



## A new *Clymenura* (Polychaeta: Maldanidae) from the intertidal of Banks Peninsula, New Zealand, with a reassessment of *Leiochone* Grube, 1868 and *Clymenura* Verrill, 1900

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### Abstract

A maldanid discovered on sand beaches of Banks Peninsula, South Island, New Zealand is newly described. *Clymenura snaiko* **sp. nov.** is of large size at over 250 mm length, with 18 chaetigers, two achaetous preanal segments with tori, unmodified dentate uncini in anterior chaetigers, a ventral glandular shield on chaetiger eight, a high cephalic rim notched laterally, and a deep anal funnel rimmed with 16 short subequal cirri and one longer ventral cirrus. The confused taxonomy of ventral-shield-bearing maldanids is reassessed and clarified. *Leiochone* Grube 1868 and *Clymenura* Verrill, 1900 are here treated as the valid members of Arwidsson's (1906) tribe Leiochonini in Euclymeninae, and given emended diagnoses, while Imajima and Shiraki's (1982) subfamily Clymenurinae and *Clymenura* subgenus *Cly.* (*Cephalata*) are considered invalid. Differentiating character states of the valid Leiochonini species are tabulated. *Leiochone* is restricted to six species, including the new combinations *L. annulata* (Mohammad, 1980) and *L. japonica* (Imajima & Shiraki, 1982). *Clymenura* is restricted to nine valid taxa, including *Cly. snaiko* **sp. nov.** and the new combination *Cly. polaris lena* (Averincev, 1990). These updated groupings exclude a further eight nominal taxa which mostly may be indeterminable. *Leiochone* species occur in inshore temperate to tropical Eastern Hemisphere waters, while *Clymenura* mostly occur in high North European latitudes and the northern Pacific region, usually offshore in deep water. The new species is the first record of a *Clymenura* from Southern Hemisphere waters, and the second member of the genus to be found in the intertidal.

**Key words:** *Clymenura*, *Cephalata*, *Leiochone*, Leiochonini, taxonomy, generic emendation, new species, new combinations, sand beach

### Introduction

The Maldanidae (bamboo worms) of New Zealand intertidal sands consist of two endemic species, *Macroclymenella stewartensis* Augener, 1926 and *Axiothella serrata* Kudenov & Read, 1977, and a third species previously reported from northern New Zealand by Ehlers (1907) as *Asychis amphiglyptus* (Ehlers, 1897), type locality South Georgia. Two of the maldanids mainly occur in sheltered waters and are regional in distribution, with *Ax. serrata* present only in the greater Cook Strait area and *As. amphiglyptus* only in the northern half of the North Island, whereas *M. stewartensis* occurs widely throughout the three main islands, including on relatively open coasts (Ehlers 1907; Augener 1926; Kudenov & Read 1977; Read 1984; Read pers. obs.). *As. amphiglyptus* and *M. stewartensis* also occur subtidally, and all three maldanids are large worms, sometimes common and conspicuous in the intertidal, although only *Ax. serrata* populations have been studied in any detail (Read 1984).

In addition to the known sandy intertidal species, another large sandy-shore maldanid was discovered in February 2008 at Banks Peninsula, South Island, a much-eroded complex of Miocene volcanoes attached to the edge of the Canterbury plains (Weaver *et al.* 1985). The hitherto undescribed species occurred at low densities and only on isolated beaches at the head of three northeastern Banks Peninsula bays.

The Banks Peninsula maldanid belongs to a small group of mainly Northern Hemisphere euclymenin species which have a distinctively shaped ventral glandular structure that is always only on chaetiger eight. Species with

this ventral shield, which consists of a pale triangular or half-oval glandular area slightly raised from the adjoining epidermis, have been placed in two genera, *Leiochone* Grube, 1868 and *Clymenura* Verrill, 1900, which have an intertwined taxonomic history. The ventral shield appears to be a synapomorphy, with no matching mid-body glandular structures present in other euclymenins. Most species of the two genera (except some *Clymenura*) also have an anal cone which is rimmed by sparse cirri.

In recent decades *Clymenura* has been the more used as a valid genus, with new or existing members of the *Leiochone/Clymenura* group mostly placed there (e.g., Imajima & Shiraki 1982; Garwood 2007). However, Arwidsson (1906), followed by Chamberlin (1919:410) and others, had earlier treated *Clymenura* as a synonym of the then better-known *Leiochone*, and new *Leiochone* were named in 1967 and 1990 (Bellan & Reys 1967; Averincev 1990). Herein *Leiochone* and *Clymenura* are treated as distinct, and all former and current *Leiochone/Clymenura* group original names are assessed in a literature-based review.

