

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/337567270>

Cymothoid isopods in UK Waters. Porcupine Marine Natural History Society Bulletin.

Article · March 2019

CITATIONS

2

READS

430

2 authors:



Tammy Horton

National Oceanography Centre, Southampton

86 PUBLICATIONS 2,836 CITATIONS

[SEE PROFILE](#)



Charles Baillie

FCDO

19 PUBLICATIONS 261 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Biodiversity databases [View project](#)



Taxonomy & Ecology of Lysianassoid Amphipods [View project](#)

Cymothoid isopods in UK Waters

Tammy Horton¹ & Charles Baillie²

¹ National Oceanography Centre, Southampton, European Way, Southampton SO14 3ZH, UK. tammy.horton@noc.ac.uk

² University of Salford, School of Environment and Life Sciences, Peel Building, Salford M5 4WT, UK.

Introduction

Cymothoid isopods are obligate fish parasites, found globally in marine, fresh and brackish waters (except in polar regions). The family Cymothoidae (Crustacea: Isopoda) is mostly confined to shallow waters (less than 200 m), with only 10 species being recorded at depths greater than 500 m (Smit *et al.* 2014). Around 40 genera are currently known with more than 380 species (Smit *et al.* 2014; WoRMS 2018). Cymothoids are some of the largest known isopods, reaching 75 mm in length (Brusca 1981). They are perhaps better known colloquially as ‘fish lice’ or ‘tongue-biters’, and strike horror in many who are made aware of them. Cymothoids are known to attach to their fish hosts in a number of ways, which relate to their morphology and can also aid in their identification. There are ‘buccal or gill-attaching’ species, which are not immediately apparent to the observer. These parasites are often encountered by fishermen, anglers or fishmongers after capture of the infected fish. On death of the host, the isopods will often crawl out from the mouth or gill cavity, to be discovered free in the net or on the deck of a boat. There are ‘skin-attaching’ species, which will cling onto the exterior surface of their hosts, using their powerful and wickedly sharp dactyls (or claws, the terminal part of the leg) to pierce the host tissue and prevent detachment. They will generally attach to the host in particular attachment sites (e.g. near the tail or on the head) and this information can sometimes aid in identification of the isopod to genus and species. There is also a smaller group of bizarre ‘flesh-burrowing’ species, which is largely confined to freshwaters, in South America and Asia (Brusca 1981).

Cymothoids are characterised by the possession of seven pairs of prehensile legs armed with recurved dactyls capable of closing back in on the carpus of the leg and thus enabling them to firmly attach to the host. Indeed, the first three pairs of legs oppose the last four pairs, further reducing the chances of dislodgement (Lincoln 1971).

In UK waters there are a number of species that are increasingly reported and it is the intention of this article to introduce these to Porcupine readers to raise awareness and improve the recording of these wonderfully bizarre and often overlooked isopods.

Historical records of UK Cymothoidae

In 1996, the buccal-inhabiting cymothoid *Ceratothoa steindachneri* Koelbel, 1878 was discovered parasitizing the lesser weever fish, *Echiichthys vipera* (Cuvier) in Whitsand Bay Cornwall (Horton 2000). This finding was considered unusual since cymothoids are more usually found in tropical and warm temperate latitudes (Brusca 1981). The study of this host-parasite association over a three-year PhD program allowed the mapping of its distribution at the time (Horton & Okamura 2002) and it was then confined to south west Britain (Whitsand Bay, Whitesands Bay & Perran Bay). It was thought that the finding of a breeding population of the species was probably a result of a range expansion related to climate change. The distribution of the species has not been studied since 2002, although there are now additional confirmed records from weever populations in the Channel Islands (<https://societejersiaise.wordpress.com/2009/09/13/new-species-of-isopod-for-the-channel-islands-ceratothoa-steindachneri/>) and the Hayle Estuary (David Fenwick, pers comm. See photographs here: http://www.aphotomarine.com/isopoda_ceratothoa_steindachneri.html).

Since the completion of the PhD, the senior author (TH) has been sent records including photographs and specimens of cymothoids found in UK waters, and these records have become more frequent in recent years. However, according to the literature, cymothoids have been recorded in the UK since the 1900s.

