sometimes, mortality can be observed	Europe	Reece et al. 2024; De Montaudouin et al. 2021
Haplosporidium pinnae	Protozoan	<i>Pinna nobilis</i>	Associated with mass mortalities of <i>P. nobilis</i> along the Mediterranean coasts since 2018.	Europe, Asia	Reece et al. 2024; Carella et al. 2023
Minchinia mercenaria	Protozoan	<i>Mercenaria mercenaria</i> , <i>Cerastoderma edule</i>	Parasites present in connective tissue and sporulation stage can cause important lesions.	Europe	Reece et al. 2024; De Montaudouin et al. 2021
Minchinia mytili	Protozoan	<i>Mytilus edulis</i> , <i>Mytilus galloprovincialis</i>	Parasites present in gills, mantle, digestive gland. Unknown impact	Europe	Reece et al. 2024; Arzul et al. 2022
Minchinia tapetis	Protozoan	<i>Ruditapes philippinarum</i> , <i>R. decussatus</i> , <i>Politapes aureus</i> , <i>P. rhomboides</i> , <i>Cerastoderma edule</i> , <i>Venerupis corrugata</i>	Parasites present in connective tissue and sporulation stage can cause important lesions.	Europe	Reece et al. 2024; De Montaudouin et al. 2021
Marteilia refringens (type O)*	Protozoan	<i>Ostrea edulis</i> , <i>O. stentina</i> , <i>Chamelea gallina</i>	Extracellular parasite of the digestive gland. Oyster mortalities	Europe, North Africa	Bower 2024; WOA - WAHIS database
Marteilia pararefringens (or M. refringens type M)*	Protozoan	<i>Mytilus edulis</i> , <i>M. galloprovincialis</i> , <i>Xenostrobus securis</i> , <i>Solen marginatus</i>	Extracellular parasite of the digestive gland. Sometimes, mussel mortalities can be observed.	Europe	Bower 2024; WOA - WAHIS database
Marteilia cochillia	Protozoan	<i>Cerastoderma edule</i>	Extracellular parasite of the digestive gland. Associated with mass mortalities of cockles in Spain since 2012.	Europe	Bower 2024
Marteilia cocosarum	Protozoan	<i>Cerastoderma edule</i>	Parasites found in connective tissue of different organs, rarely observed in the epithelia of digestive tract. Strong inflammatory reaction associated with the parasites presence. Unknown impact.	Europe	Skujina et al. 2022
Marteilia sydneyi	Protozoan	<i>Saccostrea glomerata</i>	Parasite of palps, gills, the digestive gland. Oyster mortalities in Australia.	Oceania	Bower 2024
Marteilioides chungmuensis	Protozoan	<i>Magallana gigas</i> , <i>M. nippona</i> , <i>M. ariakensis</i>	Nodule in the mantle (heavy infection) Parasite present in the ovocyte. Impact on oyster reproduction	Asia	Bower 2024; Yanin et al. 2013
Mikrocytos mackini	Protozoan	<i>Magallana gigas</i> , <i>M. sikamea</i> , <i>Crassostrea virginica</i> , <i>Ostrea edulis</i> , <i>O. lurida</i>	Green pustules on the mantle, palps. Intracellular parasites present in connective tissue cells. Oyster mortality	North America	Bower and Meyer 2024
Mikrocytos mimicus	Protozoan	<i>Magallana gigas</i>	Green pustules on the mantle, palps. Intracellular parasites present in connective tissue cells. Oyster mortality	Europe	Bower and Meyer 2024
Mikrocytos veneroides	Protozoan	<i>Donax trunculus</i>	Intracellular parasites present in muscular tissues (mantle, foot...). Clam mortalities.	Europe	Bower and Meyer 2024
Mikrocytos donaxi	Protozoan	<i>Donax trunculus</i>	Intracellular parasites present in muscular tissues (mantle, foot...). Clam mortalities.	Europe	Bower and Meyer 2024