Imajima & Shiraki (1982) moved their conception of *Clymenura* (effectively the *Leiochone/Clymenura* group) from Euclymeninae into a new subfamily, Clymenurinae, characterised by the presence of a ventral shield on the eighth chaetiger. However, Garwood (2007) noted that the transverse mouth openings and well-developed palpoles of *Clymenura sensu* Imajima & Shiraki are euclymenin-like attributes, and Hausen & Bleidorn (2006) report that a synapomorphy of anterior-posterior aligned posterior notochaetae fascicles links *Clymenura clypeata* (Saint-Joseph, 1894) (= *L. leiopygos* (Grube, 1860)) to other Euclymeninae. Use of Clymenurinae at subfamily level is previously unsupported elsewhere (Jiménez-Cueto & Salazar-Vallejo 1997; Garwood 2007), and is unsupported here; while continuation of the name at reduced rank appears to be superfluous since tribe Leiochonini Arwidsson, 1906 exists as a senior name for the *Leiochone/Clymenura* group.

## Material and methods

*Clymenura* worms were extracted from their burrows by suction using a bait-collector plunger-pump (Alvey yabbie pump) during low tide at locations on still-wet sands where worm casts and stopings were visible. Sampling station positions were determined on site with a handheld Garmin GPS unit. Specimens were studied using stereo and compound microscopy, and figures include some digital-camera images post-processed with CombineZ and Adobe™ Photoshop software. The holotype, paratypes, and all material examined are deposited in the NIWA Invertebrate Collection, Wellington. Abbreviations for complete specimens, anterior fragments, and posterior fragments are cs, af, and pf respectively in material examined; abbreviated references to *Clymene* and *Clymenura* are distinguished as *C.* and *Cly.* respectively.

## Systematic account

**Family Maldanidae** Malmgren, 1867; **Subfamily Euclymeninae** Arwidsson, 1906; **Tribe Leiochonini** Arwidsson, 1906 [Includes Clymenurinae Imajima & Shiraki, 1982]

**Type genus.** *Leiochone* Grube, 1868

**Genus *Leiochone* Grube, 1868, emended**

**Type species.** *Clymene leiopygos* Grube, 1860:91, herein by subsequent designation [explicit designation following implicit in Arwidsson 1906:144]

*Leiocephalus* Quatrefages, 1866 [in part], non Gray, 1827 [homonym in Reptilia]

*Clymenura* (*Clymenura*) *sensu* Imajima & Shiraki, 1982, non Verrill, 1900

**Diagnosis.** Body of 19 to 29 chaetigers, followed by up to five achaetous preanal segments. Cephalic plate and rim absent, or weakly defined plate edge present adjacent cephalic keel. Nuchal organs straight, length variable, palpode tip bluntly oval. Cephalic ocelli usually present. Eighth chaetiger with a large ventral glandular shield. Notochaetae winged capillaries only, or also with weakly ornamented forms. Neurochaetae single rows of rostrate manubriavicular uncini throughout, reduced in number, dentition, and subrostral bristle development on first two or

three chaetigers. Pygidium with anal funnel absent, with anal cone prominent, basally rimmed with three cirri, or cirri absent, with anal valve peg usually present.

**Remarks.** *Leiochone* includes seven nominal taxa, of which six are valid, listed below under their original combinations, ordered by date of description (\* = junior synonym), with character states as enumerated in Table 1. The next group of seven names are *nomina dubia* that have been included in *Leiochone* in the past, but which mostly now appear to be indeterminable.

*Clymene leiopygos* Grube, 1860, Adriatic. Type of *Leiochone*, with holotype at Zoologisches Museum, Berlin, Verm. Q.4641 (Hartwich 1993:112).

\**Leiochone clypeata* Saint-Joseph, 1894, Brittany, France. Synonym of *L. leiopygos* *vide* Arwidsson (1906, 1922) and Garwood (2007). Treated as valid by Fauvel (1927:188) although he listed several possible senior synonyms.

*Leiochone johnstoni* McIntosh, 1915, British Isles.

*Leiochone tenuis* Day, 1957, South Africa.

*Leiochone tricirrata* Bellan & Reys, 1967, Mediterranean France.

*Clymenura annulata* Mohammad, 1980, Kuwait. **New combination** herein as *Leiochone annulata*.

*Clymenura (Clymenura) japonica* Imajima & Shiraki, 1982, Japan. **New combination** herein as *Leiochone japonica*.

#### *Nomina dubia*

*Clymene ebiensis* Milne Edwards, 1843, plate 22, fig. 4, in Milne Edwards (1837 [1837–1848]) (publication date *vide* Cowan (1976:61), see also Quatrefages (1866:243), McIntosh (1892:103; 1913:98), and Arwidsson (1922:8)), Brittany, France. Incompletely figured and no text description published, except characterised in the figure caption by "...la forme pyramidale de la tête et l'absence de dentelures autour de l'anus". Placed in *Leiochone* subsequently, although presence of ventral shield unknown. Indeterminable to species (*vide* Arwidsson 1922), and holotype untraced.

*Clymene urceolata* Leidy, 1855 (as *C. urceolatus*), New Jersey, USA. Inadequate description, type missing (Light 1974:181). Placed in *Leiochone* by Grube (1868), but perhaps an indeterminable *Asychis* sp. (*vide* Arwidsson 1906).

*Leiocephalus parvus* Quatrefages, 1866, France? Inadequate description from anterior fragment, with no mention of ventral shield. Included in *Leiochone* by Arwidsson (1906:145). Holotype at Muséum national d'Histoire naturelle, Paris. Indeterminable to species?