In 1905, Tattersall noted that the family Cymothoidae, is “entirely unknown from boreal waters, and only three species approach anywhere near to the British and Irish area”. These were: *Anilocra asilus* Stebbing, 1893 [now recognised as a synonym of *Anilocra frontalis* H. Milne Edwards, 1840, see Trilles 1994] and *A. physodes* (Linnaeus, 1758), both of which had, at that time, been recorded from the Channel Islands [as *Anilocra mediterranea* Leach, 1818, see Norman 1868 and Koehler 1885) and *Nerocila neapolitana* Schioedte & Meinert, 1881 [now recognised as a synonym of *Nerocila orbigny* (Guérin-Méneville, 1832)] which had been found by Norman in Plymouth (Tattersall 1905).

The Plymouth Marine Fauna (Marine Biological Association 1957) reports the presence of two species: *Anilocra physodes*, collected on a Red Mullet in 1951, being the first record for the British Isles (excluding Channel Islands) and *Nerocila neapolitana*, identified by A.M. Norman and reported in the *Crustacea of Devon & Cornwall* (Norman & Scott 1906). This was noted as “the first record of this genus in our seas” and had been taken 5 or 6 miles south of the Mewstone (Norman & Scott 1906).

Lincoln (1971) notes that “*Anilocra physodes* is a particularly common species found on a variety of shore fish around the British Isles, especially *Labrus* species (wrasses, corkwings) but also gobies, blennies and even sticklebacks.” A year later, Holthuis (1972), reporting on the first record of *Anilocra* from the North Sea, points out that while *Anilocra* is a common name in Roscoff, France, the species is scarce on the English south coast. Holthuis (1978) changes the identification of the *Anilocra* specimen from the southern North Sea to *Anilocra frontalis* after the specimens were re-determined by Trilles (1977). He also reports on the finding of *Nerocila maculata* H. Milne Edwards, 1840 in the southern North Sea.

Trilles was at this time conducting extensive studies of the Cymothoidae of the French coasts. He reported extensively on *Anilocra* and *Nerocila* and noted that on French

coasts there are five species recorded (*Anilocra physodes*, *Anilocra frontalis*, *Nerocila bivittata*, *Nerocila maculata*, *Nerocila orbigny*). Trilles (1975) reports the known geographical and host preferences for each species. He indicates that *Anilocra physodes* and *Anilocra frontalis* are found in the Mediterranean, but also mentions the records from the Channel as follows:

“Some authors have mentioned [*Anilocra physodes*] occurs not only in the Mediterranean, but also in the English Channel. This is due to the fact that they certainly had a mixture of samples of *Anilocra physodes* and *Anilocra frontalis*. As to the presence of *Anilocra physodes* in the Gulf of Gascogne, in Portugal ... and at the North Atlantic coast and South of Spain... it would need to be confirmed.”

Therefore, according to the literature there are potentially five cymothoid species in the UK: *Ceratothoa steindachneri*, Koelbel, 1878; *Anilocra physodes* (Linnaeus, 1758); *Anilocra frontalis*, H. Milne Edwards, 1840; *Nerocila orbigny* (Guérin-Méneville, 1832); and *Nerocila maculata* H. Milne Edwards, 1840.

However, other than for *C. steindachneri*, the literature records have not been confirmed and there are clearly issues with the taxonomic identity and validity of the species found in our waters. Part of the problem results from the difficulty in differentiating between the two species of *Anilocra* and the modern taxonomic decisions regarding the validity of the species *Nerocila maculata* (which is regarded as a synonym of *Nerocila orbigny* by Bruce 1987). The relevant papers for identifying the species date from the 1960s and 1970s, are written in French, and may be difficult to obtain. In order to record these species accurately an updated understanding of these species is needed.

