

Bonamia parasites: a rapidly changing perspective on a genus of important mollusc pathogens

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Supplement. Additional data

Phylogenetic methods used to generate Fig. 3

Parsimony bootstrap analysis was used to illustrate the relationships among 39 GenBank-deposited small subunit ribosomal DNA (SSU rDNA) sequences from haplosporidian parasites characterized to date. These are presented in Fig. 3 in the main manuscript. The sequences were aligned using Clustal W in MacVector 12.5.1, and parsimony bootstrap analysis was then performed in PAUP v.4.0b10 (Swofford 2002) with characters weighted equally, gaps treated as missing data, and sequences obtained from parasites of *Haliotis iris* and *Pandalus platyceros* comprising an outgroup. Starting trees were obtained by stepwise addition, with the addition sequence simple and 1 tree held during each step, followed by branch swapping by tree-bisection-reconnection.

Table S1. Geographical distribution of *Bonamia* species based on published literature and disease reports of the OIE World Animal Health Information Database (supplementary information related to Fig. 5 in the main text). For Europe, the nomenclature of territorial units for statistics (NUTS) is used, where Macro-area is NUTS1, Region is NUTS2 and Province is NUTS3

EUROPE

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
<i>Bonamia ostreae</i>	<i>Ostrea edulis</i>	France	Ouest	Bretagne	Ille-et-Vilaine	Bay of Cancale; Rance	Pichot et al. (1980), Tigé et al. (1984)
					Côtes-d'Armor	Bay St Brieuic; Binic; Bay Paimpol	Pichot et al. (1980), Balouet et al. (1983), Tigé et al. (1984)
					Finistère	Bay Morlaix; Carantec; Aber-Benoit; Elorn River; Landevennec; Roscanvel; Ile-Tudy; River Penzé; Emb. Aulne	Comps et al. (1980), Pichot et al. (1980), Balouet et al. (1983), Tigé et al. (1984), Pascual et al. (1991)
					Morbihan	River d'Etel; Bay of Quiberon-Le Pô; River Crach; River St Philibert; River d'Auray; Golfe du Morhiban	Tigé et al. (1984), Pascual et al. (1991)
				Pays de la Loire	Vendée	Bourgneuf Bay	Naciri-Graven et al. (1999)
			Sud-Ouest	Aquitaine	Gironde	Bay of Arcachon	Pichot et al. (1980), Pascual et al. (1991), Robert et al. (1991)
		Spain	Noroeste	Galicia	Pontevedra	Ría de Arousa; Ría de Vigo, Domayo; Cambados; Grove; Noaia; Aldan; Islas Cies;	Polanco et al. (1984), Figueras (1991), Montes et al. (1992, 1996), Montes & Lama (1992), Lama & Montes (1993), Cáceres-Martínez et al. (1995), Carnegie et al. (2000), Abollo et al. (2008)
					A Coruña	Ortigueira; Sada; Camariñas; Freixo; Noya; Anllóns	Polanco et al. (1984), Montes et al. (1992, 1996), Montes & Lama (1992)
					Lugo	Ribadeo; San Ciprán; Vivero	Polanco et al. (1984), Montes & Lama (1992), Montes et al. (1996)

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
		Italy	Southern Italy	Apulia	Foggia	Manfredonia Gulf	Narcisi et al. (2010)
		Netherlands	West-Nederland	Zeeland		Oosterschelde; Lake Grevelingen	Van Banning (1982, 1985, 1987, 1991)
		Belgium	Vlaams Gewest	Prov. West-Vlaanderen	Arr. Ostende	Ostende	WAHID-Interface (2008a)
		Republic of Ireland		Southern and Eastern	South-West	Cork Harbour	McArdle et al. (1991), Rogan et al. (1991), Carnegie et al. (2000)
				Border, Midland and Western	West	Clew Bay; Galway Bay; Blacksod Bay; Achill Sound	McArdle et al. (1991), Beare et al. (1998), Culloty & Mulcahy (2007)
					Border	Lough Swilly; Lough Foyle	WAHID-Interface (2006a), Culloty & Mulcahy (2007)
		United Kingdom	East of England	Essex	Essex County Council	Mersea; Walton-on-the-Naze; Walton Backwaters; River Colne; River Blackwater; River Crouch/Roach; mid-Essex Creeks; North Essex; South Essex	Bucke et al. (1984), Hudson & Hill (1991), Howard (1997)
			South East (England)	Surrey, East and West Sussex	West Sussex	Chichester Harbour	Howard (1997)
				Hampshire and Isle of Wight	Hampshire County Council	Langstone Harbour; Upper Beaulieu; Middle Beaulieu; Lower Beaulieu; Emsworth	Hudson & Hill (1991), Howard (1997)