*Praxilla simplex* Claparède, 1870, Italy. Inadequate description, with no mention of ventral shield, but has anal cirri. Tentative inclusion in *Leiochone* by Arwidsson (1906:145), and tentative synonymy into *L. clypeata* by Fauvel (1927:188). Types not retained, and indeterminable to species.

*Leiochone singularis* Gravier, 1907, Antarctica. Inadequate description, with no mention of ventral shield. Holotype at Muséum national d'Histoire naturelle, Paris. Not Leiochonini?

*Leiochone polaris acirrata* Zachs, 1923 (& Derjugin 1927), as var. *acirrata*. White Sea, Russia. *Nomen nudum*.

*Leiochone tropica* Mesnil & Fauvel, 1939, Indonesia. Inadequate description from broken specimen, with no mention of ventral shield, and holotype untraced. Not Leiochonini, and indeterminable to species?

Grube (1868) defined *Leiochone* simply on the basis of (in translation) a "terminal funnel smooth-edged and destitute of teeth [cirri]". He did this for two existing species, his own *Clymene leiopygos* Grube, 1860 from Cherso (= Cres), an Adriatic island off Croatia, and *C. urceolata* Leidy, 1855 from New Jersey, USA, which together simply "might form a particular group (*Leiochone*)". *Clymene urceolata* is a *nomen dubium* in *Asychis* (*vide* Light 1974:181), with an inadequate and un-illustrated original description, and a missing type. In essence, the original description indicated a species of 26 segments, with pygidium urceolate (pitcher shaped), head with a thin cephalic rim, and uncini from the second segment. *C. leiopygos* is the better-described of Grube's species pair, and has an existing holotype, although it is fragmented. The original text inadequately indicates character states but is accompanied with anterior and posterior body figures.

Arwidsson (1906 footnote p.145, p.249) made statements that at the time eliminated *C. urceolata* from relevance to *Leiochone* (treating it as an *Asychis* on p.249), and treated *C. leiopygos* as the type of *Leiochone*. His state-

ment that "... *Clymene urceolata* Leidy vermutlich eine *Maldane*- oder *Asychis*-Art ist. Der Name *Leiochone* ist auf das Vorderende von *Clymene leiopygos* zu beziehen, das verhältnismäßig gut bekannt ist und dessen Übereinstimmung mit dem z. B. von *Clymene ebiensis* und *Leiochone clypeata* augenfällig ist." is indicative for the requirements of ICZN Article 69.1 on subsequent type designation (International Commission on Zoological Nomenclature 1999), and no conflicting designation exists (see below). However, Arwidsson's indication may not be sufficiently categorical under Art. 67.5, and accordingly *C. leiopygos* has been designated as type of *Leiochone* above. Arwidsson (1922) later redescribed *L. leiopygos* at length, based on specimens from Devon, and included *L. clypeata* as a synonym. *L. clypeata* was at that time known as a common species on the Bay of Biscay coast (Joyet-Lavergne 1910). The species concept of *L. leiopygos* is in current use, but either under the combination *Clymenura leiopygos*, or more often still under *Cly. clypeata* (for *L. clypeata*) (e.g., Capaccioni *et al.* 1993; Martin *et al.* 2000; MarBEF 2004 distribution records, including from Adriatic; Hausen & Bleidorn 2006; Garwood 2007).

Arwidsson (1906:144) gave a loosely worded diagnosis of *Leiochone*, significantly mentioning the presence of a ventral glandular shield (also the diagnostic character in his p.5 key), that the cephalic plate and rim can be poorly developed, the presence of few anal cirri, and that anterior uncini had reduced dentition. Nevertheless, he included Verrill's then monotypic *Clymenura* as a synonym (along with *Leiocephalus* Quatrefages, 1866) because of the glandular shield in *Clymenura cirrata*, although aware this species has a well-developed cephalic rim as figured in the original description. Arwidsson (1906:147) also indicated a possible future restructuring of *Leiochone* might again split off *Clymenura* when more was known of the group, and might also split off a new genus for *L. polaris* (Théel) (= *Cly. polaris*), a species with a cephalic plate, but almost no rim. After these preliminary analyses Arwidsson (1906) described a new species, *L. borealis* from Norway, an unnamed *Leiochone* (perhaps *L. johnstoni* McIntosh, *vide* Arwidsson 1922:16), and redescribed *L. polaris*.

McIntosh (1915) gave his own *Leiochone* diagnosis, noting a reduced cephalic plate, reduced dentition of anterior uncini, and few anal cirri, but did not include a clear statement on the significance of the 8<sup>th</sup> chaetiger glandular shield, although mentioning or figuring it for some of the four European *Leiochone* he included, including his new species *L. johnstoni*. Arwidsson (1922) did not include another formal diagnosis of the genus, but redescribed *L. johnstoni*, and was critical of McIntosh's reports on the other nominal taxa, *inter alia* suggesting that McIntosh's "*L. ebiensis*" description was of *L. leiopygos*. Four further *Leiochone* species and one subspecies were added to *Leiochone* by other authors between 1923 and 1967, with subsequently only a further subspecies added by Averincev (1990).

