Journal of Invertebrate Pathology 106 (2011) 54–70

Contents lists available at ScienceDirect

Journal of Invertebrate Pathology

journal homepage: www.elsevier.com/locate/jip

Minireview

Diseases of crayfish: A review

Matt Longshaw *

Cefas Weymouth Laboratory, Barrack Road, The Nothe, Weymouth, Dorset DT4 8UB, UK

ARTICLE INFO

Keywords:
Crayfish
Virus
Fungi
Bacteria
Protista
Metazoa

ABSTRACT

A systematic review of parasites, pathogens and commensals of freshwater crayfish has been conducted. All major groups of disease causing agents have been covered including viruses, bacteria, fungi, protistans and metazoans. Most agents tend to cause limited problems for crayfish. Exceptions to this include fungi, bacteria and viruses. However, in many cases, these tend to be isolated reports in either a specific geographical location or in individual animals. The apparent absence of pathology associated with these agents in crayfish should not be taken to suggest that movements of crayfish to new geographical areas is necessarily acceptable. Several examples are given where seemingly healthy animals have been moved to new areas leading to mortality of other crayfish within the same area as a direct result of transmission of pathogens to naïve hosts. Some future research needs are proposed, including the need for pathogen characterisation and production of disease-free crayfish for aquaculture.

Crown Copyright © 2010 Published by Elsevier Inc. All rights reserved.

Contents

1. Introduction . . . 55
1.1. Viruses . . . 55
1.1.1. Intranuclear bacilliform viruses . . . 55
1.1.2. Birnaviridae . . . 56
1.1.3. Nimaviridae . . . 56
1.1.4. Parvoviridae . . . 56
1.1.5. Picornaviridae . . . 57
1.1.6. Reoviridae . . . 57
1.1.7. Totiviridae . . . 57
1.1.8. Unidentified viral infections . . . 57
1.2. Bacteria . . . 58
1.2.1. Coxiella cheraxi . . . 58
1.2.2. Nocardia . . . 58
1.2.3. Spiroplasma . . . 58
1.2.4. Vibrio . . . 58
1.2.5. Aeromonas . . . 58
1.3. Fungi . . . 58
1.3.1. Class Oomycetes . . . 59
1.3.2. Class Sordariomycetes . . . 59
1.3.3. Microsporidia . . . 59
1.4. Mesomycetozoea . . . 60
1.5. Protista . . . 61
1.5.1. Ciliata . . . 61
1.5.2. Phylum Apicomplexa . . . 61
1.6. Digenea . . . 61
1.6.1. Family Allocreadiidae . . . 61
1.6.2. Family Choanocotylidae . . . 61
1.6.3. Family Cladorchidae . . . 62

* Fax: +44 (0)1305 206601.
E-mail address: matt.longshaw@cefas.co.uk

0022-2011/$ - see front matter Crown Copyright © 2010 Published by Elsevier Inc. All rights reserved.
doi:10.1016/j.jip.2010.09.013

1.6.4. Family Gorgoderidae . . . 62
1.6.5. Family Haematoloechidae . . . 62
1.6.6. Family Macroderoididae . . . 62
1.6.7. Family Microphallidae . . . 62
1.6.8. Family Opecoelidae . . . 62
1.6.9. Family Orchipedidae . . . 62
1.6.10. Family Paragonimidae . . . 63
1.6.11. Superfamily Plagiorchioidea . . . 63
1.6.12. Family Psilostomatidae . . . 63
1.6.13. Family Reniferidae . . . 63
1.6.14. Family Troglotrematidae . . . 63
1.7. Cestoda . . . 63
1.8. Acanthocephala . . . 63
1.9. Nematoda . . . 64
1.10. Branchiobdellida . . . 64
1.11. Temnocephalida . . . 64
1.12. Other fouling organisms . . . 64
1.13. Idiopathic conditions . . . 65
2. Conclusions and future directions . . . 65
References . . . 65

1. Introduction

Freshwater crayfish are widespread crustaceans occurring on all continents except Antarctica, either as native species or following anthropogenic movements. Several species have been used for aquaculture purposes and more recently, there has been an increase in the sale of crayfish for aquaria. Movements of several species have been responsible for the transfer of the devastating crayfish plague (*Aphanomyces astaci*) which has led to the complete or near extinction of several populations of native crayfish in Europe. There has therefore been a large focus of research on crayfish plague including characterisation, development of diagnostic methods, description of geographical distribution and evaluation of impact at individual and population levels. However, because of the recognition that *A. astaci* is a major mortality driver, some cases of unexplained mortalities may have been attributed to crayfish plague despite absence of clear diagnostic evidence (Alderman and Polglase, 1988).