Perkinsus marinus*	Protozoan	<i>Crassostrea virginica</i> , <i>C. corteziensis</i> , <i>Magallana gigas</i> , <i>M. ariakensis</i> , <i>Saccostrea palmula</i>	Parasite present in the connective tissue and epithelial cells. Could induce a pale digestive gland and weight loss in highly infected oysters. <i>C. virginica</i> mortalities. Low impact on <i>M. gigas</i> .	North, central and South America, Asia	Reece et al. 2024; Kim et al. 2024; WOA - WAHIS database
Perkinsus olseni*	Protozoan	<i>Haliotis ruber</i> , <i>H. laevigata</i> , <i>Ruditapes decussatus</i> , <i>R. philippinarum</i> , <i>Mytilus galloprovincialis</i> , <i>Perna canaliculus</i>	Sometimes, nodules in the mantle, muscle, gills. Parasite present in connective tissue and epithelial cells. Abalone mortalities in the Pacific and clams mortalities the south of Europe and in Asia.	Europe, Asia, Oceania, Central and South America	Reece et al. 2024; Muznebin et al. 2023; Carella et al. 2023; WOA - WAHIS database
Perkinsus chesapeaki	Protozoan	<i>Ruditapes decussatus</i> , <i>R. philippinarum</i> , <i>Mya arenaria</i> , <i>Macoma balthica</i> , <i>Mercenaria mercenaria</i>	Hemocyte infiltration and encapsulation of clusters of parasite cells. Impact unclear	North, Central and South America, Europe, Oceania	Reece et al. 2024
Thraustochytrid parasites (ex: QPX= Mucochytrium quahogii; Labyrinthulochytrium haliotidis...)	Protozoan	<i>Mercenaria mercenaria</i> , <i>Ruditapes decussatus</i> , <i>R. philippinarum</i> , <i>Haliotis rufescens</i> , <i>H. kamschatkana</i>	Clam mortality in spring/summer with QPX parasites. Parasites in connective tissues of different organs and could induce abscesses or necrotic lesions	North America, Asia, Europe	Smolowitz 2024; Zhao et al. 2023
Coccidian parasites (ex: <i>Pseudoklossia</i> sp., <i>Margolisella</i> sp., ...)	Protozoan	Marine molluscs (oyster, mussel, clam, scallop, abalone...)	Frequent in pectinids. Generally, low impact on host but recently one parasite species incriminated in <i>Argopecten irradians</i> mortality	Probably ubiquitous	Scro 2024
Gregarine parasites (ex: <i>Nematopsis</i> sp., <i>Porospora</i> sp.,...)	Protozoan	Marine molluscs (oyster, mussel, clam, scallop, abalone...)	Intracellular parasites. Generally, low impact on mollusc (=intermediate host).	Probably ubiquitous	de Montaudouin et al. 2021
Microsporidia parasites (ex: <i>Steinhausia</i> sp.,...)	-	Marine molluscs (oyster, mussel, clam, cockles, ...)	Intracellular parasites. Local tissue reaction. Generally, low impact on host.	Probably ubiquitous	Chintiroglou and Antoniadou 2024, de Montaudouin et al. 2021
Copepod parasites (ex: <i>Mytilicola</i> sp., <i>Myicola</i> sp.,...)	Copepod (metazoan)	Marine bivalves (oyster, mussel, clam...)	Mainly found in gills and digestive lumen. Generally, low impact on host.	Probably ubiquitous	de Montaudouin et al. 2021
Turbellaria parasites (ex: <i>Uratostoma</i> sp., <i>Paravortex</i> sp.,...)	Plathelminthe (metazoan)	Marine molluscs (oyster, mussel, clam, cockle, ...)	Mainly found in gills and digestive lumen. Generally, low impact on host.	Probably ubiquitous	de Montaudouin et al. 2021
Trematod parasites : sporocyst and metacercaria stages (ex: <i>Labratrema</i> sp., <i>Himasthla</i> sp., ...)	Plathelminthe (metazoan)	Marine molluscs (oyster, mussel, clam, scallop, abalone...)	Frequent in clams and cockles. Different impact according to the trematode stages. Sporocyst (multiplication stage) have an higher impact on host and could induce mortality.	Probably ubiquitous	de Montaudouin et al. 2021; Smolowitz 2024