Hartman (1959:458) followed Arwidsson (1906) in placing *C. urceolata* in *Asychis* in her catalogue, but treated *Leiochone* as an orphan genus "*ex auctore*" without valid membership. She incorrectly stated that it was "erected for *C. urceolatus*", and disregarded *C. leiopygos*, the other possible type species. The use of "erected for" does not qualify as a type designation and was contrary to her usual practice of clearly indicating type species. She dealt with *C. leiopygos* circuitously, first under *Clymene* (Hartman 1959:453) by tentatively referring it to the junior taxon *L. clypeata*, and then referring *L. clypeata* and all other *Leiochone* to *Clymenura*, except for *L. johnstoni* which is not in her catalogue. Hartman's entries may have been influential in the subsequent disregard of *Leiochone* in favour of *Clymenura* by some authors (e.g., Fauchald 1977:41). However, Bellan & Reys (1967:199) continued *Leiochone*, stating, "Nonobstant l'opinion de Hartman (1959), nous avons préféré conserver le taxon générique de *Leiochone* au lieu de celui de *Clymenura* Verrill 1900... ", and "Nous donnons au genre *Leiochone* le sens le plus restreint que lui attribue Arwidsson et admettons le bien fondé de son argumentation sur la validité du genre proposé par Grube ...".

The six valid *Leiochone* species have very similar morphology (Table 1). All lack cephalic plate rims and have reduced dentition in first chaetiger uncini, all have anal cones with three pygidial cirri (or cirri are absent in one species), and all except one have prostomial ocelli. They currently appear to be limited to temperate to tropical Eastern Hemisphere waters (Europe, Asia, Africa). Four are known as shore species (at least from the original description occurrences), and two may occupy inshore depths, although one of those (*L. japonica*) has been more often found in deepwater (Table 1).

**TABLE 1, part one**

Species (* = junior synonym)	Type locality region	Comment (** = redescription author)	Depth (m)	Size (mm) length width	Chaetiger count	Prenal achaetous segments count	Achaetous tori present
<b><i>Leiochone</i> species</b>							
<i>L. annulata</i> (Mohammad, 1980)	Kuwait	<b>New combination</b>	0	50L 1W	21–22	3?	?
* <i>L. chypeata</i> Saint-Joseph, 1894	Brittany, France	Synonym of <i>L. leiopygos</i>	0	200L 3W	25–29	1?	?
<i>L. japonica</i> (Imajima & Shiraki, 1982)	Japan	<b>New combination</b>	29– 1480 (mostly deep)	43L 1W	19	5	n
<i>L. johnstoni</i> McIntosh, 1915	British Isles	(**Arwidsson, 1922)	0	58L 2.3W	19	5	y
<b><i>L. leiopygos</i> (Grube, 1860)</b>	N. Adriatic	<b>Type of genus</b> (**Arwidsson, 1922)	0	120L 3.2W	24–25	2	n
<i>L. tenuis</i> Day, 1957	Indian Ocean South Africa		0	120L 1.5W	23+?	3 indistinct	n
<i>L. tricirrata</i> Bellan & Reys, 1967	Mediterranean France		30–75	50L 1W	19	2–5	y
<b><i>Clymenura</i> species</b>							
<i>Cly. aciculata</i> Imajima & Shiraki, 1982	Japan	Incomplete original description	306– 1850	27af 2W	?	?	?
<i>Cly. borealis</i> (Arwidsson, 1906)	Norway	Suggested to be a synonym of <i>Cly. tankasteri</i>	90–590	70L 2W	19	5	n?
<b><i>Cly. cirrata</i> Ehlers, 1887</b>	Florida, U.S.A.	<b>Type of genus.</b> Holotype broken, incomplete	642	>43L (2 pieces)	?	1 long	n
<i>Cly. columbiana</i> (Berkeley, 1929)	Canadian Pacific		15–46	40L 1.8W	19	3	n
<i>Cly. tankasteri</i> (McIntosh, 1885)	Japan	Type (incomplete) redescribed (**Imajima & Shiraki, 1982)	120– 1650	45L 1.8W	19	5–6	?
<i>Cly. longicaudata</i> Imajima & Shiraki, 1982	Japan		0–1500	56L 1W	18	2	y
<i>Cly. polaris</i> (Théel, 1879)	Novaya Zemlya	(**Arwidsson, 1906)	42– 1690	31L 2W	19	3	?
<i>Cly. polaris lena</i> (Averincev, 1990)	Laptev Sea (N. Russia)	<b>New combination.</b> Distinct in pygidial ornamentation and estuarine habitat from stem species. <i>vide</i> author	0–7	60L 1.3W	17–19	2	n
<i>Cly. snaitko</i> sp. nov.	New Zealand		0	255L 4W	18	2	y

