Checklist of marine mammal parasites in New Zealand and Australian waters

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Abstract

Marine mammals are long-lived top predators with vagile lifestyles, which often inhabit remote environments. This is especially relevant in the oceanic waters around New Zealand and Australia where cetaceans and pinnipeds are considered as vulnerable and often endangered due to anthropogenic impacts on their habitat. Parasitism is ubiquitous in wildlife, and prevalence of parasitic infections as well as emerging diseases can be valuable bioindicators of the ecology and health of marine mammals. Collecting information about parasite diversity in marine mammals will provide a crucial baseline for assessing their impact on host and ecosystem ecology. New studies on marine mammals in New Zealand and Australian waters have recently added to our knowledge of parasite prevalence, life cycles and taxonomic relationships in the Australasian region, and justify a first host–parasite checklist encompassing all available data. The present checklist comprises 36 species of marine mammals, and 114 species of parasites (helminths, arthropods and protozoans). Mammal species occurring in New Zealand and Australian waters but not included in the checklist represent gaps in our knowledge. The checklist thus serves both as a guide for what information is lacking, as well as a practical resource for scientists working on the ecology and conservation of marine mammals.

Introduction

In the oceanic waters around New Zealand (NZ) and Australia, marine mammals are considered as vulnerable wildlife and often endangered due to anthropogenic impacts on their habitat. Strandings of these long-lived top predators and often pelagic species are rare and individuals are seldom available for data collection. A recent assessment has shown that the conservation status of NZ marine mammals has not improved (Baker et al., 2010). Furthermore, three endemic NZ marine mammals, i.e. NZ sea lion (Phocarctos hookeri), Hector’s dolphin (Cephalorhynchus hectori hectori) (both endangered) and Maui’s dolphin (Cephalorhynchus hectori maui) (nationally critical) are regarded as threatened. Thirteen taxa are considered data deficient (Baker et al., 2010). Around Australia, at least seven species are classified threatened, among them the iconic blue whale (Balaenoptera musculus), and the conservation status of 25 cetacean species is unknown due to insufficient data (Schumann et al., 2013). Australian and NZ waters include critical feeding and breeding grounds for permanent cetacean residents and visitors that migrate from summer feeding grounds in the Antarctic to the warmer waters of the Australian coast during the winter (Bannister et al., 1996; Salgado Kent et al., 2012). Recent dangers to pinnipeds in Australasian waters include exposure to marine debris and bycatch in fishing gear, which is an acute threat for the endangered Australian sea lion (Neophoca cinerea) (Kovacs et al., 2012) and NZ sea lion (Robertson & Chilvers, 2011). Continuous pressure of anthropogenic impacts such as fisheries, entanglement, vessel strike and chemical and noise pollution has prompted researchers to evaluate the effects of cumulative stress on marine mammals in Oceania and to implement conservation strategies to protect their survival (Kingsford et al., 2009).

Parasitism is ubiquitous in wildlife, and parasites in marine mammals are common. While a certain parasite load may not hamper host physiology, heavy infections can have serious pathogenic effects on host fitness (Measures, 2001; Siebert et al., 2001). Although Australian and NZ waters are a hotspot for marine mammal species richness (Pompa et al., 2011), little is known of their parasite diversity. Parasitic infections, their prevalence and intensity as well as emerging species have proven to be valuable bioindicators of the ecology and health of marine mammals (Siebert et al., 2006; Lehnert et al., 2014), reflecting habitat use (Aznar et al., 1995), diet (Marcogliese, 2002), social behaviour and population dynamics (Balbuena and Raga, 1994), but also as markers for exposure and detrimental effects of xenobiotics (Sures, 2004; Pascual & Abollo, 2005; Marcogliese & Pietrock, 2011). They reveal evolutionary host–parasite relationships and highlight their biogeography and phylogeny over historical timescales (Anderson, 1982; Leidenberger et al., 2014).
2007). In the future, metazoan parasites, emerging infectious diseases and microparasites like viruses may be used as markers for the effects of anthropogenic stress on the health of marine mammals, as their role also as indicators for global change has become evident (Gulland & Hall, 2007; van Bressem et al., 2009). Additionally, some parasites of marine mammals have zoonotic potential, causing public health concerns and economic harm. Both the tapeworm Diphyllobothrium latum and anisakid nematodes (e.g. Anisakis spp., Pseudoterranova spp.) increasingly cause zoonotic infections in humans (Dorny et al., 2009; Shamsi, 2014), and can induce severe gastro-intestinal disease when ingested via undercooked fish (Mattucci et al., 2013; Bao et al., 2017). These parasites are transmitted to their definitive cetacean and pinniped hosts via infective larvae within prey intermediate hosts, while infected fillets cause economic losses for the fishery industries (Llarena-Reino et al., 2015). Zoonotic protozoans like Giardia and Cryptosporidium are significant enteropathogens in NZ, causing higher infection rates than in other developed countries (Britton et al., 2010). Faeces from humans, pets and farm animals are discharged in runoff, bringing encysted parasites to coastal waters. They are filtered and concentrated by invertebrates and consumed by marine mammals, infecting a wide range of hosts, resulting in morbidity and mortality to some species (Fayer et al., 2004).

Collecting information about parasite diversity in marine mammals will provide a crucial baseline for assessing their impact on host and ecosystem ecology (Poulin et al., 2016). Study design in live marine mammals is restricted by legal as well as ethical constraints so that, since the cessation of whaling, data are collected mostly opportunistically from stranded or bycaught individuals. In the oceanic waters of the southern hemisphere, many species are seldom found stranded; therefore, few parasitological records (Berón-Vera et al., 2008; Nikolov et al., 2010) exist. Parasitology increasingly complements marine ecology to further our understanding of ecosystem dynamics (Poulin et al., 2016), but so far, little is known about the biodiversity of Australasian marine parasites (Poulin, 2004; Stockin et al., 2009). New studies on marine mammals in NZ and Australian waters have recently added to our knowledge about parasite prevalence, life cycles (Tomo et al., 2010; Lehnert et al., 2017) and taxonomic relationships (Shamsi et al., 2012, Hernández-Orts et al., 2017), and justify a first host–parasite checklist encompassing all available data. Previous marine mammal parasite checklists include Baylis (1932), Delyamure (1955), Dailey & Brownell (1972), Raga (1994), Felix (2013) and Fraija-Fernández et al. (2016). Most include host data, but geographical data are scanty. Australian lists include that of the internal parasites of mammals by MacKerras (1958), the references of which are unfortunately disconnected from the text and, therefore, not useable, and Arundel (1978), which records parasites found in all marine mammals that are found in Australian waters. This list, however, does not differentiate between parasites found in the host species within Australian waters and those found in the same species in other parts of the world. There are no equivalent lists for the marine mammals of NZ.

A couple of useful lists are available for particular host taxa (e.g. Blair, 1981: dugong monostome digeneans; Bowie, 1984: bottle-nosed dolphin parasites), and parasite taxa (e.g. Price, 1932: trematodes in marine mammals; Leung, 1967: whale lice of cetaceans). There have also been compilations with a veterinary perspective (e.g. Duignan, 2000; Dailey, 2001; Ladds, 2009; McFarlane et al., 2009) and those looking at certain pathologies (e.g. Baylis & Daubney, 1925: lungworms of cetacean; Spratt, 2002: respiratory parasites in Australian mammals; Measures, 2001: lungworms of marine mammals).

Here, we present a host–parasite checklist collating all information about the metazoan and protozoan parasites of marine mammals in NZ and Australian waters. Although viruses (e.g. morbilliviruses) and bacteria (e.g. Brucella) are relevant pathogens with zoonotic potential that can cause mortality in marine mammals (Castinel et al., 2007), we limit our list to the better-known eukaryotic parasites. Where possible, we also identify knowledge gaps and research needs, especially with regard to human interactions and zoonoses, as well as marine mammal conservation.

Material and methods

We present a list of the parasites found in pinnipeds, cetaceans and sirensians of NZ and Australia, as far as possible up to date at the time of publication. The list was assembled from primary publications found through searches on Google Scholar using all combinations of relevant keywords, plus searches of the reference lists in those publications. The parasites are presented in alphabetical order of Families under their relevant Phylum, Class and Order. Within Families, species are listed in alphabetical order. Classifications followed for helminths are: Anderson et al. (2009) (Nematoda); Cairns & Jensen (2017) (Cestoda); Olson et al. (2003), Gibson et al. (2002), Jones et al. (2005) and Bray et al. (2008) (Trematoda); and Amin (2013) (Acanthocephala). For arthropods and protozoa higher taxonomy was taken from the records cited, or from searches for more up-to-date phylogenetic studies. Synonyms are taken from the references in square brackets following the entries, with corrections and updates from primary sources in some cases.

Localities of records are given as indicated in the original source. Standard abbreviations are used for Australian states: New South Wales, NSW; Queensland, QLD; South Australia, SA; Victoria, VIC; Tasmania, TAS; Western Australia, WA; and New Zealand, NZ. We have included only those records that fall within the geographical boundaries of Australia and NZ, and their subantarctic islands. Records for mainland Antarctica have not been included, because there is no geographical distinction between Australian or NZ-held territory, and those territories belonging to other countries. Although there are many records for mainland Antarctica, these are best dealt with as a separate entity.

Where there is more than one reference source, hosts and localities bear a superscript number that refers to the numbered reference. In a few cases, where references cite differing infection sites, these are also numbered with the relevant superscript number. Multiple references are listed in chronological order.

For host taxonomy we have adhered to WoRMS (2018) (Pinnipeda and Cetacea), Berta and Churchill (2012) (Pinnipeda) and Perrin (2018) (Cetacea). Host names listed are considered to be up to date as of publication. Where hosts were named differently in the original source, we have noted this in the relevant Remarks section. Hosts’ common names can be found in the host–parasite list.

The developmental stage of the parasite has been noted, where given in the original source. If such information was not given, worms are assumed to be adult if egg presence is noted or egg measurements are given.

Remarks sections contain information on intermediate hosts when available, notes on prevalence and intensity, and on pathology when available; short summaries of the latest research on disputed or complicated species; and mention of molecular data
if available (i.e. from papers listed in the references and placed on GenBank) with the genetic markers used.
A list of host–parasite associations follows the parasite–host checklist.

Results

Parasite–host list
Phylum: Acanthocephala
Class: Palaeoacanthocephala Meyer, 1931
Order: Polymorphida Petrochenko, 1956
Family: Polymorphidae Meyer, 1931

Parasite name: Bolbosoma balaenae (Gmelin, 1790) Porta, 1908

Synonyms. Bolborhynchus porrigens Porta, 1906; Bolbosoma porrigens (Rudolphi, 1814) Porta, 1908; Echinorhynchus balaenae Gmelin, 1790; E. lendix Phipps, 1774; E. mysticeti Beneden, 1870; E. porrigens Rudolphi, 1819; Sipunculus lendix Phipps, 1774 [Amin, 2013; Yamaguti, 1963].

Hosts. Megaptera novaeangliae. Localities. Bondi Beach, NSW.
Infection site. Intestine.
Stage. Adult.
References. (1) Johnston & Edmonds (1953); (2) Edmonds (1955); (3) Edmonds (1957a); (4) Johnston & Best (1942); (5) Smales (1986).
Remarks. Host reported as prob-
Hosts. Phocarctos hookeri.
Locality. Auckland/Campbell Island, NZ.
Infection site. Stomach.
Stage.
References. Johnston & Edmonds (1953).
Remarks. Host called Otaria hookeri in this paper.

Parasite name: Corynosoma sp.

Synonyms.

Hosts. Arctophoca australis forsteri (2), Cephalorhynchus hectori (3), Delphinus delphis (1), Hydrurga leptonyx (2), Neophoca cinerea (4).
Locality. (1) St. Vincent Gulf, SA; (2) Auckland/Campbell Island, NZ; (3) Canterbury coast, NZ; (4) Port Adelaide, SA.

Remarks. The specimens of Johnston and Deland (1929) were later designated as C. cetaceum (Johnston & Best, 1942). Host called Otaria forsteri in Johnston and Edmonds (1953). McKenzie & Blair (1983) reported finding seven specimens in one of three dolphins.

Phylum: Nemathelminthes
Class: Nematoda Rudolphi, 1808
Order: Ascaridida Sprehn, 1927
Class: Nematoda Rudolphi, 1808

Parasite name: Anisakis berlandii Mattiucci, Nasceetti, Cianchi, Paggi, Arduino, Margolis, Brathey, Webb, D’Amelio, Orecchia & Bullini, 1997

Synonyms. Anisakis simplex C, of Mattiucci et al. (1997).
Hosts. Kogia sima.
Locality. Coast of NSW.
Infection site. Stomach.
Stage. Larva.
References. Shamsi et al. (2012).