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
					Isle of Wight	River Medina	Howard (1997)
				Kent	Kent County Council	North Kent (Whitstable area)	WAHID-Interface (2008b)
			South West (England)	Cornwall and Isles of Scilly	Cornwall	Fal estuary; Helford estuary; Calamansack Bight	Bucke et al. (1984), Bucke & Hepper (1987), Hudson & Hill (1991), Howard (1997)
				Dorset and Somerset	Bournemouth and Poole	Poole Harbour	Hudson & Hill (1991), Howard (1997)
				Devon	Plymouth	Plymouth Harbour; River Lynher	Howard (1997)
			Wales	West Wales and The Valleys	South West Wales	River Cleddau	WAHID-Interface (2006c)
			Scotland	Highlands and Islands	Lochaber	Loch Sunart	WAHID-Interface (2006b)
				Western Isles	Eilean Siar	West Loch Tarbert	WAHID-Interface (2007b)
		Norway	Norge	Agder og Rogaland	Aust-Agder	Langestrand	WAHID-Interface (2009)
	<i>Ostrea puelchana</i>	France	Ouest	Bretagne	Finistère	Penzé River	Pascual et al. (1991)
					Morbihan	Bay of Quiberon; St Philibert River	Pascual et al. (1991)
			Sud-Ouest	Aquitaine	Gironde	Bay of Arcachon	Pascual et al. (1991)
	<i>Ostrea angasi</i>	France	Bassin Parisien	Basse-Normandie	Manche	Linverville (Ouest Cotentin)	Bougrier et al. (1986)
			Ouest	Bretagne	Morbihan	St-Guillaume (Rivière d'Etel); Les Presses (Rivière de Crach)	Bougrier et al. (1986)

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
	<i>Ostrea chilensis</i>	France	Ouest	Bretagne	Morbihan	Crach; Auray	Grizel et al. (1983)
					Finistère	Ile Tudy	Grizel et al. (1983)
		United Kingdom	South West (England)	Cornwall and Isles of Scilly	Cornwall	River Helford, Calamansack Bight	Bucke & Hepper (1987)
<i>Bonamia exitiosa</i>	<i>Ostrea edulis</i>	Spain	Noroeste	Galicia	Pontevedra	Ría de Arousa, Cambados	WAHID-Interface (2007a), Abollo et al. (2008)
			Este	Catalonia	Tarragona	Alfacs Bay	Carrasco et al. (2012)
		Italy	Nordest	Veneto	Venezia	Venezia Mestre	WAHID-Interface (2010)
					Rovigo	Rosolina	WAHID-Interface (2010)
			Sud	Apulia	Foggia	Manfredonia gulf	Narcisi et al. (2010)
		United Kingdom	South West (England)	Cornwall and Isles of Scilly	Cornwall	River Fal, Turnaware Bar	WAHID-Interface (2011)
<i>Bonamia sp.</i>	<i>Crassostrea ariakensis</i>	France	Ouest	Poitou-Charentes	Charente-Maritime	Marennes Oleron basin	Cochennec et al. (1998)

AFRICA

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
<i>Bonamia ostreae</i>	<i>Ostrea edulis</i>	Morocco		Laayoune province	Akhfennir rural district	Khnifiss lagoon	OIE World Animal Health Information Database (2005)
<i>Bonamia sp.</i>	<i>Ostrea stentina</i>	Tunisia		Nabeul		Southwest of Hammamet	Hill et al. (2010)