**TABLE 1, part two**

Species (* = junior synonym)	Anal cone present	Anal valve peg present	Pygidial funnel present	Pygidial cirri total & length	Reduced number of first chaetiger uncini	Reduced dentition in first chaetiger uncini	Prostomial ocelli present	Cephalic plate rim present	Cephalic rim notches, lateral, dorsal
<b><i>Leiochone</i> species</b>									
<i>L. annulata</i> (Mohammad, 1980)	y	?	n	3 long	n	y	y	n	na
* <i>L. clypeata</i> Saint-Joseph, 1894	y	?	n	0	y	y	y	n	na
<i>L. japonica</i> (Imajima & Shiraki, 1982)	y	?	n	3 long	y	y	n	n	na
<i>L. johnstoni</i> McIntosh, 1915	y	y	n	3 long	n	slight	y	n	na
<b><i>L. leiopygos</i> (Grube, 1860)</b>	y	y	n	0	y	y	y	n	na
<i>L. tenuis</i> Day, 1957	weak	y	n	3 long	y	y	y	n	na
<i>L. tricirrata</i> Bellan & Reys, 1967	y	y	n	3 long	y	y	y	n	na
<b><i>Clymenura</i> species</b>									
<i>Cly. aciculata</i> Imajima & Shiraki, 1982	?	?	?	?	y	y	n	y	none
<i>Cly. borealis</i> (Arwidsson, 1906)	y	y	n	7–11 long	y	y	y	y	lat, dor
<b><i>Cly. cirrata</i> Ehlers, 1887</b>	y	?	n	4 long	?	n	?	y	lat only
<i>Cly. columbiana</i> (Berkeley, 1929)	n	?	y	20 short, ventralmost longest	y	y	y	y	lat, dor
<i>Cly. lankesteri</i> (McIntosh, 1885)	y?	y	y (short)	~9 long	y	y	n	y	lat, dor
<i>Cly. longicaudata</i> Imajima & Shiraki, 1982	n	n	y	22+ variable, ventralmost longest	n	n	y	y	dor only
<i>Cly. polaris</i> (Théel, 1879)	y	y	n	1 short	y	y	y	n	na
<i>Cly. polaris lena</i> (Averincev, 1990)	n	?	n	1 short	?	y	?	n	na
<i>Cly. snaiiko</i> sp. nov.	n	n	y	16 short, ventralmost longest	n	n	n	y	lat only

**TABLE 1.** Valid species in *Leiochone* and *Clymenura*, with differentiating character states. Character states taken from original descriptions, except redefinitions as indicated. States for the junior synonym *L. clypeata* (= *L. leiopygos*) are included separately for comparison.

(Anal valve peg = a small projection or flap-like structure at the anal opening; ‘long’ pygidial cirri = cirri length longer than the anal cone. Abbreviations: y, n, ? = yes, no, uncertain; L, W = length, width; lat, dor = lateral, dorsal; na = not applicable; af = anterior fragment.)

## Genus *Clymenura* Verrill, 1900, emended

**Type species.** *Clymene cirrata* Ehlers, 1887:182, by monotypy  
*Clymenura* (*Cephalata*) Imajima & Shiraki, 1982 [= nominotypical *Clymenura*]

**Diagnosis.** Body of 18 to 19 chaetigers, followed by up to six achaetous preanal segments. Cephalic plate present, strongly developed, with cephalic rim prominently raised or, exceptionally, present but indistinct. Nuchal organs straight, length variable, palpode tip bluntly oval. Cephalic ocelli present or absent. Eighth chaetiger with a large ventral glandular shield. Notochaetae winged capillaries only, or also with weakly ornamented forms.

Neurochaetae single rows of rostrate manubriavicular uncini similar on all chaetigers, or reduced in number, dentition, and subrostral bristle development on first two or three chaetigers, or acicular on first chaetigers. Pygidium with or without a deep funnel, if without then with prominent anal cone. Pygidial rim or funnel edge with one to numerous anal cirri, of short, long, or alternating length, with anal valve peg present or absent.

**Remarks.** *Clymenura* includes nine valid taxa which are listed immediately below under their original combinations, ordered by date of description, with character states as enumerated in Table 1. It excludes *Clymenura gracilis* Hartman, 1969, a species of uncertain placement which may need to be redescribed.

*Praxilla polaris* Théel, 1879, Novaya Zemlya. Included in *Leiochone* by Arwidsson (1906:150 redescription), included in *Clymenura* by Hartman (1959) and Imajima & Shiraki (1982).

*Praxilla lankesteri* McIntosh, 1885, Japan. Incomplete original description from anterior fragment. Redescribed in part from holotype by Imajima & Shiraki, 1982, and newly included in *Clymenura* by them as type of subgenus *Cly. (Cephalata)* Imajima & Shiraki.

*Clymene cirrata* Ehlers, 1887, Florida, offshore. Type of *Clymenura*. Holotype fragmented, possibly incomplete, also damaged *fide* Hartman (1938:15).

*Leiochone borealis* Arwidsson, 1906, Norway. Included in *Clymenura* by Hartman (1959). Treated as distinct herein, but possible synonym of *Cly. lankesteri* *fide* Imajima & Shiraki (1982).