Differentiating the three genera known in UK waters

The three genera found in the UK, *Nerocila*, *Anilocra* and *Ceratothoa*, can be relatively easily distinguished morphologically and according to location on the host as follows:

1. - Externally attaching; head not immersed in pereonite 1; posterior margin of head trisinate; basal articles of first antennae not touching, separated by rostrum/clypeus2

- Buccal-inhabiting; head immersed in pereonite 1; posterior margin of cephalon not trisinate; basal articles of first antennae are expanded and touching*Ceratothoa*

2. - Head generally narrowing anteriorly forming a projection, which is produced ventrally between first antennae; posterolateral angles of pereonites 2-6 not extended; coxal plates short, just reaching or falling short of posterior border of respective segments.....*Anilocra*

- Head not narrowing anteriorly; bases of first antennae separated by clypeus; posterolateral angles of pereonites 2-6 clearly extended, increasingly so posteriorly; coxal plates long, usually extended to or falling just short of posterior border of respective segment*Nerocila*

Morphological features can be seen in Figure 1. Additional information about the host on which the parasite is found will also aid in distinguishing the genera. *Ceratothoa* is only found in the buccal cavity of fish, and does not attach externally. In the UK, there is only one species, found infecting the lesser weever fish. *Anilocra* and *Nerocila* are both externally attaching genera.

Identification to species

While identification of *Ceratothoa* in the UK is clear, identification of species of *Anilocra* and *Nerocila* is more difficult. Trilles provides detailed illustrations of the species of both genera (Trilles 1965, 1968, 1975; Trilles & Raibaut 1971, 1973). However, despite these illustrations, the distinctions between them remain unclear.

According to Trilles (1975), *Anilocra physodes* is a rather ubiquitous species that parasitizes various fish species with a clear predominance on fish from the families Sparidae and Centranchidae. He also states that this species is only found in the Mediterranean, which should preclude it from being found on British coasts. Indeed, Trilles (1975, 1977)



Fig. 1: Dorsal views (left to right) of *Nerocila orbigny*, *Anilocra cf. physodes*, and *Ceratothoa steindachneri*, all collected from UK waters. Photograph copyright L-R: Steve Trewella, Heather Buttivant, Tammy Horton]

indicates in his synonymies that specimens identified from the UK, from Atlantic French coasts and the southern North Sea belong to *A. frontalis*, and that records of *A. physodes* from these areas are in error.

Anilocra frontalis is mostly collected on fish of the family Labridae but has also been reported on numerous other species including cod, pollack, whiting, and a variety of blennies and gobies (see host records in Trilles 1975).

Trilles points to a number of means of differentiating the two species. In particular, he states that these two species differ not only morphologically, but also:

- by their parasitic specificity: *Anilocra frontalis* is parasitic on Labridae, while *Anilocra physodes* most often attaches to Sparidae or Centracanthidae;
- by their position on the host: *A. frontalis* is usually fixed very forward on the fish, above the operculum, behind the eye and above the relative level of the lateral line. Whereas *Anilocra physodes* is usually fixed above the lateral line and very clearly behind the posterior edge of the operculum.

Morphological characters of adult females (Figure 2) from Trilles (1965) include:

Anilocra physodes females measure 18–50 mm in length and are characterized by their globular form, little ovoid. The head is well-developed, anteriorly the cephalon is truncated. The eyes are well-developed. Lateroposterior edges of pereonites I, VI and VII are clearly prolonged and auriform (ear-shaped!). The telson is shield-shaped and presents distally a pointed tip. The endopods of the uropods generally do not exceed the posterior edge of the telson.

Anilocra frontalis females measure 15–35 mm in length, are globular and distinctly ovoid. The width of the pereonites increases markedly from the first to the fifth. The head is well-developed but clearly extended anteriorly and more acuminate. It is rounded at its distal end. The eyes are visible but reduced. Without auriform extensions of the pereonites I, VI and VII, present in *Anilocra*

physodes. The telson is semicircular, rounded at its distal end; the uropods go clearly beyond its posterior edge.