Remarks. Molecular data available (ITS1&2). The specimens in this paper referred to as A. simplex C following Mattiucci et al. (1997) were later assigned to A. berlandii by Mattiucci et al. (2014).

Parasite name: Anisakis brevispiculata Dollfus, 1966

Synonyms.

Hosts. Kogia sima.
Locality. Coast of NSW.
Infection site. Stomach.
Stage. Adult.
References. Shamsi et al. (2012).

Remarks. Molecular data available (ITS1&2).

Parasite name: Anisakis nascetti Mattiucci, Paoletti & Webb, 2009

Synonyms. Anisakis sp. of Pontes et al. (2005) and Iglesias et al. (2008); Anisakis sp. of Valentini et al. (2006).
Hosts. Mesoplodon bowdoini, M. grayi, M. layardii.

Locality. South Pacific Ocean, off NZ.
Infection site. Stomach.
Stage. Adult.
References. Mattiucci et al. (2009).

Remarks. Molecular data available (cox2). The intermediate host was confirmed molecularly as the squid, Onykiaps ingens by Mattiucci et al. (2009) (then Moroteuthis ingens).

Parasite name: Anisakis oceanica (Johnston & Mawson, 1951) Davey, 1971

Synonyms. Stomachus oceanicus Johnston & Mawson, 1951.
Hosts. Globicephala melas.
Locality. Coast of NSW.
Infection site. Stomach.
Stage.
References. Johnston & Mawson (1951).

Remarks. Described as S. oceanicus in this paper, with the host called Globicephalus ventricosus. Davey (1971) synonymized this species with A. physeteris, but Shamsi et al. (2012) and Shamsi (2014) have kept the species separate as a sp. mag. Species is also accepted by Mattiucci et al. (2003).

Parasite name: Anisakis pegreffii Campana-Rouget & Biocca, 1955

Synonyms.

Hosts. Delphinus delphis, Tursiops truncatus.
Locality. Blaigowrie and Apollo Bay, VIC.
Infection site. Stomach.
Stage. Adult plus immatures in D. delphis, larvae in T. truncatus.
References. Shamsi et al. (2012).

Remarks. Molecular data available (ITS1&2).

Parasite name: Anisakis physeteris Baylis, 1923

Synonyms. Anisakis skrabini Mozgovoi, 1949 [WoRMS].
Hosts. Kogia breviceps.
Locality. Wellington Beach, NZ.
Infection site. Stomach.
Stage.
References. Hurst (1980).

Remarks. A single host harboured 61 specimens.

Parasite name: Anisakis simplex sensu lato

Synonyms. Anisakis catodontis Baylis, 1929; A. ivanizkii Mozgovoi, 1949; A. kogiae Johnston & Mawson, 1939; A. kuekenthalii (Cobb, 1889) Baylis, 1920; A. marina (Linnaeus, 1767) van Thiell, 1966; A. patagonica (von Linstow, 1880) Davey, 1971; A. rosmari (Baylis, 1916) Baylis, 1920; A. similis (Baird, 1853) Baylis, 1920; A. simplex (Rudolph, 1809) Dujardin, 1845; A. tridentata Kreis, 1859; A scarsus kuekenthalii Cobb, 1888; A. similis Baird, 1853; C ephalus marina (Linnaeus, 1767) Johnston & Mawson, 1943; A similis (Baird, 1853) Davey, 1971 and many more [WoRMS; Davey 1971].

Hosts. Arctophoca australis forsteri (11), Delphinus delphis (2), Globicephala melas (14), Hydrurga leptonyx (2, 5, 6), Kogia breviceps (1, 11), Lagenodelphis hosei (12), Lagenorhynchus obscurus (3, 7), Mirounga leonine (4, 6, 9, 10), Peponocephala electra (8), Tursiops truncatus (13).
Localities. (1) Port Victoria, Spencer Gulf, SA; (1) Moreton Bay, QLD; (2) Sydney Harbour, NSW; (2) Port Adelaide, SA; (3) Cook Strait, NZ; (4, 6, 9) Macquarie Island, TAS; (5) Campbell Island, NZ; (6) Heard Island, Australia; (7) NZ coast; (8) Moreton Island, QLD; (8) Tweed Heads, NSW; (10) in captivity, NZ; (11) Wellington Beach, NZ; (12) Corio Bay, VIC; (13) Otago Harbour, NZ; (14) McIntyre’s Beach, Falmouth, and Macquarie Harbour, TAS.

Infection site. Stomach.

Stage. All stages are reported from larvae to adults.

References. Johnston & Mawson (1939), (2) 1941, (3) 1942, (4) 1945, (5) 1953; (6) Mawson (1953); (7) Brundson (1956); (8) Cannon (1977); (9) Morgan et al. (1978); (10) Cordes & O’Hara (1979); (11) Hurst (1980); (12) McColl & Obendorf (1982); (13) Bowie (1984); (14) McManus et al. (1984).

Remarks. *Anisakis simplex* is widely accepted to be a complex of closely related species (Nascetti et al., 1986; Mattiucci et al., 1997, 2009, 2014; D’Amelio et al., 2000; Abe et al., 2006; Abe, 2008), and the name has been attached to the species world over and in numerous hosts. Davey (1971) alone lists 34 different hosts from both Cetacea and Pinnipedia. While it is not possible to assign specimens reported in the literature over the years, Mattiucci et al. (2014) have made wide inroads into resolving some of the ambiguity. As a result of their findings, it is likely that at least some of those specimens found in NZ will be their newly erected *A. berlandi* Mattiucci, Cipriani, Webb, Paololetti, Marcerc, Bellissario, Gibson & Nascetti, 2014 (see entry for *Anisakis berlandi* above). Without further information, or examining each of the specimens mentioned in the literature, we here assign all references to *A. simplex* in the Australasian region, except those of Mattiucci et al. (2014), which have been characterized to *A. simplex sensu lato*. *Anisakis simplex* has been shown to occur as a larva in many species of fish under various names (Johnston & Mawson, 1943a, b, 1945, 1951, 1953). Brundson (1956) was able infect eels with encapsulated *A. simplex* from barracouta, where they re-established, demonstrating that horizontal infection is possible. This is not surprising in a system where the species complex appears to be highly generalist in its choice of host and where there exists a cascade in size of predatory fish. The larva must be able to withstand being eaten by a succession of fish before being finally taken by a cetacean, where it can mature in the stomach. Hurst (1980) completed the life cycle of *A. simplex* with *Nectophanes australis* (first intermediate host), large fish – for example, *Thrysites attu*, *Trachurus* sp. (second intermediate host) – and squid or small fish – for example, hoki, anchovy, sprat (paratenic host). While host specificity does appear extremely broad when all reports are taken into account, this effect may be exaggerated by the fact that *A. simplex* is, in fact, many cryptic species that are yet to be fully disentangled. In the above references the species is called *A. kogiae* (1), *A. similis* (2), *S. marinus* (7) and *S. similis* (4, 6). Host species are called *D. forsteri* (2). In the literature cited in this section, the maximum number of worms per infection amounted to several hundred (13). The species is widely reported to cause gastric ulceration and, according to some sources, mortality (10, 11).

Parasite name: *Anisakis sp.*

Synonyms.

*Hosts.* Arctocephalus pusillus doriferus (1), *Arctocephala australis forsteri* (2), Balaneoptera acutorostrata (3), Globicephalus melas (6), *Kogia breviceps* (7), Mesoplodon grayi (5), *M. hectori* (4), Phocoena dioptrica (7).

Localities. (1) Franklin Island Derwent Heads, TAS; (2) in captivity, NZ; (3) Pigeon Bay, Banks Peninsula, NZ; (4) Oneroa Bay, Waiheke Island Hauraki Gulf, NZ; (5) NZ coast; (6) Farewell Spit, Golden Bay, NZ; (7) Moeraki Beach, NZ; (7) Caroline Bay, Timaru, NZ.

Infection site. Stomach and intestine. *Mouth (K. breviceps).*

Stage. Larva, immature, adult.

References. (1) Johnston & Mawson (1941); (2) Cordes & O’Hara (1979); (3) Dawson & Slooten (1990); (4) Baker et al. (2001); (5) Valentini et al. (2006); (6) Beatson & O’Shea (2009); (7) Lehner et al. (2017).

Remarks. Molecular data available (cox2) (5). The specimens from Grey’s beaked whale (Valentini et al., 2006) grouped with some from the South African coast, also unnamed. They were closest to *Anisakis ziphideraum* in phylogenetic analyses. A lack of adult specimens limited the morphological description and proper naming of this new species. Type 1 larvae were identified from *Aphanopus carbo* (black scabbard fish) from Madeira and from *Trachurus trachurus* (Atlantic horse mackerel) from the North Atlantic. The host in Johnston & Mawson’s (1941) report is called *Gypsophoca tasmanica.*

Parasite name: *Anisakis typica* (Diesing, 1860) Baylis, 1920

Synonyms. *Anisakis alexandri* Hsü & Hoepli, 1933; *A. tursiopis* Crusz, 1946; *Ascaris typica* (Diesing, 1860) Jägerskiöld, 1894; *Conocephalus typicus* Diesing, 1860; *Peritracheilus typicus* (Diesing, 1860) Jägerskiöld, 1894 (WoRMS; Li et al., 2016).

*Hosts.* *Pepenosephula elegans.*

Localities. Moreton Island, QLD; Tweed Heads, NSW.

Infection site. Stomach.

Stage. Adults and immatures.

References. Cannon (1977).

Remarks. Shamsh (2014) note that *A. typica* specimens in Australia appear to be genetically different from those reported in other countries. Jabbar et al. (2012) found larval stages (confirmed by DNA sequence) in a number of different fish species.

Parasite name: *Anisakis ziphideraum* Paggi, Nascetti, Webb, Mattiucci, Cianchi & Bullini, 1988

Synonyms.

*Hosts.* Mesoplodon bowdoini.

Localities. South Pacific Ocean, off NZ.

Infection site. Stomach.

Stage. Adult.

References. Mattiucci et al. (2009).

Remarks. Molecular data available (cox2).

Parasite name: *Contracaecum mirounga* Nikolskii, 1974

Synonyms.

*Hosts.* Hydrurga leptonyx, *Mirounga leonina.*

Localities. Heard Island and Macquarie Island, Australia.

Infection site. Stomach.

Stage.

References. Fagerholm (1988).

Remarks. Using the arrangement of the male caudal papillae, this study found that *C. mirounga* was restricted to southern waters.
Parasite name: *Contracaecum ogmorhini* Johnston & Mawson, 1941

**Synonyms.** *Contracaecum corderoi* Lent & Freitas, 1948; *C. ogmorhini* Johnston & Mawson, 1941 (*lapsus*); *C. osculatum* of Flores-Barroeta et al., 1961 [Fagerholm & Gibson, 1987].

**Hosts.** *Arctocephalus pusillus doriferus* (2), *Hydrurga leptonyx* (1).

**Locality.** (1) Port Adelaide, SA; (2) coast of NZ.

**Infection site.** Stomach.

**Stage.** Adult.

**Remarks.** Molecular data available (*cytb*) (2). Described as new species in Johnston & Mawson (1941), but with a lapsus in the main heading of ‘ogmorhini’. Has been accepted as *ogmorhini* ever since.

Parasite name: *Contracaecum osculatum* (Rudolphi, 1802)

Baylis, 1920

**Synonyms.** *Ascaris osculata* Rudolphi, 1802; *C. antarcticum* Johnston, 1937; *C. gypsophoca* Johnston & Mawson, 1941; *Phocascaris hydruraga* Johnston & Mawson, 1941 [WoRMS].

**Hosts.** *Arctocephalus pusillus doriferus* (3), *Arctophoca australis forsteri* (3, 5, 6), *Mirounga leonine* (2, 3), *Neophoca cinerea* (3, 4), *Neohiphoca cinerea* (1).

**Locality.** (1) Pearson Island, SA; (2) Port Adelaide, SA; (3) Franklin Island Derwent Heads, TAS; (3, 4) Macquarie Island, TAS; (3) Heard Island, Australia; (5) in captivity, NZ; (6) Open Bay Island, Wellington, NZ.

**Infection site.** Stomach and small intestine.

**Stage.** Adults and immatures.

**References.** (1) Johnston (1937); (2) Johnston & Mawson (1941); (3) Mawson (1953); (4) Morgan et al. (1978); (5) Cordes & O’Hara (1979); (6) Hurst (1980).