*Leiochone columbiana* Berkeley, 1929, Canadian Pacific. Included in *Clymenura* by Hartman (1959) and Imajima & Shiraki (1982).

*Clymenura (Cephalata) longicaudata* Imajima & Shiraki, 1982, Japan.

*Clymenura (Cephalata) aciculata* Imajima & Shiraki, 1982, Japan. Incomplete original description from anterior fragments.

*Leiochone polaris lena* Averincev, 1990, Laptev Sea, Arctic Ocean. **New combination** herein as *Clymenura polaris lena*.

*Clymenura snaiko* **sp. nov.** New Zealand.

#### *Incertae sedis*

*Clymenura gracilis* Hartman, 1969, California. No ventral shield in holotype, LACM-AHF POLY 400, or in other specimens at Los Angeles County Museum of Natural History, pers. comm. Leslie Harris. Not *Clymenura*, not *Leiochonini*.

*Clymenura* was monotypic when introduced by Verrill (1900:654) for *Clymene cirrata* Ehlers, 1887 from 642 m depth off Carysfort Reef, off Key Largo, Florida. Verrill gave the following diagnosis in a footnote:

“Head as in *Euclymene*. Anal segment elongated, with a circular rim, bearing 4 long cirri. Uncini remarkable for having, above the large tooth, two transverse rows of numerous small hooklets, the first row containing about 9 larger ones, the 2d many more. The 2d, 3d and 4th setigerous segments are elongated, and each has a narrow anterior collar.”

Ehlers' original description and figures from three fragments probably suffice to recognise new specimens of the *Clymenura* type species when obtained, but its total number of chaetigers remains uncertain, especially as Hartman (1938:15) reported that the type specimen had since become dry and considerably fragmented. Two species were added directly to *Clymenura* between 1969 and 1980 (Hartman 1969; Mohammad 1980), then Imajima & Shiraki (1982) added a further three species, and produced an emended *Clymenura* diagnosis with two subgenera. They included species first described in *Leiochone*, but without stating why they disregarded *Leiochone* as a name.

None of the features in the quotation from Verrill above remain in the diagnosis of *Clymenura* by Imajima & Shiraki (1982). Rather they considered that *Clymenura* united all maldanids with a ventral glandular shield on chaetiger eight. The seven species Imajima & Shiraki (1982:15) placed in a new subgenus *Cly. (Cephalata)* were supposedly those having a well-defined cephalic plate with flaring rim. The species remaining in the nominotypical subgenus, *Cly. (Clymenura)*, were not listed by Imajima & Shiraki, but they intended to retain species where the plate is poorly defined and plate borders “are situated close to the keel,” thus paradoxically matching Arwidsson's

*Leiochone* concept if it excluded *Clymenura*.

Imajima & Shiraki (1982:12) are incorrect in stating that the nominotypical *Clymenura* species *Cly. cirrata* has a “rudimentary cephalic plate” as it is very well developed (see Ehlers 1887, pl. 46, fig.12). Imajima & Shiraki’s subgeneric split is thus anomalous, with both the *Cly. (Clymenura)* type, and the type species of the new subgenus, *Cly. lankesteri*, having very well-defined plates and rims. Further, both bear some very long anal cirri around an anal cone. Consequently the respective types of the two subgenera appear to be more closely allied to each other than to their intended fellow subgroup members, and subgeneric partitioning of *Clymenura* on the foundation set by Imajima & Shiraki is unworkable.

Imajima & Shiraki (1982) described one new species, *Cly. (Cly.) japonica*, in the nominal subgenus, and compared it to (current names) *Leiochone johnstoni* and *L. tenuis*. It seems logical from those comments, and is also apparent from Table 1 character states, that *Cly. japonica* is a *Leiochone*.

*Clymenura* is here restricted to members of Leiochonini with a well-developed cephalic plate and rim, with the addition of *Cly. polaris*, which has a wide cephalic plate, but lacks a cephalic rim. The separation from *Leiochone* is not so distinct in other important characters, and overall the members are more varied in morphology than *Leiochone*, with, for example, some *Clymenura* possessing similar pygidial features to members of *Leiochone* (such as a prominent anal cone), while others have the anal funnels similar to several other euclymenin genera. The synonymy of *Leiochone borealis* from Norway with *Cly. lankesteri* from Japan seas as suggested by Imajima and Shiraki (1982) is not confirmed; although both belong in *Clymenura* and they are very similar, the former has ocelli, and appears to differ in pygidial structure from the latter (Table 1).

The nine valid *Clymenura* are mostly species from high North European latitudes and the northern Pacific region, with the interesting geographic exceptions of *Cly. cirrata* from offshore Florida, and the New Zealand shore species. The geographic range was not previously known to extend to the Southern Hemisphere. Most are subtidal, with four of the species having depth distributions from inshore or continental shelf depths out to deep water (Table 1, variously to 590–1850 m).

Contrary to a suggestion of Jiménez-Cueto & Salazar-Vallejo (1997), the deep-water southern Indian Ocean maldanid, *Axiothella crozetensis* Gillet, 1989, cannot be placed in *Clymenura*, despite its tricirrate pygidial morphology and prominent anal cone (more typical of *Leiochone*), as Gillet (1989) originally reported it lacks a ventral glandular shield on chaetiger eight.