Unfortunately, these characters are not consistent in specimens that we have seen, nor in photographed specimens. In most cases, the specimens display a combination of these characters e.g. the large eyes, truncated head anterior of *A. physodes* but without the auriform extensions of the pereonites, and yet found on the fixation point, host and geographical locality expected for *A. frontalis*. This means that, at the present time, we cannot confidently identify specimens of *Anilocra* as either *A. physodes* or *A. frontalis*. More specimens are needed and a comparison of specimens from the type localities of both species and certainly with material from the Mediterranean is needed.

Specimen records

There are now numerous records of *Anilocra* in UK waters, and indeed breeding populations are known in Dorset at both Kimmeridge Bay and Swanage Pier, with manca larvae and small males being collected regularly in light traps (Steve Trewella, pers comm.) The NBN Atlas holds records of cymothoids: *Anilocra frontalis* – 6 records from Seasearch, Channel Islands, between 2013 and 2014. No indication of host. *Anilocra* sp. 1–26 records and a single record of *Anilocra physodes* (Channel Islands Seasearch).

There are currently no records of *Nerocila* in the National Biodiversity Network but we have received a number of specimens since 2010 that were identified as *Nerocila orbigny*. These have been collected on a variety of fish species, including thick-lipped grey mullet, mackerel and herring.

There are a number of specimens in the Natural History Museum in London, mostly from the Channel Islands. We will now be working to trace all records of cymothoids from UK waters held in museum collections.

In addition to physical specimens, we have been sent numerous photographs of specimens (sometimes attached to the host) which can usually be identified to the

Identification	Host	Location	Specimens
<i>Anilocra</i> cf. <i>physodes</i>	On head of black bream, <i>Spondylosoma cantharus</i> (Linnaeus, 1758)	Christchurch Bay, Hampshire, 09/2006. Coll. Jenny Mallinson.	1 large female, 1 male
<i>Anilocra</i> cf. <i>physodes</i>	On head of black bream, <i>Spondylosoma cantharus</i> (Linnaeus, 1758)	Dungeness Point.	1 large female
<i>Anilocra frontalis</i>	Ballan (<i>Labrus bergylta</i> Ascanius, 1767) & Corkwing (<i>Symphodus melops</i> (Linnaeus, 1758)) wrasse (Labridae)	QEII Marina, St Peter Port, Guernsey Coll. Richard Lord.	5 specimens, small, all males
<i>Nerocila orbignyi</i>	Mackerel (<i>Scomber scombrus</i> Linnaeus, 1758)	Swanage, 09/08/2008, Collected by Steve Trewella	1 large female
<i>Nerocila orbignyi</i>	Herring (<i>Clupea harengus</i> Linnaeus, 1758)	Southampton Water, 50° 54.30' N, 001° 27.54' W to 54° 54.48' N, 001° 27.80' W, 04/12/2010, Coll. Robin Soames.	1 large female
<i>Nerocila orbignyi</i>	Herring (<i>Clupea harengus</i> Linnaeus, 1758)	Southampton Water, close to 50.90° N 1.441° W, 21/12/17. Coll. Robin Soames.	1 large female
Photograph only			
<i>Nerocila orbignyi</i>	Thick lipped grey mullet (<i>Chelon labrosus</i> (Risso, 1827)), attached at vent/base of the anal fin.	Newlyn harbour (SW4645128545), 28-01-18, Coll. Jenny Kent.	1 large female
<i>Anilocra</i> sp.	On head of Pouting (<i>Trisopterus luscus</i> (Linnaeus, 1758))	Plymouth area, coll. by Fisherman. 04/2014	1 large female
<i>Anilocra</i> sp.	Corkwing Wrasse (<i>Symphodus melops</i> (Linnaeus, 1758))	Hannafore, West Looe, Cornwall, 02/04/2018. Coll. Heather Buttivant.	1 large female, 1 male
<i>Anilocra</i> sp.	Corkwing Wrasse (<i>Symphodus melops</i> (Linnaeus, 1758))	Swanage Pier, Coll. Steve Trewella	1 large female
<i>Anilocra</i> sp.	2-spot goby (<i>Gobiusculus flavescens</i> (Fabricius, 1779))	Kimmeridge Bay, Coll. Steve Trewella	1 male
<i>Anilocra</i> sp.	Ballan Wrasse (<i>Labrus bergylta</i> Ascanius, 1767)	Chesil Bay, Coll. Steve Trewella	1 large female
<i>Anilocra</i> sp.	Pollack (<i>Pollachius virens</i> (Linnaeus, 1758))	Kimmeridge Bay, Coll. Steve Trewella	1 large female, 1 male
<i>Anilocra</i> sp.	Pouting (<i>Trisopterus luscus</i> (Linnaeus, 1758))	Newtons Cove, Coll. Steve Trewella	1 large male