Candidatus Xenohaliotis californiensis*	Bacteria	<i>Haliotis</i> spp.	Atrophy of foot muscle. Bacteria in the epithelium of intestinal tract. Abalone mortalities	North, Central and South America, Asia, Europe	Crosson et al. 2014; Wetchateng et al. 2010
Endozoicomonas-like organisms and other intracellular microcolonies of bacteria (<i>Rickettsia</i> sp., <i>Chlamydia</i> sp., <i>Mycoplasma</i> sp., ...)	Bacteria	Marine molluscs (oyster, mussel, clam, cockles, ...)	Bacteria present in the digestive gland, gills, kidney, epithelial cells. Minimal impact on host.	Probably ubiquitous	Cano et al. 2020
Vibrio tapetis	Bacteria	<i>Ruditapes decussatus</i> , <i>R. philippinarum</i> , <i>Politapes aureus</i> , <i>P. rhomboides</i> , <i>Cerastoderma edule</i> , <i>Dosinia exoleta</i>	Responsible for the Brown ring disease. <i>R. philippinarum</i> is the most sensitive host.	Europe, Asia	Paillard et al. 2024; Paillard 2004
Vibrio aestuarianus	Bacteria	<i>Magallana gigas</i> , <i>Ostrea edulis</i> , <i>Cerastoderma edule</i>	Sub-species <i>Vibrio aestuarianus francensis</i> associated with oyster mortalities Sub-species <i>Vibrio aestuarianus cardii</i> associated with cockle mortalities	Europe, North America, Asia, Oceania Paeiffe	Garcia et al. 2021; Mesnil et al. 2023
Vibriosis of bivalves	Bacteria	Marine molluscs (oyster, mussel, clam, scallop, abalone...)	Variable impact on molluscs. Some species can induce mollusc mortalities.	Probably ubiquitous	Go' mez-Chiarri et al. 2024
Francisella haliotidica	Bacteria	<i>Haliotis gigantea</i> , <i>Mizuhopecten yessoensis</i> , <i>Mytilus edulis</i> , <i>Mytilus galloprovincialis</i>	In abalones and scallops, orange coloured lesions in the adductor muscle, conchiolin deposits and shell erosion. No gross sign in mussel. Responsible for mortalities of abalones in Japan, and scallops in Japan and Canada. Bacteria reported in Europe in the context of mussel mortality events. Role in mussel mortalities unclear.	Asia, North America, Europe	Garcia et al. 2024, Meyer and Itoh 2024
Nocardia crassostreae	Bacteria	<i>Magallana gigas</i> , <i>Ostrea edulis</i> , <i>Mytilus galloprovincialis</i>	Possible nodules on adductor muscle and on visceral mass in <i>M. gigas</i> . Sometime associated with mortalities of <i>M. gigas</i>	North America, Asia, Europe	Cutarelli et al. 2023
OshV-1 (Oyster herpesvirus)	Virus	<i>Magallana gigas</i> , <i>M. angulata</i> , <i>Ostrea edulis</i> , <i>Ruditapes decussatus</i> , <i>R. philippinarum</i> , <i>Pecten maximus</i> , <i>Anadara broughtonii</i>	Virus present in the connective tissues. Sometimes larvae and juvenile mortalities. The variant OshV-1 "juvar" is responsible of an increase of summer mortality events in <i>M. gigas</i> .	Europe, North, Central and South America, North Africa, Asia, Oceania	Renault 2024
Aurivirus haliotidimalco1 (AbHV - Abalone herpesvirus)	Virus	<i>Haliotis diversicolor</i> , <i>Haliotis laevigata</i> , <i>Haliotis rubra</i> , hybrid <i>Haliotis laevigata</i> x <i>H. rubra</i>	Loss of muscle control, minimal movement of the pedal muscle and excessive mucous production. Abalone mortalities.	Oceania, Asia	Chang and Handlinger 2022
Papillomalike viruses and polyomalike viruses	Virus	<i>Crassostrea virginica</i> , <i>Magallana gigas</i> , <i>Pinctada maxima</i> , <i>Ensis arcuatus</i> , <i>Mya arenaria</i>	Hypertrophy of infected cells. Low impact on mollusc	Europe, North, Central and South America, Asia, Oceania	Renault 2024

In red: EU listed pathogens
*: WOA listed pathogens
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