### ***Clymenura snaiko* sp. nov.**

Figures 1–4

**Diagnosis.** A *Clymenura* of up to at least 255 mm length, with red anterior body, 18 chaetigers, 2 preanal achaetous segments with tori, more than 10 manubriavicular uncini present from chaetiger 1, capitium teeth array well developed and similar in all rami. High cephalic rim with lateral dip into a pronounced notch, not incised, dorsal rim entire, weakly crenellate, nuchal organs straight, almost full length of plaque. No ocelli, no segmental collars. Anal funnel present with 16 distinct conical cirri, with the ventral cirrus about twice the length of adjacent; anal cone absent. Chaetiger 8 glandular shield edge a curved line extending anteriorly and ventrally from notochaetal fascicle forming a subtriangular half-oval.

**Material examined.** Station Y10432, 19 Feb 2008, Decanter Bay, Banks Peninsula, NIWA 44716 (3 af 2 pf), 43.6599°S, 172.9911°E, 0 m; Y10434, 20 Feb 2008, Decanter Bay, Banks Peninsula, NIWA 44575 (1 cs 3 af), 43.6599°S, 172.9911°E, 0 m; Y10435, 21 Feb 2008, Okains Bay, Banks Peninsula, NIWA 60439 (1 cs, HOLOTYPE), NIWA 44599 (1 cs, PARATYPE), NIWA 44600 (7 af 6 pf, PARATYPES), 43.6946°S, 173.0641°E, 0 m; Y10439, 24 Feb 2008, Le Bons Bay, Banks Peninsula, NIWA 44573 (1 broken cs), NIWA 44574 (3af 2 pf), 43.7408°S 173.09610°E, 0 m.