**Remarks.** Described as new species, *C. gypsophoca* and as *P. hydruraga* in Johnston & Mawson (1941). Both synonymized by Johnston & Mawson (1945). Original host recorded as *Gypsohoca tasmanica*. Hosts recorded as *Arctocephalus forsteri* (5, 6). Johnston’s (1937) original description stated the host as *A. forsteri*, but this was corrected to *N. cinerea* in Johnston and Best (1942). Hurst (1980) recorded 100% prevalence for this anisakid in the NZ fur seal. They found an infection range of 5–344 in the seals examined, and the presence of *C. osculatum* was associated with gastric ulcers.

Parasite name: *Contracaecum radiatum* (von Linstow, 1907)

Baylis 1920

**Synonyms.** *Ascaris falcigera* Railliet & Henry, 1907; *A. oesulaia* von Linstow, 1892; *A. radiata* von Linstow, 1907; *Contracaecum falcigerum* (Railliet & Henry, 1907) Baylis, 1920; *Kathleena radiata* Leiper & Atkinson, 1915 [WoRMS; Baylis 1937].

**Hosts.** *Hydrurga leptonyx*, *Mironga leonine*.

**Locality.** Heard Island, Australia.

**Infection site.** Stomach.

**Stage.**

**References.** Mawson (1953).

**Remarks.**

Parasite name: *Contracaecum sp.*

**Synonyms.**

**Hosts.** *Cephalorhynchus hectori.*

**Locality.** Canterbury coast, NZ.

**Infection site.** Stomach.

**Stage.**

**References.** McKenzie & Blair (1983).

**Remarks.**

Parasite name: *Phocascaris sp.*

**Synonyms.**

**Hosts.** *Cephalorhynchus hectori.*

**Locality.** Canterbury coast, NZ.

**Infection site.** Stomach.

**Stage.** Immature.

**References.** McKenzie & Blair (1983).

**Remarks.**

Parasite name: *Pseudoterranana decipiens* (Krabbe, 1878)

Gibson, 1983

**Synonyms.** *Agamonema piscium* Schneider, 1862; *Ag. campbelli* Chatin, 1885; *Ascaris bulbosa* Cobb, 1888; *A. capsularia* Stiles and Hasall, 1899, in part; *A. decipiens* Krabbe, 1878; *A. rectangula* Linstow, 1888; *A. simplex* von Linstow, 1888; *Phocanema decipiens* (Krabbe, 1878) Myers, 1959; *Physaloptera guari Garin, 1913; Porrocaecum decipiens* (Krabbe, 1878) Baylis, 1920; *Por. piscium* Johnston & Mawson, 1943; *Por. capsularia* Dogiel, 1932; *Terranana decipiens* (Krabbe, 1878) Mozgovoi, 1953; *T. piscium* (Rudolphi, 1809) Johnston and Mawson, 1943 [Johnston & Mawson, 1945; Myers, 1959].

**Hosts.** *Arctophoca australis forsteri* (3, 5), *Hydrurga leptonyx* (3, 4), *Miroguna leonine* (2, 3), *Kogia breviceps* (5), *Phocarctos hookeri* (1, 3, 5).

**Locality.** (1, 3) Campbell Island, NZ; (2) Macquarie Island, TAS; (3, 5) Auckland Island, NZ; (5) Wellington Beach, NZ.

**Infection site.** Stomach.

**Stage.** Adult plus immatures.

**References.** (1) Johnston & Mawson (1943a); (2) Johnston & Mawson (1945); (3) Johnston & Mawson (1953); (4) Mawson (1953); (5) Hurst (1980).

**Remarks.** Mawson (1953) reported a prevalence of seven out of nine leopard seals from Macquarie Island. Hurst reported a range of infection between one and 122 per host animal. Hurst’s (1980) data include both pinniped and cetacean hosts. Johnston & Mawson (1943a) referred to this species as *Por. decipiens* (Krabbe, 1878) Baylis, 1920 and (1945, 1953) *T. piscium*. Various fish are recorded as intermediate hosts; *Thyrsites atun* (5), notothenioid species (1, 3) and the flounder *Rhomboidea* sp. (3). Hosts variously called *Arctocephalus hoo-keri* (1), *Otaria forsteri* (3), *O. hookeri* (3). Mawson (1953) also reported this species from the Royal penguin *Eudyptes schlegeli* Finsch, 1876.
Parasite name: *Pseudoterranova kogiae* (Johnston & Mawson, 1939) Mozgovoi, 1951

**Synonyms.** *Porococecum kogiae* Johnston & Mawson, 1939; *Terranova kogiae* (Johnston & Mawson, 1939) Johnston & Mawson, 1945 [Johnston & Mawson, 1945; Deardorff & Overstreet, 1981].

**Hosts.** *Kogia breviceps* (1, 2).

**Locality.** (1) Port Victoria, Spencer Gulf, SA and Moreton Bay, QLD; (2) Wellington Beach, NZ.

**Infection site.** Stomach.

**Stage.** Adults and larvae.

**References.** (1) Johnston & Mawson (1939); (2) Hurst (1980).

**Remarks.** Called *P. kogiae* in Johnston & Mawson (1939).

**Family.** : Acuariidae Railliet, Henry & Sisoff, 1912

**Order.** : Spirurida Chitwood, 1933

**Synonyms.** *Acuaria* sp.

**Hosts.** *Cephalorhynchus hectori*.

**Locality.** Canterbury coast, NZ.

**Infection site.** Stomach.

**Stage.** Larva.

**References.** McKenzie & Blair (1983).

**Remarks.** A single specimen was found in one of three dolphins.

**Family.** : Ascarididae Baird, 1853

**Parasite name: Paradujardinia halicoris** (Owen, 1833) Travassos, 1933

**Synonyms.** *Ascaris dugonis* Brandt, 1846; *A. halichoris* Owen, 1833; *Dujardinia halicoris* (Owen, 1833) Baylis, 1920; *Dujardiniscaris halicoris* (Owen, 1833) Baylis, 1947 [Sprent, 1980].

**Hosts.** *Dugong dugon* (1–4).

**Locality.** (1) Wallum Creek, North Stradbroke Island, QLD; (2) Yarrabah, near Cairns, QLD; (3) north coast of QLD; (4) coast of QLD.

**Infection site.** Stomach and intestine.

**Stage.** Adults and immatures.

**References.** (1) Drexler & Freund (1906); (2) Johnston & Mawson (1941); (3) Sprent (1980); (4) Owen et al. (2012).

**Remarks.** Johnston & Mawson (1941) called their specimens *Dujardinia halicoris*. Owen et al. (2012) reported the presence of 5500 to 6000 worms in a single dugong, with the massive impaction possibly the cause of death of the individual.

Order: Spirurida Chitwood, 1933

Family: : Ascarididae Baird, 1853

**Parasite name: Acuaria sp.**

**Synonyms.**

**Hosts.** *Cephalorhynchus hectori*.

**Locality.** Canterbury coast, NZ.

**Infection site.** Stomach.

**Stage.** Larva.

**References.** McKenzie & Blair (1983).

**Remarks.** A single specimen was found in one of three dolphins.

**Family.** : Gnathostomatidae Railliet, 1895

**Parasite name: Echinocephalus overstreeti** Deardorff & Ko, 1983

**Synonyms.**

**Hosts.** *Delphinus delphis*.

**Locality.** St. Vincent Gulf, SA.

**Infection site.** Intestine.

**Stage.** Immature.

**References.** Johnston & Mawson (1941).

**Remarks.** This species is usually found as adults in elasmobranchs, with the larval stages in molluscs and teleosts. This finding of a larval stage in the intestine of a dolphin almost certainly represents an accidental infection from predation on a paratenic fish host. Johnston and Mawson (1941) listed this as *Echinocephalus uncinatus* Molin, 1858. However, Beveridge (1987) showed that all adult and larval specimens found in elasmobranchs in Australian waters belonged to *E. overstreeti*, and that earlier records of *E. uncinatus* can probably be attributed to *E. overstreeti*. Moravec and Justine (2006), however, questioned this decision.

**Family.** : Tetrameridae Travassos, 1914

**Parasite name: Crassicauda boopis** Baylis, 1920

**Synonyms.** *Crassicauda pacifica* Margolis & Pike, 1955 [WoRMS].

**Hosts.** *Ziphius cavirostris*.

**Locality.** Kiritehere Beach, Purakanui Bay, Mahia Peninsula, NZ.

**Infection site.** Kidneys.

**Stage.** Adult.

**References.** Duignan (2003).

**Remarks.** *Crassicauda boopis* is recorded as pathogenic in this paper. The worms destroy functional renal elements and cause physical obstruction of the urinary ducts, likely causing renal failure in some cases.

**Family.** : Crassicaudidae Mawson, 1939

**Parasite name: Crassicauda grampicola** Johnston & Mawson, 1941

**Synonyms.**

**Hosts.** *Grampus griseus*.

**Locality.** Manley, NSW.

**Infection site.** Pterygoid sinus.

**Stage.** Adults and immatures.

**References.** Johnston & Mawson (1941).

**Remarks.**

**Family.** : Crassicaudidae Mawson, 1939

**Parasite name: Crassicauda magna** Johnston & Mawson, 1939

**Synonyms.**

**Hosts.** *Kogia breviceps* (1, 2).

**Locality.** (1, 2) Moreton Bay, QLD; (1) Port Victoria and Spencer Gulf, SA.

**Infection site.** Subcutaneous tissue and connective tissue of neck.

**Stage.** Adult.
**Parasite name: Uncinaria hamiltoni** Baylis, 1933

**Synonyms.**
Hosts. Neophoca cinerea.
Locality. Kangaroo Island, SA.
Infection site.
Stage.
References. Beveridge (1980).
Remarks. Uncinaria hamiltoni sensu Beveridge (1980) should be treated as a synonym of *U. sanguinis* (Professor Ian Beveridge, pers. comm.).

**Parasite name: Uncinaria sanguinis** Marcus, Higgins, Slapeta & Gray, 2014

**Synonyms.**
Hosts. Neophoca cinerea (1, 2).
Locality. (1, 2) Dangerous Reef, Spencer Gulf, SA; (1) South Page Island, Backstairs Passage, SA; (1, 2) Seal Bay, Kangaroo Island, SA.
Infection site. Intestine.
Stage. Adults and immatures.
References. (1) Haynes et al. (2014); (2) Marcus et al. (2014).
Remarks. Molecular data available (*cox1*) (1). Haynes et al. (2014) found that all pups examined were infected and that the infection route was trans-mammary. They also found that hookworms were genetically highly variable, but female host natal site fidelity and the transmammary route of infection do not restrict hookworm gene flow between *N. cinerea* populations.

**Parasite name: Uncinaria sp.**

**Synonyms.**
Hosts. Phocarctos hookeri (1, 2, 4, 5), Arctophoca australis forsteri (3, 7), Neophoca cinerea (6, 7).
Locality. (1, 2) NZ; (3) Ohau Point, Kaikoura, NZ; (4, 5) Sandy Bay, Enderby Island, Auckland Island, NZ; (6) Adelaide Zoo, SA; (7) Kangaroo Island, Dangerous Reef, Spencer Gulf, SA.
Infection site. Stomach, intestine.
Stage. Adults and immatures.
References. (1) Duignan (1998); (2) Duignan (2000); (3) Boren (2005); Castinel et al. (4) 2006, (5) 2007; (6) I. Beveridge in Ladds 2009; (7) Ramos et al. (2013).
Remarks. Molecular data available (ITS1&2) (7). Hookworms are the cause of haemorrhagic enteritis and are the main cause of death to pups in some seasons and localities. Sources report up to 7000 worms in a single pup. Route of infection is trans-mammary and worms develop into adults within three weeks of infection (4). Castinel et al. (2006) found a high level of size variability within adult worm populations in a single host. We suspect that most or all of the specimens reported in these papers could be referred to *U. sanguinis* or to the unnamed species of Nadler et al. (2013) in the following.

**Parasite name: Uncinaria sp. NZSL of Nadler et al., 2013**

**Synonyms.**
Hosts. Phocarctos hookeri.
Locality. Sandy Bay Beach, Enderby Island, NZ.
Infection site.
Stage.
References. Nadler et al. (2013).
Remarks. Nadler et al. (2013). Molecular data available (ITS1&2, 28S, 12S). The phylogeny of Nadler et al. (2013) included *Uncinaria* spp. from pinniped hosts worldwide and recovered seven independent evolutionary lineages or species, including the two described species (*U. hamiltoni* and *U. lucasi*) and five undescribed species, each from a different host. *Uncinaria* sp. NZSL was restricted to the NZ sea lion. Note, however, that Ramos et al. (2013) concluded that the three species found in Australian hosts *A. p. doriferus*, *A. forsteri* and *N. cinerea* were not distinguishable.