Perhaps reflecting the locality of researchers and of major aquaculture production areas, much of the research focus has been in Australia, the United Kingdom, Germany and the United States of America with other countries contributing to a lesser extent. Many papers published in the field of crayfish disease are of a descriptive nature, describe pathogen life cycles or provide a case review of a mortality event. Furthermore, due to problems associated with white spot virus syndrome (WSSV), there has been a focus on the distribution, detection and transmission of the virus to crayfish and other Crustacea (Stentiford et al., 2009). In addition, with the recent advent of molecular diagnostic tests, there have been several publications describing new methods for identifying pathogens in crayfish, such as *A. astaci*.

With increasing evidence of other pathogens of importance, in particular viruses, it is timely to provide a review of the current knowledge of crayfish pathogens. This review is not intended to be exhaustive; rather it will cover the major groups of pathogens including viruses, bacteria, fungi, protistans, metazoan parasites and idiopathic conditions. It will consider the impact of these infections on individuals and populations, provide information on available diagnostic methods and provide gaps in our knowledge and suggest future research needs.

1.1. Viruses

Several viruses have been reported from crayfish, although as indicated by Edgerton et al. (2002a) they remain "a conspicuously understudied group of pathogens of crayfish". Most crayfish viruses reported are found in certain commercially important species such as members of the genus *Cherax*, and the majority are intranuclear bacilliform viruses (IBVs). Furthermore, studies on crayfish viruses reflect research interests of selected individuals and their associated institutions rather than necessarily the apparent geographical bias in distribution. Further examples of viral infections will likely be identified as more hosts are examined specifically for viruses. The taxonomy of crayfish viruses is in a state of flux; the higher taxonomic status for some is currently unresolved.

1.1.1. Intranuclear bacilliform viruses

Intranuclear bacilliform viruses (IBVs) are a group of non-occluded double stranded DNA viruses; due to a lack of molecular, immunological and biochemical data on these viruses, their taxonomic position is currently unknown. The IBV's were previously assigned to the family Baculoviridae (Stentiford et al., 2004). They are restricted to the hepatopancreas and the gut.

1.1.1.1. Astacus astacus bacilliform virus (AaBV). To date AaBV has only been reported from *A. astacus* from Finland at prevalences up to 100% and with variable intensity and no apparent mortality or morbidity (Edgerton et al., 1996b). Infections occur in the hepatopancreas with infected cells being only slightly hypertrophied and with emarginated chromatin. In some, infected nuclei were compartmentalised by remaining chromatin. Sloughing of infected cells and necrosis and encapsulation of affected tubules were also noted. The virions have a rod-shaped nucleocapsid with a trilamellar envelope and a subapical unilateral expansion. Virions measure $\sim$70 $\times$ 340 nm with nucleocapsids measuring $\sim$50 $\times$ 260 nm.

1.1.1.2. Austropotamobius pallipes bacilliform virus (ApBV). Edgerton et al. (2002b) reported mortalities of the white clawed crayfish *A. pallipes* in France which appeared to be associated with the presence of ApBV; however no consistent clinical signs were apparent. In addition, the virus was present at relatively low intensity, suggesting that the virus was unlikely to be the primary cause of the mortality. Subsequently, Edgerton (2003) showed that the virus was present in other populations of *A. pallipes*; it was recently found in several populations in England and Wales with limited effects (Longshaw, Stebbing and Hockley, in preparation). Infected hepatocytes and cells of the midgut are hypertrophied with emarginated chromatin. Although not reported by Edgerton et al. (2002b) or Edgerton (2003), infected nuclei can contain septae giving rise to

Download English Version:

https://daneshyari.com/en/article/4558050

Download Persian Version:

https://daneshyari.com/article/4558050

Daneshyari.com