Table 1: Records of UK *Anilocra* and *Nerocila* from photographs & specimens sent to Tammy Horton.

genus level at least (Table 1). Unfortunately, determination to species is not possible in many cases as the necessary features are not visible. A selection of these photographs are included here for reference (Figure 2).

Molecular barcoding

In addition to morphological characterisation of the specimens from the UK for comparison with Mediterranean specimens, we are also extracting DNA from suitable specimens,

which will be used to generate genetic barcodes (cytochrome oxidase 1). This will aid in the confirmation of the identification of these difficult species. Tissue samples from confirmed identified specimens of each of the entities found in the UK and in the Mediterranean are needed in order to determine if these are from the same species or if there are unrecognised cryptic *Anilocra* and *Nerocila* species within the North Atlantic and Mediterranean fauna.

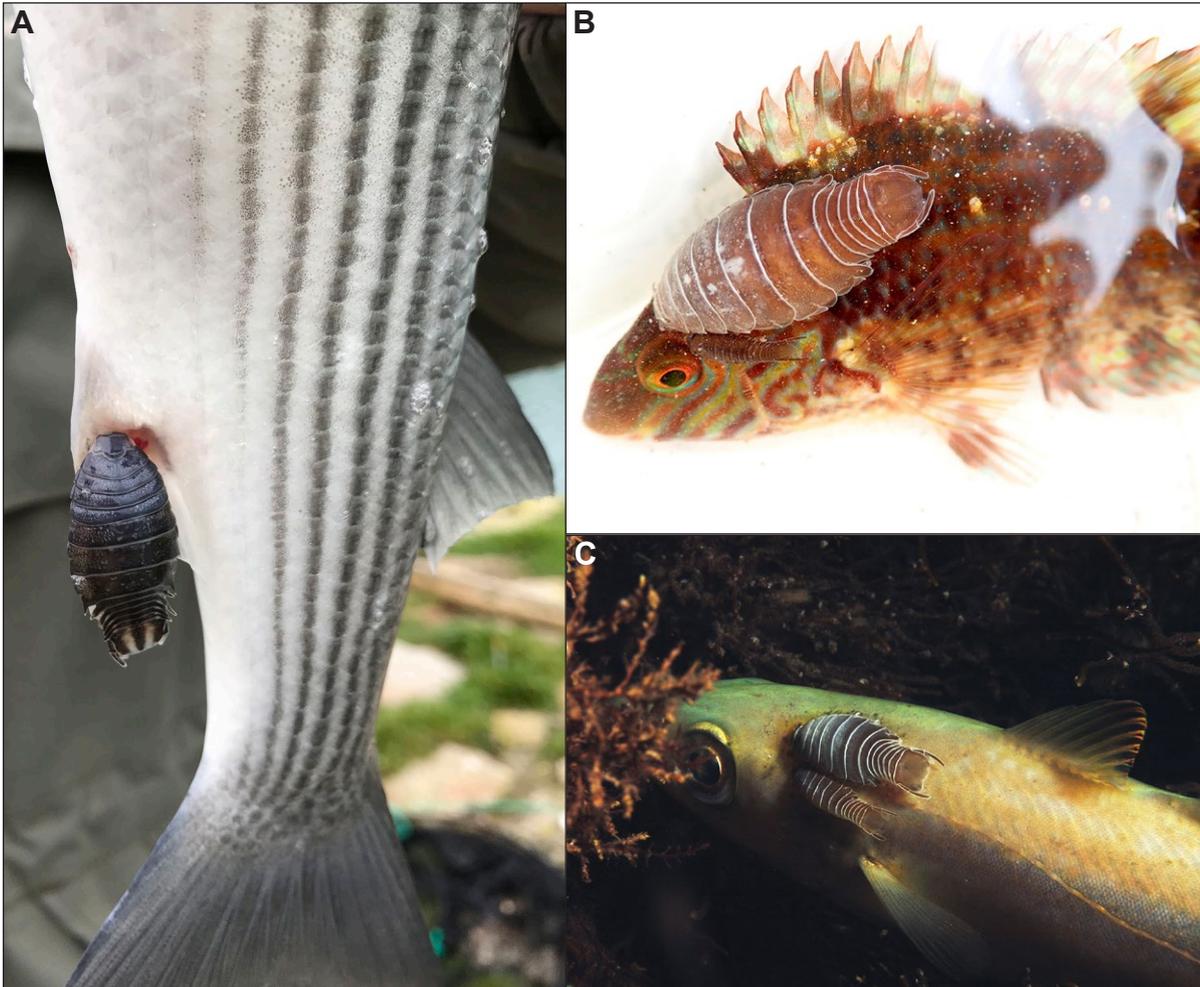


Fig. 2A: *Nerocila* sp. on mullet, Plymouth (Photo: J. Kent); B: *Anilocra* sp. on corkwing wrasse, Hannafore (Photo: H. Buttivant); C: *Anilocra* sp. on pollack, Kimmeridge (Photo: S. Trewelha)