**Parasite name: Uncinaria sp. AFS of Nadler et al., 2013**

**Synonyms.**
Hosts. Arctocephalus pusillus doriferus (1, 2).
Locality. (1, 2) Lady Julia Percy Island and Seal Rocks, Phillip Island, VIC; (2) Kanowna Island, VIC.
Infection site.
Stage.
References. (1) Nadler et al. (2013); (2) Ramos et al. (2013).
Remarks. Molecular data available (ITS1&2, 28S, 12S) (1, 2).
Although not explicitly stated in their paper, we understand that the specimens from *A. p. doriferus* of Ramos et al. (2013) are the same as those of Nadler et al. (2013) from the same host.
Family: Filaroididae Schultz, 1951

**Parasite name: *Parafilaroides decorus* Dougherty & Herman, 1947**

Synonyms.

Hosts. *Phocarctos hookeri*.

Locality. NZ.

Infection site. Lungs.

Stage. Adult.

Remarks. Duignan (2000).

**Parasite name: *Parafilaroides hydrurgae* Mawson, 1953**

Synonyms.

Hosts. *Hydrurga leptonyx*.

Locality. Heard Island, Australia.

Infection site. Lungs and bronchi.

Stage. Adult.

Remarks. Mawson (1953).

**Parasite name: *Parafilaroides normani* Dailey, 2009**

Synonyms.

Hosts. *Arctocephalus pusillus doriferus* (1, 2), *Arctophoca australis forsteri* (1).

Locality. (1) Dog Beach, Ocean Grove, VIC; (1) Foxton Beach, Palmerston North, NZ; (2) Phillip Island, VIC.

Infection site. Lungs.

Stage. Adult.

Remarks. Molecular data available (mitochondrial genome) (2).

**Parasite name: *Parafilaroides sp.***

Synonyms.

Hosts. *Arctocephalus pusillus doriferus* (3), *Arctophoca australis forsteri* (2, 3), *Delphinus delphis* (4), *Hydrurga leptonyx* (3), *Neophoca cinerea* (1).

Locality. (1) Dangerous Reef, Spencer Gulf and Seal Bay, Kangaroo Island, SA; (2) Ohau Point, Kaikoura, NZ; (3) Cape Woollamai and Ocean Grove, VIC; (3) Taranaki Bight, NZ; (3) Geelong, VIC; (4) coast of NZ.

Infection site. Lungs.

Stage. Adults and larvae.

Remarks. Molecular data available (ITS1&2, 28S, 12S) (1, 2).

**Parasite name: *Pharurus alatus***

Synonyms. "Prosthecosacter alatus" Hassall, 1905

Hosts. *Delphinus delphis* (Leuckart, 1848) Yorke & Maplestone, 1926; *Stenella coeruleoalba* (Leuckart, 1848) Diesing, 1851; *Tursiops truncatus* (Leuckart, 1848) Diesing, 1851; *Tursiops truncatus* (Leuckart, 1848) Diesing, 1851; *Tursiops truncatus* (Leuckart, 1848) Diesing, 1851; *Hydrurga leptonyx* (Leuckart, 1848) Yorke & Maplestone, 1926; *Pharurus alatus* (Leuckart, 1848) Stiles & Hassall, 1905

Locality. (1) Macquarie Island, TAS; (2) Possession Island, QLD and Lady Julia Percy Island, VIC.

Infection site. Lungs.

Stage. Adult.

References. (1) Nadler et al. (2013); (2) Ramos et al. (2013).

Remarks. Molecular data available (ITS1&2, 28S, 12S) (1, 2). Although not explicitly stated in their paper, we understand that the specimens from *M. leonina* of Ramos et al. (2013) are equivalent to those of Nadler et al. (2013) from the same host.

Family: Pseudaliidae Railliet & Henry, 1909

**Parasite name: *Halocercus lagenorhynchi* Baylis & Daubney, 1925**

Synonyms.

Hosts. *Delphinus delphis* (2), *Tursiops aduncus* (2), *Tursiops truncatus* (1).

Locality. (1) Encounter Bay, SA; (2) coast of SA.

Infection site. Lungs.

Stage. Adult.

References. (1) Johnston & Mawson (1941); (2) Tomo et al. (2010).

Remarks. Tomo et al. (2010) report ‘necrotic microabscesses, in serious acute to chronic infections, lung function would have been compromised’ in lungworm infections of dolphins, ‘moderate and heavy burdens may have contributed to animals’ deaths.’ Predominantly calves and juveniles were infected. During the 18-year study, the prevalence of lung nematode infections increased in 2005–2006 fourfold from 14% before the outbreak to 63% in short-beaked common dolphins; some cases were also recorded in Indo-Pacific bottlenose dolphins and common bottlenose dolphins.

**Parasite name: *Halocercus delphini* Baylis & Daubney, 1925**

Synonyms.

Hosts. *Stenella coeruleoalba*.

Locality. Carter’s Beach, Te Akau, NZ.

Infection site. Lungs.

Stage. Adult.

References. Lehnert et al. (2017).

Remarks.

**Parasite name: *Halocercus sp.***

Synonyms.

Hosts. *Cephalorhynchus hectori* (1, 2), *Delphinus delphis* (3), *Stenella coeruleoalba* (3).

Locality. (1) Canterbury coast, NZ; (2) NZ; (3) Kawaa Kawaa Bay, NZ; (3) Muriwai Beach, NZ.

Infection site. Lung.

Stage. Adult.

References. (1) McKenzie & Blair (1983); (2) Duignan (2000); (3) Lehnert et al. (2017).

Remarks.

**Parasite name: *Pharurus alatus* (Leuckart, 1848) Stiles & Hassall, 1905**

Synonyms. *Prosthecosacter alatus* (Leuckart, 1848) Diesing, 1851; *Pseudalius alatus* (Leuckart, 1848) Diesing, 1851; *Stenurus alatus* (Leuckart, 1848) Yorke & Maplestone, 1926; *Strongylus
alatus Leuckart, 1848; Str. (Pharusurus) alatus (Leuckart, 1848)
Diesing, 1851; Torynurus alatus (Leuckart, 1848) Delyamure, 1952 [WoRMS; Baylis 
& Daubney, 1925].
Hosts. Delphinus delphis.
Locality. Coast of SA.
Infection site. Lungs.
Stage.
References. Tomo et al. (2010).
Remarks.

Parasite name: Skrjabinalius cryptocephalus Delyamure, 1942

Synonyms.
Hosts. Tursiops truncatus.
Locality. Otago Harbour, NZ.
Infection site. Lungs.
Stage.
References. Bowie (1984).
Remarks. The anterior end of this nematode was tightly knotted, embedded in the parenchyma of the lung and surrounded by purulent fluid in a fibrous or calcified capsule (Bowie, 1984).

Parasite name: Stenurus globicephalae Baylis & Daubney, 1925

Synonyms.
Hosts. Globicephala melas (3, 5), Globicephala sp. (1), Grampus griseus (4), Peponocephala electra (2).
Locality. (1) Prosperine, QLD; (2) Moreton Island and Tugun Beach, QLD; (3) McIntyres Beach, Falmouth, TAS; (4) NSW; (5) Big River, Kahurangi National Park, NZ; (5) Kaka Point, NZ.
Infection site. Guttural pouch, ear canals, auditory sinuses.
Stage. Adult.
References. (1) Arnold in Cannon (1977); (2) Cannon (1977); (3) McManus et al. (1984); (4) J. Boulton in Ladds (2009); (5) Lehnert et al. (2017).
Remarks. Molecular data available (ITS2) (5). McManus et al. (1984) reported ‘huge masses of worms: average 2300, range 1140–4200 per ear’ in the lead bulls, and their data led them to conclude that this auditory parasitism played a significant role in the mass stranding of 183 pilot whales on this occasion. However, a study on by-caught porpoises with good nutritional status has revealed high loads of Stenurus minor, with no apparent effect on echo-location or hunting ability, and no pathological changes (Faulkner et al., 1998). Another recent study on S. minor in the inner ear of harbour porpoises highlights the need of further research to assess the impact these nematodes may have on hearing (Morell et al., 2017). Host named G. malaenas in McManus et al. (1984).

Parasite name: Stenurus minor (Kuhn, 1829) Baylis & Daubney, 1925

Synonyms. Pharusurus minor (Kuhn, 1929) Cobbold, 1879; Prosthecocaster minor (Kuhn, 1829) Diesing, 1851; Pseudalius minor (Kuhn, 1829) Schneider, 1866; Stenurus inflexus Dujardin, 1845; Stenurus phocoenae Dougherty, 1943; Stenurus vulgaris Dougherty, 1943; Strongylus minor Kuhn, 1829 [WoRMS; Baylis & Daubney, 1925].
Hosts. Phocoena dioptrica.
Locality. Pipikaretu, Otago Peninsula, NZ.
Infection site. Sinuses and tympanic cavity.
Stage. Adult.
References. Lehnert et al. (2017).
Remarks. Molecular data available (ITS2).

Parasite name: Stenurus ovatus (von Linstow, 1910) Baylis & Daubney, 1925

Synonyms. Pseudalius ovatus von Linstow, 1910 [WoRMS].
Hosts. Delphinus delphis (3), Lagenodelphis hosei (1), Tursiops aduncus (3), T. truncatus (2, 3).
Locality. (1) Corio Bay, VIC; (2) Otago Harbour, NZ; (3) coast of SA.
Infection site. Lungs.
Stage. Adults and larvae.
References. (1) McColl & Obendorf (1982); (2) Bowie (1984); (3) Tomo et al. (2010).
Remarks. McColl & Obendorf (1982) report the lungs of their host specimen were highly congested with worms, causing verminous pneumonia and greatly impairing respiratory function.

Parasite name: Adenocephalus pacificus Nybelin, 1931

Synonyms. Adenocephalus septentrionalis Nybelin, 1931; Bothriocephalus sp. of Stiles & Hassall (1899); B. macrophallus von Linstow, 1905, in part; Dibothriocephalus atlanticum Delyamure & Parukhin, 1968; Diphyllobothrium glaciale (Cholodkovsky, 1915) Markowski, 1952; Dip. krotovi Delyamure, 1955; Dip. pacificum (Nybelin, 1931) Margolis, 1956; Dip. septentrionalis Nybelin, 1931 [WoRMS; Hernández-Orts et al., 2015].
Hosts. Arctocephalus pusillus doriferus (1), Neophoca cinerea (2).
Locality. (1) Lady Julia Percy Island, VIC; (2) Pearson Island, SA.
Infection site. Intestine.
Stage. Adult plus immatures.
References. (1) Drummond (1937); (2) Johnston (1937).
Remarks. Described in Drummond (1937) as Dip. arctocephali n. sp., and host called A. tasmanicus. Described in Johnston (1937) as Dip. arctocephalinnus n. sp. and host called A. forsteri, but Johnston corrected this to N. cinerea in Johnston & Mawson (1941) and Johnston & Best (1942), Johnston (1937) described the worms as a ‘tangled mass’ in the intestine.

Parasite name: Diphyllobothrium sp.

Synonyms.
Hosts. Arctophoca australis forsteri, Hydrurga leptonyx.
Locality. In captivity, NZ.
Parasite name: Monorygma chamissonii (Linton, 1905) Meggitt, 1924

Synonyms. Cysticercus delphini Rudolphi, 1819; Phyllobothrium chamissonii (Linton, 1905) Southwell & Walker, 1936; Taenia chamissonii Linton, 1905.

Hosts. Peponocephala electra. Locality. Moreton Island and Tugun Beach, QLD.

Infection site. Stomach wall and peritoneum.

Stage. Encysted larvae.

References. Cannon (1977).

Remarks. Called Phyllobothrium chamissonii in this paper. Found in cysts 20–25 mm in diameter with thick fibrous walls. The inner blastocysts (metacestode) were almond-shaped, with fat droplets in the wall giving them an orange colour.

Parasite name: Monorygma grimaldii (Moniez, 1899) Meggitt, 1924

Synonyms. Cephalocotyleum delphini delphis Diesing, 1850; Cysticercus delphini Rudolphi, 1819; Cysticercus grimaldii Braun, 1898; Cysticercus Taenia grimaldii Moniez, 1889; Cysticercus du groupe grimaldii Baer, 1932; Dubium delphini Rudolphi, 1810; Phyllobothrium sp. Beneden, 1868; P. delphini Beneden, 1870; Taenia grimaldii Moniez, 1889; T. chamissonii Linton, 1905 [Baylis 1932; Delyamure, 1955].

Hosts. Delphinus delphis (2, 3), Lagenodelphis hosei (1), Stenella coeruleoalba (4).