NORTH AMERICA

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
<i>Bonamia ostreae</i>	<i>Ostrea edulis</i>	USA	Maine		Damaris-cotta River area	Little point; Mears Cove; Lowes Cove; Witch Island, Johns Bay; Gun Point Creek	Friedman & Perkins (1994), Zabaleta & Barber (1996), Carnegie et al. (2000, 2003), Carnegie & Barber (2001)
			Washington State		Puget Sound	South Puget Sound; North Puget Sound; Mud Bay	Elston et al. (1986)
			California			Tomales Bay	Friedman et al. (1989), Friedman & Perkins (1994)
						Santa Barbara Channel	Friedman et al. (1989), Friedman & Perkins (1994)
		Canada	British Columbia		South British Columbia	Malaspina Inlet	Marty et al. (2006)
<i>Bonamia exitiosa</i>	<i>Crassostrea virginica</i>	USA	Massachusetts			Chatham, Stage Harbor	WAHID-Interface (2013)
<i>Bonamia</i> sp.	<i>Crassostrea ariakensis</i>	USA	North Carolina		Bogue Sound and Masonboro Sound	Hope Pole Creek; Core Creek	Burreson et al. (2004, Bishop et al. (2006), Carnegie et al. (2008)
						Oregon Inlet, Hatteras Inlet, Beaufort Inlet, Chadwick Bay, Oak Island; Newport River	Bishop et al. (2006), Carnegie et al. (2008)
			Maryland		Chesapeake Bay	Potomac River, Piney Point	Schott et al. (2008)
			Virginia		Chesapeake Bay	Gloucester Pt.	Schott et al. (2008)

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
			Florida		Indian River Lagoon	Fort Pierce	Dungan et al. (2012), Hill et al. (2014, this DAO Special)
	<i>Ostrea lurida</i>		California			Elkhorn Slough	Hill et al. (2014)
	<i>Ostrea stentina</i>	USA	North Carolina		Bogue Sound and Masonboro Sound	Beaufort Inlet; Morehead City; Wilmington	Bishop et al. (2006), Carnegie et al. (2006), Hill et al. (2014)
<i>Bonamia perspora</i>	<i>Ostrea stentina</i>	USA	North Carolina		Bogue Sound and Masonboro Sound	Morehead City; Wilmington	Carnegie et al. (2006)

SOUTH AMERICA

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
<i>Bonamia sp.</i>	<i>Ostrea puelchana</i>	Argentina	North Patagonia	Rio Negro Province		San Matías Gulf, San Antonio Bay	Kroeck & Montes (2005), Kroeck et al. (2008)
	<i>Ostrea stentina</i>					San Antonio Bay	Hill et al. (2014)
	<i>Ostrea chilensis</i>	Chile		Chiloe Island		Quempillén River; Hueihue Bay	Campalans et al. (2000)

NEW ZEALAND / AUSTRALIA / OCEANIA

Species	Host	Country	Macro-area	Region	Province	Point locations	Key references
<i>Bonamia exitiosa</i>	<i>Ostrea chilensis</i>	New Zealand				Foveaux Strait	Dinamani et al. (1987), Hine (1991, 2002), Hine et al. (2001), Cranfield et al. (2005)
<i>Bonamia</i> sp.	<i>Ostrea stentina</i>	New Zealand		Auckland	Tamaki Estuary	Karaka Bay, Glendowie	Hill et al. (2014)
	<i>Ostrea angasi</i>	Australia		Tasmania		Georges Bay	Wilson et al. (1993)
				New South Wales		Bateman's Bay; Bermagui; Narooma Merimbula; Pambula	Heasman et al. (2004), Corbeil et al. (2006)
	<i>Saccostrea glomerata</i>	Australia		New South Wales		Georges River	Hill et al. (2014)
	<i>Ostrea sand-vicensis</i>	USA	Hawaii			Kaneohe Bay	Hill et al. (2014)
<i>Bonamia roughleyi</i>	<i>Saccostrea glomerata</i>	Australia		New South Wales		Georges River, Woollooware Bay	Farley et al. (1988)

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