We need as many specimens and records from UK waters as possible. We are particularly interested in obtaining specimens suitable for molecular analyses (in 95% ethanol). If you manage to collect a specimen, please either freeze or place in 95% ethanol and send to Tammy Horton at the National Oceanography Centre, Southampton.

Acknowledgements

Steve Trewella, David Fenwick, Heather Buttivant, Jenny Mallinson, Robin Soames, Jenny Kent and anyone else who has sent specimens and/or photographs over the years.

References

- Bruce, N.L. 1987. Australian species of *Nerocila* Leach, 1818, and *Creniola* n. gen. (Isopoda: Cymothoidae), crustacean parasites of marine fishes. *Records of the Australian Museum* **39**: 355–412.
- Brusca, R.C. 1981. A monograph on the Isopoda Cymothoidae (Crustacea) of the eastern Pacific. *Zoological Journal of the Linnaean Society* **73**: 117–199.
- Guérin-Méneville, F.E. 1832. Crustaces. In: 'Expedition scientifique de Moree, section des Sciences physiques' **3(1)**: 30–50.
- Holthuis, L.B. 1972. De Isopode *Anilocra physodes* (Linnaeus, 1758) voor de Nederlandse kust gevonden. *Zoologische Bijdragen, Leiden* **13**: 21–23.
- Holthuis, L.B. 1978. Cymothoide isopode vande Nederlandse Kust en de zuidelijke moordzee. Bijdragen tot de faunistiek van Nederland. V. *Zoologische Bijdragen, Leiden* **23(3)**: 28–33.