Locality. (1) Corio Bay, VIC; (2) Barwon Heads, VIC; (3) coast of NZ; (4) Carter’s Beach, Te Akau, NZ; (4) Kawera Parade, Paramon East, NZ; (4) Miruwai Beach, NZ.

Infection site. (1) Abdominal muscle; (2, 3) peritoneal cavity; (4) urogenital area; (4) mammary gland; (4) blubber.

Stage. Merocercoid larva.

References. (1) McColl & Obendorf (1982); (2) Norman (1997); (3) Stockin et al. (2009); (4) Lehner et al. (2017).

Remarks. Norman (1997) reported localized lymphoplasmacytic response to the cysts. These metacestodes are merocercoids of marine tapeworms infecting various marine mammals (Agusti et al., 2005; Aznar et al., 2007); historically, they have been referred to as ‘Phyllobothrium delphini’ (Bosc, 1802) and ‘Monorygma grimaldii’ (Moniez, 1889), but molecular evidence suggests that they belong to the ‘Clistobothrium’ clade (Aznar et al., 2007; Randhawa, 2011; Randhawa & Brickle, 2011). Recently, they were found in subcutaneous blubber from fur seals and shown to be intermediate stages of the cestode Clistobothrium, infecting sharks (Klotz et al., 2018). The merocercoids represented the delphini-morphotype but were identified as grimaldii-genotype using 18S and 28S sequences.

Parasite name: Phyllobothrium delphini (Bosc, 1802) Gervais, 1885

Synonyms. Cephalocotyleum delphini delphis Diesing, 1850; Cysticercus delphini Laennec, 1804; Cy. delphini Rudolphi, 1810; Cy. mysticeti Diesing, 1850; Cy. physeteri Diesing, 1863; Cysticercus sp. Bennett, 1937; Hydatids delphini Bosc, 1802; H. delphini Bosc, 1802; Phyllobothrium sp. Beneden, 1868; Phyllobothrium sp. Carnot, 1822; Phyllobothrium sp. Rennie and Reid, 1912; P. inchoatum Leidy, 1891; P. tumidum Linton, 1922; Scoloeosis delphini Stossich, 1897; Vermis delphini delphini Rudolphi, 1810 [Baylis, 1932; Delyamure, 1955; Williams, 1968].

Hosts. Cephalorhynchus hectori (3), Delphinus delphins (4, 5, 6), Kogia breviceps (1), Lagenorhynchus obscurus (6), Mirounga leonina (2), Phoecoena dioptrica (6), Stenella coeruleoalba (6).

Locality. (1) Port Victoria, Spencer Gulf, SA; (2) Macquarie Island, TAs; (3) Kaikoura coast, NZ; (4) Barwon Heads, VIC; (5) coast of NZ; (6) Sandspit Estuary, Green’s Point, NZ; (6) Portobello Bay, Otago Harbour and off Kaikoura, NZ; (6) Caroline Bay, Timaru, NZ; (6) Carter’s Beach, Te Akau, NZ.

Infection site. Blubber, especially around tail and genital area.

Stage. Merocercoid larva.

References. (1) Johnston & Mawson (1939); (2) Morgan et al. (1978); (3) McKenzie & Blair (1983); (4) Norman (1997); (5) Stockin et al. (2009); (6) Lehner et al. (2017).

Remarks. Morgan et al. (1978) found this cestode encysted in each of three elephant seals examined. As evidenced by the long list of synonyms, this cestode has a complicated history. Reviews of the literature can be found in Delyamure (1955), Dollfus (1964), Johnston & Mawson (1939) and Williams (1968). Molecular evidence suggests that this species belongs to the ‘Clistobothrium’ clade (Aznar et al., 2007; Randhawa, 2011; Randhawa & Brickle, 2011). See also Monorygma grimaldii.

Parasite name: Phyllobothrium sp.

Synonyms.

Hosts. Arctophoca australis forsteri (3), Balaenoptera acutorostrata (2), Cephalorhynchus hectori (3), Delphinus delphins (3), Lagenorhynchus obscurus (3), Phocartctos hookeri (3), Tursiops truncatus (1).

Locality. (1) Otago Harbour, NZ; (2) Pigeon Bay, Banks Peninsula, NZ; (3) NZ.

Infection site. Ventral blubber.

Stage. Merocercoid larva.

References. (1) Bowie (1984); (2) Dawson & Slooten (1990); (3) Duignan (2000).

Remarks. Duignan (2000) found that prevalence was higher in dusky dolphins than in common or Hector’s dolphins. In pinipeds they found a higher prevalence in NZ fur seals than in NZ sea lions. They also reported granulomatous mastitis associated with the cysts that resulted in underfed pups. Dawson and Slooten (1990) reported several hundred cysts in the blubber of a dwarf minke whale.

Parasite name: Phyllobothriidae gen. sp.

Synonyms.

Hosts. Arctophoca australis forsteri.

Locality. In captivity, NZ.

Infection site. Ventral blubber.
| Parasite name | Remarks | Stage | Infection site | Locality | Hosts | Synonyms |
|---------------|---------|-------|----------------|----------|-------|----------|
| *Tetrabothrius forsteri* (Krefft, 1871) Fuhrmann, 1904 | Synonyms. Prosthecoyle forsteri (Krefft, 1871) Monticelli, 1892; *Taenia forsteri* Krefft, 1871; *Tetrabothrius dalli* Yamaguti, 1952 [Linton, 1923; WoRMS]. Hosts. *Delphinus delphis* (1), *Mesoplodon hectori* (2). Locality. (1) Port Jackson, VIC; (2) Oneroa Bay, Waiheke Island, NZ. Infection site. Stomach and intestine. Stage. References. (1) Krefft (1871); (2) Baker *et al.* (2001). Remarks. Described in Krefft (1871) as *Taenia forsteri* n. sp., and host recorded as *D. forsteri*. |
| *Tetrabothrius sp.* | Synonyms. Hosts. *Delphinus delphis* (2), *Lagenodelphis hosei* (1). Locality. (1) Corio Bay, VIC; (2) unknown locality, Australia. Infection site. Stomach and intestine. Stage. References. (1) McColl & Obendorf (1982); (2) Ladds (2009). Remarks. McColl & Obendorf (1982) reported minor haemorrhaging in pancreatic ducts caused by this cestode. |
| *Braunina cordiformis* Wolf, 1903 | Class: Trematoda Rudolphi, 1808 Order: Diplostomida Olson, Cribb, Tkach, Bray & Littlewood, 2003 Family: Brauninidae Wolf, 1903 |
| *Solenorchis travassossi* Hilmy, 1949 | Synonyms. *Solenorchis baer* Hilmy, 1949; *S. gohari* Hilmy, 1949; *S. naguibmahfouzi* Hilmy, 1949 [WoRMS]. Hosts. *Dugong dugon* (1, 2). Locality. (1) Mornington Island and Townsville, QLD; (2) Lucinda, QLD. Infection site. Caecum and large intestine. Stage. Adult. References. (1) Blair (1980); (2) Olson *et al.* (2003). Remarks. Molecular data available (18S, 28S) (2). In his redescriptions of *I. hirudinaceus*, Blair (1980) is adamant that it is a separate species and genus. He states that Hilmy’s (1949) specimens should be *S. travassossi* but still retains his specimens as distinct. He mentions that their size range is large and that the Australian specimens do not overlap the Indian ones in size. Sey (1980) synonymized *I. hirudinaceus* with *S. travassossi*, and now only one species, *S. travassossi*, is accepted from dugong. |
| *Mesostephanus neophoae* Dubois & Angel, 1976 | Synonyms. Hosts. *Mirounga leonina*, *Neophoca cinerea*. Locality. In captivity and St. Vincent Gulf, SA. Infection site. Intestine. Stage. Adult. References. Dubois & Angel (1976). Remarks. Dubois & Angel (1976) put forward the suggestion that species of this genus are more usually parasites of phalacrocoracid birds, and that perhaps the sea lion had taken on the parasite after predating a bird. |
| *Labicola cf. elongata* | Synonyms. Hosts. *Dugong dugon*. Locality. Lucinda, QLD. Infection site. Stage. References. Olson *et al.* (2003). Remarks. Molecular data available (18S, 28S). |
| *Labicola elongata* Blair, 1979 | Synonyms. Hosts. *Dugong dugon* (1, 2). Locality. (1) Mornington Island and Townsville, QLD; (2) unknown locality, Australia. Infection site. Upper lip. |
Stage. Adult.

References. (1) Blair (1979); (2) Blanshard (2001).

Remarks. Blair (1979) found these trematodes in all 21 specimens he observed. They were so unusual that he erected the Family Labicolidae to contain the species. Several worms together formed pus-filled abscesses along the sides of the upper lip, with pores to the outside.

Family: Notocotylidae Lühe, 1909

Parasite name: Ogmogaster sp.

Synonyms.

Hosts. Caperea marginata.

Locality. Fotheringate Bay, Flinders Island, TAS.

Infection site. Intestine.

Stage. Adult.

References. McManus et al. (1984).

Remarks.

Parasite name: Folitrema jecoris Blair, 1981

Synonyms.

Hosts. Dugong dugon.

Locality. Mornington Island, Thursday Island and Townsville, QLD.

Infection site. Gall bladder and bile ducts.

Stage. Adult.

References. Blair (1981).

Remarks.

Parasite name: Lankatrema macrocotyle Blair, 1981

Synonyms.

Hosts. Dugong dugon.

Locality. Mornington Island, Thursday Island and Townsville, QLD.

Infection site. Intestine.

Stage. Adult.

References. Blair (1981).

Remarks. Lankatrema spp. are found encapsulated in the wall of the intestine. Different species may be found in the same capsule (Blair, 1981).

Parasite name: Lankatrema mannarense Crusz & Fernand, 1954

Synonyms.

Hosts. Dugong dugon (1, 2).

Locality. (1) Mornington Island, QLD; (2) Townsville, QLD.

Infection site. Stomach and intestine.

Stage. Adult.

References. (1) Blair (1981); (2) Olson et al. (2003).

Remarks. Molecular data available (18S, 28S) (2). Blair (1981) admits they are poor specimens in his paper, and that the record is questionable.

Parasite name: Lankatrema minutum Blair, 1981

Synonyms.

Hosts. Dugong dugon.

Locality. Mornington Island and Townsville, QLD.

Infection site. Stomach.

Stage. Adult.

References. Blair (1981).

Remarks. Occurs in pairs in the wall of the stomach glands with their posterior ends towards the lumen of the gland. Their capsules are similar to those reported by Crusz & Fernand (1954) for L. mannarense. There appears to be no host response to their presence (Blair, 1981).

Parasite name: Lankatrema australis Price, 1932

Synonyms. Monostomum dujonis Leuckart, 1874; Opisthotrema cochleariforme Travassos and Vogelsang, 1931 (lapsus) [WoRMS; Blair, 1981].

Hosts. Dugong dugon (1–4).

Locality. (1) Wallum Creek, North Stradbroke Island, QLD; (2) coast of QLD; (3) Mornington Island, QLD; (3) Thursday Island, QLD; (3, 4) Townsville, QLD.

Infection site. (1, 3) Eustachian tubes; (3) middle ear; (2, 3) oesophagus.

Stage. Adult and immature.

References. (1) Dexler & Freund (1906); (2) Johnston (1913); (3) Blair (1981); (4) Olson et al. (2003).

Remarks. Molecular data available (18S, 28S) (4). Dexler and Freund (1906) and Johnston (1913) record this species as O. cochlearispan.
Parasite name: *Pulmonicola pulmonalis* (von Linstow, 1904)  
Poche, 1926

**Synonyms.** Cochleotrema indicum (Sharma & Gupta, 1971); Opisthotrema nasalis (*n. n.*) Purnomo, Palmieri & Budiars in Budiars, Palmieri, Imes, Allen & Lepes, 1979; Opisthotrema pulmonale von Linstow, 1904; Paracochleotrema indicum Sharma & Gupta, 1971; Pulmonicola indicus (Sharma & Gupta, 1971); Pulmonicola pulmonale (von Linstow, 1904) Ruiz, 1946 [WoRMS; Blair, 1981].

**Hosts**

Dugong dugon (1–4).

**Locality.** (1) Torres Strait, Australia; (2) Mornington Island, Thursday Island, Townsville, QLD; (3) unknown location, Australia; (4) coast of QLD.

**Infection site.** (2) Nasal passages and lungs; (4) bronchi and trachea.

**Stage.** Adult.

**References.** (1) Blair (1981); (2) Olson et al. (2003).

**Remarks.** Described as *Opisthotrema pulmonale* by von Linstow (1904). Called *Cochleotrema indicum* in Blanshard (2001) and Owen et al. (2012). Cause of chronic bronchitis, tracheitis and bronchopneumonia (3, 4).

Family: Rhabdiopoeidae Poche, 1926

Parasite name: *Faredifex clavata* Blair, 1981

**Synonyms.**

**Hosts.** Dugong dugon.

**Locality.** Mornington Island, Thursday Island and Townsville, QLD.

**Infection site.** Small intestine.

**Stage.** Adult.

**References.** Blair (1981).

**Remarks.** Found in abscesses in wall of ileum.

Parasite name: *Rhabdiopoeus taylori* Johnston, 1913

**Synonyms.**

**Hosts.** Dugong dugon (1–3).

**Locality.** (1) Coast of QLD; (2) Mornington Island, Thursday Island and Townsville, QLD; (3) Lucinda, QLD.

**Infection site.** Intestine.

**Stage.** Adult.

**References.** (1) Johnston (1913); (2) Blair (1981); (3) Olson et al. (2003).

**Remarks.** Molecular data available (18S, 28S) (3). Johnston (1913) found *R. taylori* in both dugongs he examined, ten in one and 16 in the other.

Parasite name: *Haerator caperatus* Blair, 1981

**Synonyms.**

**Hosts.** Dugong dugon.

**Locality.** Mornington Island, Thursday Island and Townsville, QLD.

**Infection site.** Intestine and caecum.

**Stage.** Adult.

**References.** Blair (1981).

**Remarks.**

Parasite name: *Taprobana bicaudata* Crusz & Fernand, 1954

**Synonyms.**

**Hosts.** Dugong dugon (1, 2).

Parasite name: *Brachycladium delphini* (Poirier, 1886) Looss, 1899

**Synonyms.** Campula delphini (Poirier, 1886) Bittner & Sprehn, 1928; Cladocoelium delphini (Poirier, 1886) Stossich, 1892; Distomum delphini Poirier, 1886; Lecithodesmus delphini (Poirier, 1886) Yamaguti, 1958 [WoRMS; Felix, 2013].

**Hosts.** Delphinus delphis.

**Locality.** Bethell’s Beach, Auckland, NZ.

**Infection site.** Liver.

**Stage.** Adult.

**References.** Lehnert et al. (2017).

**Remarks.**

Parasite name: *Brachycladium palliatum* (Looss, 1885) Looss, 1899

**Synonyms.** Campula palliata (Looss, 1885) Looss, 1899; Cladocoelium palliatum (Looss, 1885) Stossich, 1892; Distomum palliatum Looss, 1885; Lecithodesmus palliatus (Looss, 1885) Yamaguti, 1958 [WoRMS; Felix, 2013].

**Hosts.** Delphinus delphis (1, 2).

**Locality.** (1) In captivity NZ; (2) Battey’s Beach, Warkworth, NZ; (2) Shakespeare Peak and Waiaka Beach, Auckland, NZ.

**Infection site.** Liver and bile ducts.

**Stage.** Adult.

**References.** (1) Cordes & O’Hara (1979); (2) Lehnert et al. (2017).

**Remarks.** Cordes and O’Hara (1979) found over 100 of this species in one dolphin. The worms were associated with parasitic hepatitis in four dolphins with lesions, but no worms were found in the livers of two more. Worms and lesions blocked bile ducts, and were either contributory to, or the cause of, death.

Parasite name: *Campula sp.*

**Synonyms.**

**Hosts.** Cephalorhynchus hectori (2, 3), Lagenodelphis hosei (1).

**Locality.** (1) Corio Bay VIC; (2) New Brighton Beach, Christchurch and Gillespies Point, NZ; (3) NZ.

**Infection site.** (1) Pancreatic ducts; (2, 3) mesenteric lymph nodes.

**Stage.** Adult and eggs.

**References.** (1) McColl & Obendorf (1982); (2) Hutton et al. (1987); (3) Duignan (2000).

**Remarks.** Both Duignan (2000) and Hutton et al. (1987) found these worms encapsulated within the mesenteric lymph nodes of the host. The lymph node had granulomatous lesions with inflammatory response associated with eggs/ was enlarged with a tumour-like mass which contained purulent necrotic debris and a single parasitic worm. A secondary bacterial infection, Eikenella corrodens, was cultured from the lesion (2).
Parasite name: *Nasitrema* sp.

**Synonyms.**
- *Hosts.* Lagenodelphis hosei.
- *Locality.* Corio Bay, VIC.
- *Infection site.* Blowhole.
- *Stage.* Eggs.
- *References.* McColl & Obendorf (1982).
- *Remarks.*

Parasite name: *Synthesium tursionis* (Marchi, 1873) Stunkard & Alvey, 1930

**Synonyms.**
- Distomum longissimum Poirier, 1886 nec D. longissimum von Linstow, 1896; D. tursionis Marchi, 1873; Hadwenius tursionis (Marchi, 1873) Fernández, Balbuena & Raga, 1994; Orthosplanchnus tursionis (Marchi, 1873) Odhner, 1926; Synthesium tursionis (Marchi, 1873) [Price, 1932; Marigo et al., 2008].
- *Hosts.* Tursiops truncatus.
- *Locality.* Otago Harbour, NZ.
- *Infection site.* Small intestine.
- *Stage.* Adult.
- *References.* Bowie (1984).
- *Remarks.*

Parasite name: *Synthesium* sp.

**Synonyms.**
- *Hosts.* Neophoca cinerea.
- *Locality.* St. Vincent Gulf, SA.
- *Infection site.* Intestine.
- *Stage.*
- *References.* Dubois & Angel (1976).
- *Remarks.* Genus Hadwenius in this paper. This genus was synonymized with *Synthesium* by Gibson (2005).

Family: Heterophyidae Leiper, 1909

Parasite name: *Galactosomum angelae* Pearson, 1973

**Synonyms.**
- *Hosts.* Neophoca cinerea.
- *Locality.* St. Vincent Gulf, SA.
- *Infection site.* Intestine.
- *Stage.* Adult.
- *References.* Dubois & Angel (1976).
- *Remarks.* This species was originally described by Pearson (1973) from the Caspian tern – as mentioned in the passing reference to *G. angelae* in Dubois and Angel (1976). There is a perpetuated error in the citation of this species and the referencing of this paper. Note that both Dailey *et al.* (2002) and Hernández-Orts *et al.* (2012) list Dubois and Angel (1976) with the title 'Galactosomum angelae' Pearson 1973 in *Neophoca cinerea* (Péron, 1816) the Australian sea-lion. There does not appear to be any paper with this title. The 1976 paper is actually entitled 'Mesostephanus neophocae n. sp. (Strigeata: Prohemistomidae), parasite d’une otarie d’Australie, *N. cinerea* (Péron et Lesueur)'. In addition, the volume and page reference given in both of these works – that is, ‘82: 191–229’ – apply to a paper by Dubois and Mahon published in the Bulletin de la Société Neuchâteloise des Sciences Naturelles in 1959. The corrected reference for the Dubois and Angel (1976) paper is ’99: 29–32’.

Parasite name: Heterophyidae ‘Gen.’ sp.

**Synonyms.**
- *Hosts.* Delphinus delphis.
- *Locality.* In captivity, NZ.
- *Infection site.* Adipose tissue of omasum.
- *Stage.*
- *References.* Cordes & O’Hara (1979).
- *Remarks.*

Parasite name: *Stictodora diplacantha* Johnston, 1942

**Synonyms.**
- *Hosts.* Neophoca cinerea.
- *Locality.* St. Vincent Gulf, SA.
- *Infection site.* Intestine.
- *Stage.*
- *References.* Dubois & Angel (1976).
- *Remarks.* This species was originally described from the pied cormorant.

In addition to the above records, ‘gastrointestinal parasites’ were reported in *Arctophoca australis forsteri* from Ohau Point, NZ (Boren, 2005); ‘lung worms’ in *Delphinus delphis* from Mooloolaba Beach, QLD (Greenland & Limpus, 2008); ‘cestodes’ in *Tursiops truncatus* from Otago Harbour, NZ (Bowie, 1984) and *Globicephala melas* from McIntyre’s Beach, TAS (McManus *et al.*, 1984); and ‘trematodes’ in *A. a. forsteri* from Ohau Point, NZ (Boren, 2005), *Lagenodelphis hosei* from Corio Bay, VIC (McColl & Obendorf, 1982) and *Dugong dugon* from Wallum Creek, QLD (Dexler & Freund, 1906).

Phylum: Arthropoda
- Class: Arachnida Lamarck, 1801
- Subclass: Acari Leach, 1817
- Order: Parasitiformes
- Family: Halarachnidae Oudemans, 1906

Parasite name: *Halarachne miroungae* Ferris, 1925

**Synonyms.**
- *Halarachne erratica* Fain & Mortelmans, 1959; *H. taita* Eichler, 1958 [Domrow, 1962].
- *Hosts.* Mirounga leonine.
- *Locality.* Macquarie Island, TAS.
- *Infection site.* Respiratory tract.
- *Stage.* Adult, larvae.
- *References.* Domrow (1979).
- *Remarks.*

Parasite name: *Orthohalarachne attenuata* (Banks, 1910)

**Synonyms.**
- *Halarachne attenuata* Banks, 1910; *H. magellanica* Finnegan, 1934; *H. reflexa* Tubb, 1937; *H. rosmari* Oudemans, 1916; *H. zalophi* Oudemans, 1916; *Orthohalarachne reflexa* (Tubb, 1937) Strandtmann and Wharton, 1958 [Newell, 1947; Domrow, 1974].
- *Hosts.* Arctocephalus pusillus doriferus (1–4), Neophoca cinerea (4–6).
**Parasite name: Orthohalarachne diminuata** (Doetschman, 1944) Newell, 1947

**Synonyms.** Halarachne diminuata Doetschman, 1944; Orthohalarachne chabaudi Gretillet, 1960; O. letalis Popp, 1961 [Newell, 1947; Domrow, 1974].

**Hosts.** Arctocephalus pusillus doriferus (Trouessart & Neumann, 1888) Darwin, 1854; Arctophoca australis forsteri (Blainville, 1824) Darwin, 1854; Neophoca cinerea (Chenu, 1825) Fabricius, 1798; Phocarctos hookeri (Gray, 1841) Enderlein, 1906; Arctocephalus forsteri (Lesson, 1826)).

**Locality.** (1) Lady Julia Percy Island, VIC; (2) Portarlington, VIC; (3) Newcastle, NSW; (4–6) Dangerous Reef, SA; (4) Seal Rocks and Geelong, VIC; (6) Kangaroo Island, SA.

**Infection site.** Nasopharynx, anterior and ethmoid nasal turbinates, distal third of the trachea and in the proximal 10 cm of both bronchi.

**Stage.** Adults, larva.

**References.** (1) Tubb (1937); (2) Domrow (1963); (3) Seawright (1964); (4) Domrow (1974); (5) Marlow (1975); (6) Nicholson & Fanning (1981).

**Remarks.** Tubb (1937) reports heavy infestations, cephalothorax and legs embedded in the mucous membrane, abdomen protruding, the locus of infection was inflamed and swollen, impossible to dislodge the mites without causing extensive damage to the mucous membrane. The host in Tubb’s (1937) report is named A. tasmanicus. Seawright (1964) cites the host name as Gypsophoca tasmanica.

**Parasite name: Platylepas hexastylos** (Trouessart & Neumann, 1888) Enderlein, 1906

**Synonyms.** Echinophthirius setosus Rothschild, 1902 (nec E. setosus Burmeister 1838 = E. phocae Lucas, 1834 [Harrison, 1937].

**Hosts.** Hydrurga leptonix (1, 2).

**Locality.** (1, 2) Macquarie Island, TAS; (3) Snares Island, NZ; (4, 6) MacQuarie Island, TAS; (5) Snares Island, NZ.

**Infection site.** Fur/skin, body.

**Stage.** Adults.

**References.** (1) Harrison (1937); (2) Murray & Nicholls (1965); (3) Watson (1967); (4) Lowry et al. (1978); (5) Horning et al. (1980); (6) Palma & Horning (2002).

**Remarks.** Host named Macrorhinos leoninus in Harrison (1937). A specimen in Te Papa Museum was collected from Kaikoura NZ.

**Parasite name: Lepidophthirus macrorhini** Enderlein, 1904

**Synonyms.**

**Hosts.** Mirounga leonina (1, 2–6).

**Locality.** (1, 2–4, 6) MacQuarie Island, TAS; (5) Snares Island, NZ.

**Infection site.** Fur/skin.

**Stage.** Adult.

**References.** (1) Harrison (1937); (2) Murray & Nicholls (1965); (3) Watson (1967); (4) Lowry et al. (1978); (5) Horning et al. (1980); (6) Palma & Horning (2002).