- Horton, T. & Okamura, B. 2002. The distribution of *Ceratothoa steindachneri* (Crustacea: Isopoda: Cymothoidae) parasitic in *Echiichthys vipera* in the north-east Atlantic. *Journal of the Marine Biological Association of the UK* **82**: 415–417.
- Horton, T. 2000. *Ceratothoa steindachneri* (Isopoda: Cymothoidae) new to British waters with a key to north-east Atlantic and Mediterranean *Ceratothoa*. *Journal of the Marine Biological Association of the UK* **80**: 1041–1052.
- Koehler, R. 1885. Contribution à l'étude de la faune littorale des îles anglo-normandes (Jersey, Guernesey, Herm et Sark). *Annales des sciences naturelles. Zoologie* **620(4)**: 1–61.
- Koelbel, K. 1878. Über einige neue Cymothoiden. *Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Klasse der Kaiserlichen Akademie der Wissenschaften* **78(1)**: 401–416.
- Leach, W.E. 1818. Cymothoadées. Cymothoadæ. (Crust.). In: Cuvier, F. (ed.). *Dictionnaire des Sciences Naturelles*, Vol. 12. Strasbourg et Paris: F.G. Levrault et Le Normant. pp 337–354.
- Lincoln, R.J. 1971. Isopod fish parasites. *Marine Observer* **41**: 184–186.
- Linnaeus, C., 1758. *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Editio decima, reformata. Laurentius Salvius: Holmiae. ii, pp. 824.
- Marine Biological Association. 1957. *Plymouth Marine Fauna*. Marine Biological Association of the United Kingdom. Latimer, Trend & Co. Ltd., Plymouth, 457 pp.
- Milne-Edwards, H. 1834-1840. Histoire Naturelle des Crustacés, Comprenant l'Anatomie, la Physiologie et la Classification de ces Animaux. *Encyclopédique Roret, Paris*. Vol. **III**, 638 pp., plates 1–42.
- Norman, A.M. 1868. On two isopods, belonging to the genera *Cirolana* and *Anilocra*, new to the British Islands. *Annals and Magazine of Natural History* **4(2)**: 421–422.
- Norman, A.M. & Scott, T. 1906. *The Crustacea of Devon & Cornwall*. London. 232 pp.
- Schioedte, J.C. & Meinert, F. 1881. Symbolae and Monographiam Cymothoarum Crustaceorum Isopodum Familiae. II. Anilocridae. *Naturhistorisk Tidsskrift Kjøbenhavn*. **12**: 1–166.
- Smit, N.J., Bruce, N.L., & Hadfield, K.A. 2014. Global diversity of fish parasitic isopod crustaceans of the family Cymothoidae. *International Journal for Parasitology: Parasites and Wildlife* **3**: 188–197. doi:10.1016/j.ijppaw.2014.03.004
- Stebbing, T.R.R. 1893. *A History of Crustacea. Recent Malacostraca*. D. Appleton & Company, New York, 466 pp.; 32 figs.; 19 pls.
- Tattersall, W.M. 1905. *The Marine Fauna of the Coast of Ireland. Part V. Isopoda*. Fisheries Ireland, Scientific Investigations, 1904 II 1–90.
- Trilles, J.P. 1965. Sur deux espèces d'Anilocres (Isopodes, Cymothoidae) mal connues: *Anilocra physodes* L. et *Anilocra frontalis* (Milne-Edwards). *Annales de parasitologie humaine et comparée*, **40(5)**: 575–594.
- Trilles, J.P. 1968. *Recherches sur les Isopodes Cymothoidae des côtes Françaises*. PhD Thesis, University of Montpellier, France.
- Trilles, J.P. 1975. Les Cymothoidae (Isopoda, Flabellifera) des côtes françaises. II. Les Anilocridae Schioedte & Meinert. 1881. Genres *Anilocra* Leach, 1818 et *Nerocila* Leach, 1818. *Bulletin du Muséum national d'histoire naturelle* **290**: 347–378.
- Trilles J.P. 1977. Les Cymothoidae (Isopoda, Flabellifera) parasites des poissons du Rijksmuseum van Natuurlijke Historie de Leiden. Méditerranée et Atlantique Nord-Oriental. *Zoologische Mededelingen, Leiden* **52**: 7–17.
- Trilles, J.P. 1994. Les Cymothoidae (Crustacea, Isopoda) du Monde (Prodrome pour une Faune). *Studia Marina*, **21/22**: 1–288.
- Trilles, J.P. & Raibaut, A. 1971. Aegidae et Cymothoidae parasites de poissons de Mer Tunisiens: Premiers resultats. *Bulletin de l'Institut National Scientifique et Technique d'Océanographie et de Pêche de Salammbô* **2**: 71–86.
- Trilles, J.P. & Raibaut, A. 1973. Sur les Cymothoidae (Isopoda, Flabellifera) parasites de poissons marins de Tunisie, 2nd Note. *Bulletin du Muséum national d'histoire naturelle* **3(144)**: 273–281.
- WoRMS Editorial Board (2018). *World Register of Marine Species*. Available from <http://www.marinespecies.org> at VLIZ. Accessed 2018-12-14. doi:10.14284/170