**Remarks.** Host named Macrorhinos leoninus in Harrison (1937). A specimen in Te Papa Museum was collected from Kaikoura NZ.

**Subphylum: Crustacea**

**Class: Hexanauplia**

**Order: Sessilia**

**Family: Platylepadiidae**

**Parasite name: Platylepas hexastylos** (Fabricius, 1798) Pilsbry, 1916

**Synonyms.**

**Hosts.** Dugong dugon (1, 2).

**Locality.** (1) Sydney Harbour, Australia; (2) Magnetic Island, QLD.

**Infection site.** Skin, ventral surface.

**Stage.**

**References.** (1) Marlow (1962); (2) Zann & Harker (1978).

**Remarks.**
Order: Lepadiformes Buckeridge & Newman, 2006
Family: Lepadidae Darwin, 1852

Parasite name: _Lepas australis_ Darwin, 1851

**Synonyms.**
*Hosts._ Arctocephalus tropicalis.*
**Locality.** Adelaide, SA.
**Infection site.** Body and flippers.
**Stage.**
**References.** Shaughnessy et al. (2014).
**Remarks.** In his paper, Leung (1965) lists a large number of cyamid specimens from all over the world, collected for a study of ectocommensal protozoans. No details are given other than the locality, date and collector. Leung names the sperm whale host as _P. catodon._

Family: Balanidae Leach, 1817

Parasite name: _Balanus sp._

**Synonyms.**
*Hosts._ Dugong dugon.*
**Locality.** Wallum Creek, North Stradbroke Island, QLD.
**Infection site.** Skin of back.
**Stage.**
**References.** Dexler & Freund (1906).
**Remarks.** The authors report, 'The dugong is the host of great numbers of parasites, both external and internal. On its back, as with whales, numerous barnacles establish themselves; a few _Balanus_ but mostly _Chelonobia_ [sic].'

Family: Chelonibiidae Pilsbry, 1916

Parasite name: _Chelonibia sp._

**Synonyms.**
*Hosts._ Dugong dugon.*
**Locality.** Wallum Creek, North Stradbroke Island, QLD.
**Infection site.** Skin of back.
**Stage.**
**References.** Dexler & Freund (1906).
**Remarks.** The authors state, 'The dugong is the host of great numbers of parasites, both external and internal. On its back, as with whales, numerous barnacles establish themselves; a few _Balanus_ but mostly _Chelonobia_ [sic].'

Class: Malacostraca Latreille, 1802
Order: Amphipoda Latreille, 1816
Family: Cyamidae Rafinesque, 1815

Parasite name: _Cyamus boopis_ Lütken, 1870

**Synonyms.** _Cyamus ceti_ Chilton, 1883; _C. elongatus_ Hiro, 1938; _C. pacificus_ Lütken, 1873; _C. suffuses_ Dall, 1872 [WoRMS].
*Hosts._ Megapodera novaangliae (1), unidentified South Australian whale (2), unidentified NZ whale (2).
**Locality.** (1) Picton, NZ; (2) Carnarvon, WA; (2) unknown locality, SA, and unknown locality, NZ.
**Infection site.** Skin.
**Stage.** Adults, juveniles.
**References.** (1) Leung (1965); (2) Sedlak-Weinstein (1991).
**Remarks.** This species has been found to be highly specific in its choice of host, the humpback whale, _M. novaangliae_ (Carvalho et al., 2010), so it seems probable that the unidentified whales belonged to this species.

Parasite name: _Cyamus catadontis_ Margolis, 1954

**Synonyms.**
*Hosts._ Physeter macrocephalus.
**Locality.** Albany, WA.
**Infection site.**
**Stage.**
**References.** Leung (1965).
**Remarks.** In his paper, Leung (1965) lists a large number of cyamid specimens from all over the world, collected for a study of ectocommensal protozoans. No details are given other than the locality, date and collector. Leung names the sperm whale host as _P. catodon._

Parasite name: _Isocyamus delphinii_ (Guérin-Méneville, 1836)
Gervais & Beneden, 1859

**Synonyms.** _Cyamus delphinii_ Guérin-Méneville, 1836; _C. globicipitis_ Lütken, 1873; _Isocyamus globicipitis_ Hiro, 1938 [Leung, 1967].
*Hosts._ Globicephala melas (1), Phocoena phocoena (2), Pseudorca crassidens (3).
**Locality.** (1) Jarvis Bay, NSW; (2) Australia; (3) Little Manly and Crowdy Heads, NSW.
**Infection site.** Skin.
**Stage.** Adults, juveniles.
**References.** (1) Leung (1965); (2) Berzin & Vlasova (1982); (3) Sedlak-Weinstein (1991).
**Remarks.** Leung (1965) names the host _G. malaena._ Berzin and Vlasova (1982) list this species as occurring in _Phocoena phocoena_, which is probably a host identification error, as this porpoise does not inhabit the Australasian region. It seems probable that this host was _Phocoena dioptrica._

Parasite name: _Isocyamus deltobranchium_ Sedlak-Weinstein, 1992

**Synonyms.**
*Hosts._ Globicephala melas.
**Locality.** Coast of TAS.
**Infection site.** Skin.
**Stage.** Adults.
**References.** Sedlak-Weinstein (1992b).
**Remarks.** Host named _G. malaena_ in Sedlak-Weinstein (1992b).

Parasite name: _Isocyamus kogiae_ Sedlak-Weinstein, 1992

**Synonyms.**
*Hosts._ Kogia breviceps.
**Locality.** Moreton Island, QLD.
**Infection site.** Skin.
**Stage.** Adults.
**References.** Sedlak-Weinstein (1992a).
**Remarks.** Host named _G. malaena_ in Sedlak-Weinstein (1992b).

Parasite name: _Platycyamus thompsoni_ (Gosse, 1855) Lütken, 1870

**Synonyms.** _Cyamus thompsoni_ Gosse, 1855 [WoRMS].
*Hosts._ Mesoplodon grayi.
**Locality.** Younghusband Peninsula, SA.
**Infection site.** Skin.

**Stage.** Adults.

**References.** Sedlak-Weinstein (1991).

**Remarks.** New location and new host record.

**Parasite name: Scutocyamus antipodensis** Lincoln & Hurley, 1980

**Synonyms.**

**Hosts.** Cephalorhynchus hectori (1), Phocoena dioptrica (2).

**Locality.** (1) Cook Strait, NZ; (2) Caroline Bay, NZ.

**Infection site.** Skin.

**Stage.** Adults, juveniles.

**References.** (1) Lincoln & Hurley (1980); (2) Lehnert et al. (2017).

**Remarks.** New host location in Arafura Sea for this species.

**Parasite name: Syncyamus aequus** Lincoln & Hurley, 1981

**Synonyms.**

**Hosts.** Tursiops truncatus, Stenella longirostris.

**Locality.** Arafura Sea, north-west Australia.

**Infection site.** Skin.

**Stage.** Adults, juveniles.

**References.** Sedlak-Weinstein (1991).

**Remarks.** Analysed from faecal samples, molecular data (18S).

**Parasite name: Cryptosporidium hominis** Morgan-Ryan, Fall, Ward, Hijawi, Sulaiman, Fayer, Thompson, Olson, Lal & Xiao, 2002

**Synonyms.** Cryptosporidium parvum Tyzzer, 1912 (in part).

**Hosts.** Dugong dugon (1, 2).

**Locality.** (1, 2) Hervey Bay, QLD.

**Infection site.** Small intestine.

**Stage.**

**References.** (1) Hill et al. (1997); (2) Morgan et al. (2000).

**Remarks.** Hill et al. (1997) do not give a species name for Cryptosporidium. Three animals were found dead, one euthanized with anaesthesia and lethargy, putative oocysts found. Using the same specimens, Morgan et al. (2000) provide molecular data leading to identification as C. parvum 'human' genotype. This genotype was later described as C. hominis by Morgan-Ryan et al. (2002).

**Parasite name: Toxoplasma gondii** Nicolle & Manceaux, 1908

**Synonyms.**

**Hosts.** Tursiops aduncus (1), Sousa chinensis (2), Dugong dugon (3), Arctophoca australis forsteri (4), Phocaenoides phocaenoides (5).

**Locality.** (1) In captivity, Australia; (2) Townsville and Gladstone Harbour, QLD; (3) south-east QLD; (4) Sydney, NSW; (5) Otago, NZ.

**Infection site.** Brain (tissue cysts), heart, lungs, liver, spleen, adrenal glands (tachyzoite stages).

**Stage.**

**References.** (1) Jardine & Dubey (2002); (2) Bowater et al. (2003); (3) Owen et al. (2012); (4) Donahoe et al. (2014); (5) Roe et al. (2017).

**Remarks.** Congenital toxoplasmosis in a stillborn late-term foetus with myocardial necrosis and nonsuppurative necrotizing encephalitis were associated with tachyzoites and tissue cysts (Jardine & Dubey, 2002); systemic toxoplasmosis, molecular data (Donahoe et al., 2014); encephalitis associated with T. gondii cysts, emaciation, ataxia in one live stranded animal (Bowater et al., 2003). Host called Arctocephalus forsteri in Donahoe et al. (2014).

**Family: Hexamitidae** Kent, 1880

**Parasite name: Giardia duodenalis** (Lamb, 1859) Kofoid & Christiansen, 1915

**Synonyms.** Cercomonas intestinalis Lamb, 1859; Giardia agilis Kunstler, 1882; G. lamblia Stiles, 1914; Hexamita duodenalis Davaine, 1875; Lamblia intestinalis Blanchard, 1888.

**Hosts.** Neophoca cinerea.

**Locality.** WA, SA, in captivity QLD and NSW.

**Infection site.** Intestine.

**Stage.**

**References.** Delport et al. (2014).

**Remarks.** Analysed from faecal samples, molecular data (18S).

**Host-parasite list**

**Host taxon: Pinnipedia**

**Family: Otariidae**

**Host name: Arctocephalus pusillus doriferus** (Australian fur seal)

**Acanthocephala**

- Corynosoma australicetaceum

**Nematoda**

- Anisakis sp.
- Contracaecum ogmorhini
- Contracaecum osculatum
- Parafilaroides normani
- Parafilaroides sp.
- Uncinaria sp. 2 of Nadler et al. (2013)

**Cestoda**

- Adenocephalus pacificus

**Arachnida**

- Orthohalarachne attenuata
- Orthohalarachne diminuata

**Host name: Arctocephalus tropicalis** (subantarctic fur seal)

**Crustacea**

- Lepas australis
Host name: *Arctophoca australis forsteri* (NZ fur seal)
Gastrointestinal parasites
Acanthocephala
Corynosoma australe
Corynosoma sp.
Nematoda
Anisakis simplex s.l.
Anisakis sp.
Contracaecum osculatum
Parafilaroides normani
Parafilaroides sp.
Pseudoterranova decipiens
Uncinaria sp.
Cestoda
Diphyllobothrium sp.
Phyllobothrium sp.
Trematoda gen. sp.
Insecta
Antarctophthirus microchir
Protozoa
Toxoplasma gondii

Host name: *Neophoca cinerea* (Australian sea lion)
Acanthocephala
Corynosoma australe
Corynosoma sp.
Nematoda
Contracaecum osculatum
Parafilaroides sp.
Uncinaria hamiltoni
Uncinaria sanguinis
Uncinaria sp.
Cestoda
Adenocephalus pacificus
Trematoda
Galactosomum angulatum
Mesostephanus neophocae
Stictodora diplacantha
Synthesium sp.
Arachnida
Orthohalarachne attenuata
Orthohalarachne diminuata
Insecta
Antarctophthirus microchir
Protozoa
Giardia duodenalis

Host name: *Phocarctos hookeri* (NZ sea lion)
Acanthocephala
Corynosoma australe
Corynosoma semerm
Nematoda
Anisakis simplex s.l.
Pseudoterranova decipiens
Parafilaroides decorus
Uncinaria sp.
Uncinaria sp. 1 of Nadler et al. (2013)
Cestoda
Phyllobothrium sp.

Host name: *Zalophus californianus* (Californian sea lion) captive animal
Arachnida
Demodex zalophi
Family: Phocidae

Host name: *Hydrurga leptonyx* (Leopard seal)
Acanthocephala
Corynosoma australe
Corynosoma bullosum
Corynosoma sp.
Nematoda
Anisakis simplex s.l.
Contracaecum mirounga
Contracaecum ogmorhini
Contracaecum osculatum
Contracaecum radiatum
Parafilaroides hydrargae
Parafilaroides sp.
Pseudoterranova decipiens
Cestoda
Diphyllobothrium sp.
Insecta
Antarctophthirus ogmorhini

Host name: *Mirounga leonina* (Southern elephant seal)
Acanthocephala
Corynosoma bullosum
Nematoda
Anisakis simplex s.l.
Contracaecum mirounga
Contracaecum ogmorhini
Contracaecum osculatum
Contracaecum radiatum
Filaria s.l. sp.
Pseudoterranova decipiens
Uncinaria sp. 3 of Nadler et al. (2013)
Cestoda
Phyllobothrium delphini
Trematoda
Mesostephanus neophocae
Arachnida
Halarachne miroungae
Insecta
Leptodiphthirus macrorhini

Host taxon: Cetacea
Family: Balaenopteridae

Host name: *Balaenoptera acutorostrata* (Minke whale)
Nematoda
Anisakis sp.
Cestoda
  *Phyllobothrium* sp.

**Host name: *Megaptera novaeangliae* (Humpback whale)**

Acanthocephala
  *Bolbosoma balaenae*

Crustacea
  *Cyamus boopis*
  Family: *Neobalaenidae*

**Host name: *Caperea marginata* (pygmy right whale)**

Trematoda
  *Ogmogaster* sp.
  Family: *Delphinidae*

**Host name: *Cephalorhynchus hectori* (Hector’s dolphin)**

Acanthocephala
  *Corynosoma* sp.

Nematoda
  *Acuaria* sp.
  *Contracaeum* sp.
  *Halocercus* sp.
  *Phocascaris* sp.
  *Stenurus* sp.

Cestoda
  *Phyllolothrium delphini*
  *Phyllolothrium* sp.

Trematoda
  *Braunina cordiformis*
  *Campula* sp.

Crustacea
  *Scutocyamus antipodensis*

**Host name: *Delphinus delphis* (short-beaked common dolphin)**

Acanthocephala
  *Corynosoma cetaceum*
  *Corynosoma* sp.

Nematoda
  lung worms
  *Anisakis pegreffii*
  *Anisakis simplex* s.l.
  *Crassicauda* sp.
  *Echinocephalus* overstreeti
  *Halocercus lagenorhynchi*
  *Halocercus* sp.
  *Parafilaroides* sp.
  *Pharurus alatus*
  *Stenurus ovatus*

Cestoda
  *Monorygma grimaldii*
  *Phyllolothrium delphini*
  *Phyllolothrium* sp.
  *Tetabothrius forsteri*
  *Tetabothrius* sp.

Trematoda
  *Brachycladium delphini*
  *Brachycladium palliatum*
  *Heterophyidae* gen. sp.

**Host name: *Globicephala melas* (long-finned pilot whale)**

Acanthocephala
  *Bolbosoma capitatum*

Nematoda
  *Anisakis oceanica*
  *Anisakis simplex* s.l.
  *Anisakis* sp.
  *Stenurus globicephalae*

Crustacea
  *Isocyamus delphinii*
  *Isocyamus deltobranchium*

**Host name: *Globicephala* sp.**

Nematoda
  *Stenurus globicephalae*

**Host name: *Grampus griseus* (Risso’s dolphin)**

Nematoda
  *Crassicauda grampicola*
  *Stenurus globicephalae*

**Host name: *Lagenodelphis hosei* (Fraser’s dolphin)**

Nematoda
  *Anisakis simplex* s.l.
  *Stenurus ovatus*

Cestoda
  *Monorygma grimaldii*
  *Tetabothrius* sp.

Trematoda
  *Campula* sp.
  *Nasitrema* sp.

**Host name: *Lagenorhynchus obscurus* (dusky dolphin)**

Nematoda
  *Anisakis simplex* s.l.
  *Crassicauda* sp.

Cestoda
  *Phyllolothrium delphini*
  *Phyllolothrium* sp.

**Host name: *Peponocephala electra* (melon-headed whale)**

Nematoda
  *Anisakis simplex* s.l.
  *Anisakis typica*
  *Stenurus globicephalae*

Cestoda
  *Monorygma chamissonii*

**Host name: *Pseudorca crassidens* (false killer whale)**

Acanthocephala
  *Bolbosoma capitatum*

Nematoda
### Host name: *Sousa chinensis* (Indo-Pacific humpbacked dolphin)

- Crassicauda sp.
- Crustacea
  - *Isocyamus delphinii*
  - *Syncyamus pseudorcae*
- Protozoa
  - *Toxoplasma gondii*

### Host name: *Stenella coeruleoalba* (striped dolphin)

- Nematoda
  - *Halocercus sp.*
  - *Halocercus delphinii*
- Cestoda
  - *Monorygma grimaldii*
  - *Phyllobothrium delphini*

### Host name: *Stenella longirostris* (spinner dolphin)

- Crustacea
  - *Syncyamus aequus*

### Host name: *Tursiops aduncus* (Indo-Pacific bottlenose dolphin)

- Nematoda
  - *Halocercus lagenorhynchi*
  - *Stenurus ovatus*
- Protozoa
  - *Toxoplasma gondii*

### Host name: *Tursiops truncatus* (common bottlenose dolphin)

- Acanthocephala
  - *Bolbosoma sp.*
  - *Corynosoma cetaceum*
- Nematoda
  - *Anisakis pegreffii*
  - *Anisakis simplex s.l.*
  - *Halocercus lagenorhynchi*
  - *Skrjabinalius cryptocephalus*
  - *Stenurus ovatus*
- Cestoda
  - *Phyllobothrium sp.*
- Trematoda
  - *Synthesium tursionis*
- Crustacea
  - *Syncyamus aequus*

**Family: Kogiidae**

### Host name: *Kogia sima* (dwarf sperm whale)

- Nematoda
  - *Anisakis berlandi*
  - *Anisakis brevispiculata*

**Family: Phocoenidae**

### Host name: *Phocoena dioptrica* (spectacled porpoise)

- Nematoda
  - *Anisakis sp.*
  - *Stenurus minor*
- Cestoda
  - *Phyllobothrium delphini*
- Crustacea
  - *Scutocyamus antipodensis*

### Host name: *Phocoena* (harbour porpoise)

- Crustacea
  - *Isocyamus delphinii*

**Family: Physeteridae**

### Host name: *Mesoplodon bowdoini* (Andrew’s beaked whale)

- Nematoda
  - *Anisakis nascetti*
  - *Anisakis ziphidarum*

### Host name: *Mesoplodon grayi* (Gray’s beaked whale)

- Nematoda
  - *Anisakis nascetti*
  - *Anisakis sp.*
- Crustacea
  - *Platcyamus thompsoni*

**Family: Ziphiidae**

### Host name: *Mesoplodon hectori* (Hector’s beaked whale)

- Nematoda
  - *Anisakis sp.*
- Cestoda
  - *Tetrabothrius forsteri*

**Host name: *Mesoplodon layardi* (strap-toothed whale)

- Nematoda
  - *Anisakis nascetti*
Host name: *Ziphius cavirostris* (Cuvier’s beaked whale)

Nematoda
- *Crassicauda boopis*
- *Crassicauda* sp.

**Host taxon:** Sirenia
Family: Sireniidae

Host name: *Dugong dugon* (dugong)

Nematoda
- *Paradajardinia halicoris*

Trematoda
- *Faredifex clavata*
- *Folitrema jecoris*
- *Haerator caperatus*
- *Labicola cf. elongata*
- *Labicola elongata*
- *Lankatrema macrocotyle*
- *Lankatrema mammarensense*
- *Lankatrema microcotyle*
- *Lankatrema minutum*
- *Lankattrematoideas gardneri*
- *Opisthotrema australis*
- *Opisthotrema dujonis*
- *Pulmonicola pulmonalis*
- *Rhabdiopeus taylori*
- *Solenorchis travassosi*
- *Spirorchidae gen. sp.*
- *Taprobanelia bicaudata*

Crustacea
- *Platylepas hexastylos*
- *Balanus sp.*
- *Chelonibia sp.*

Protozoa
- *Cryptosporidium hominis*
- *Toxoplasma gondii*

**Discussion**

In this first host–parasite checklist, information about metazoan and protozoan parasites of marine mammals in NZ and Australian waters was collated. From 51 species of cetacean known from Australian and NZ waters, only 27 species have recorded parasites. From 11 species of pinnipeds known from Australian and NZ waters, eight have recorded parasites. The absence of records certainly does not signify that the remaining hosts are parasite free. There is still a lot left to learn. However, checklists such as this one remain valuable tools to ecologists and can help to further our understanding of parasite diversity and be a practical resource for scientists.

Nematodes were the most diverse group reported, with 30 different species determined, and many more records where identification was restricted to the genus or family level. Anisakid stomach nematodes (14 species) represented the family most often found in a wide range of host species, reflecting their generalist nature, followed by pseudolid lungworms (seven species), specific to the respiratory tract of odontocetes. Trematodes (22 species), mostly from the gastro-intestinal tract, were found in sirenians (15 species), cetaceans (six species) and pinnipeds (six species). Six species of acanthocephalans were identified from pinniped (n = 6) and cetacean (n = 3) hosts. Adult cestodes (five species) were recorded in the intestinal tract of three cetacean and two pinnipeds species. Cestode larvae within the subcutaneous blubber and the peritoneum were recorded from multiple cetacean (n = 9) and pinniped (n = 3) species. Thirteen different ectoparasitic crustacean species were found on cetaceans and sirenians. Other arthropod ecto- (Insecta, three species) and endoparasites (Arachnida, four species) were recorded from pinnipeds species. Three protozoan species were encountered in several marine mammal species including sirenians, pinnipeds and cetaceans within studies dating from 1997 to 2017. This may reflect, on the one hand, the relatively recent occurrence of some of these pathogens in the marine environment due to human activities and, on the other hand, new survey and diagnostic techniques (Lasek-Nesselquist et al., 2010), as well as growing awareness of these emerging zoonotic agents in the research community.

Thirty-four parasite records were from dugongs and 25 species were found in common dolphins, while leopard seals with 17 parasite species were the pinnipeds most often infected. This reflects the opportunistic nature of sampling these animals. The findings indicate that, for example, sperm whales with one crustacean ectoparasite record or elusive beaked whales with 2–3 species records are seldom encountered hosts.

Many old records have complicated histories with multiple synonyms, which need updating. Also, the advent of molecular tools has identified several species complexes (Mattiucci et al., 2014; Klotz et al., 2018), for which retrospective analyses would be useful. New techniques will likely also continue to improve the identification of parasite fragments and minute larvae (Jabbar et al., 2015), as well as provide insights on the phylogeny of parasite species (Hernández-Orts et al., 2017).

The protozoans *Toxoplasma, Giardia* and *Cryptosporidium* are emerging parasites in marine mammals. In the future, the combination of prevalence surveys with molecular techniques will probably identify further protozoans and provide knowledge on host specificity and transmission pathways (Fayer et al., 2004; Applebee et al., 2005; Grilo et al., 2018).

Foodborne parasites like cestodes (*Diphyllobothrium* sp.) and anisakids (*Anisakis* sp., *Pseudoterranova* sp.) are abundant in marine mammals in Australasia and pathogenic for humans when infective larvae are accidentally consumed with undercooked fish (Yamasaki & Kuramochi, 2009; Shamsi & Butcher, 2011). Human health concerns as well as implications for fisheries and seafood control underline the importance of better understanding the epidemiology of relevant species (Cipriani et al., 2016).

Opportunistic parasite surveys of dead or live stranded cetaceans, in cooperation with established stranding networks (e.g. that of NZ’s Department of Conservation) and systematic, minimally invasive studies to monitor live and free ranging pinnipeds (e.g. analysing faeces from pinniped colonies; Presswell & Lagrue, 2016), would enable a better overview of prevalence, intensity of infections and emerging parasite species. The importance of well-maintained and curated museum collections cannot be underestimated in their contribution towards our ongoing knowledge of parasite biodiversity (Lehnert et al., 2017). It remains unclear how contaminant exposure causing immune suppression or cumulative effects of human-induced pressures (shipping, fisheries, global change) make marine mammals more susceptible to infectious disease in Australasian waters (Van Bressem et al., 2009). Studies combining ecototoxicological analyses with systematic monitoring of parasite prevalence and impact (Lehnert
et al., 2018) would help to elucidate these relationships in the future. Parasites should be an integral part of biodiversity and conservation research in their marine mammal hosts (Aznar et al., 2010; Poulin et al., 2016). Ultimately, this research can inform managers and may guide species, habitat and population assessment and conservation, as well as encourage further investigations into the biodiversity and ecology of marine mammal parasites.

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