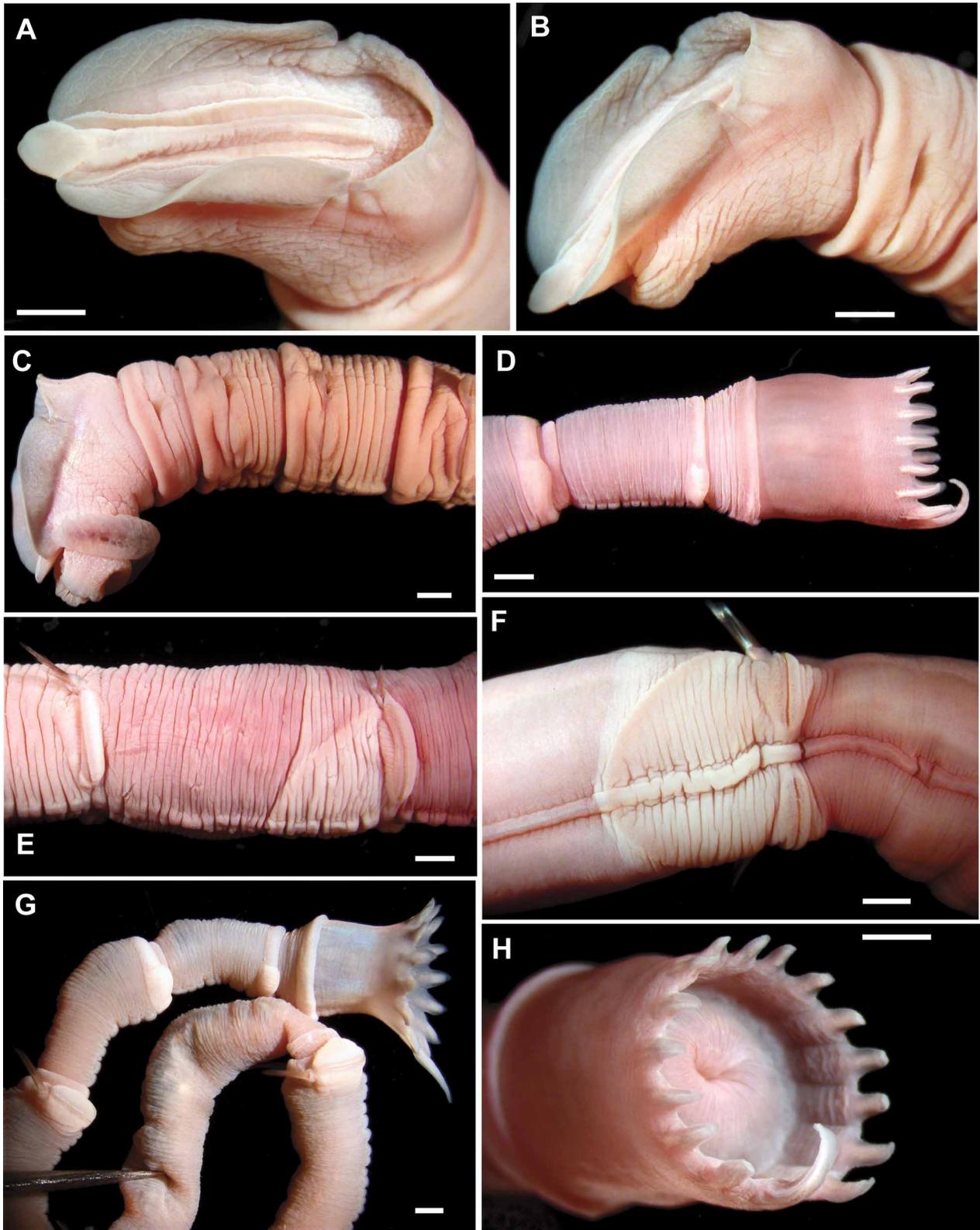


**FIGURE 1.** *Clymenura snaiko* sp. nov. Holotype. Scale bar 10 mm.

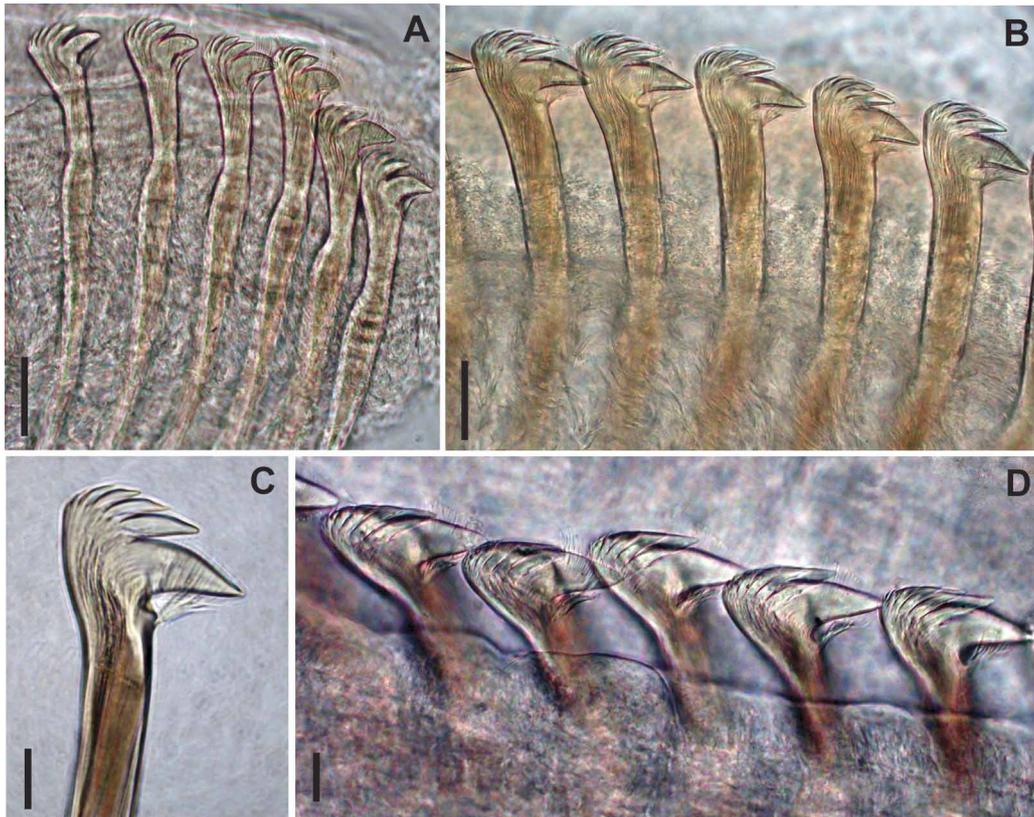
**Description.** A large maldanid with specimens of preserved length to around 255 mm long, 5.5 mm wide (complete specimens: NIWA lot 44575 160 mm long, midbody 4.7 mm wide; lot 44599 255 mm long, 5.5 mm wide; lot 44573 255 mm long, 5.0 mm wide; holotype lot 60439 210 mm long, 4.5 mm wide). Body with 18 chaetigers, 2 preanal achaetigerous segments with tori (Fig. 1). Body colour more or less uniformly dark red anteriorly, paler red posteriorly, paler chaetal tori and ventral shield area, otherwise without distinctive pigmentation patterns. Scattered fine dark flecks on uncinal tori and surrounds on chaetigers 8–14 apparent after preservation in some specimens (Fig. 2F). Well-developed cephalic plaque with high cephalic rim with lateral dip into a pronounced notch, not incised; dorsal rim entire, weakly crenellate; nuchal organs wide and straight, almost full length of plaque (Fig. 2A–C). Palpode well developed with rounded tip, proximal margin with carina distinct (Fig. 2A). No ocelli. Surface of chaetigers 1–8 with multiple prominent transverse segmental divisions, thereafter body much smoother, but fine divisions still visible. No segmental collars. Ventral shield present just anterior to chaetiger 8 chaetal fascicles as a raised pale glandular zone, with curved lateral margins and subtriangular in shape (Fig. 2E–F), varying in prominence between individuals. Distinct segmental organ apertures (nephridiopores) present posterior to ventral end of uncinal rows on chaetigers 6–9, one pair per segment.

Notochaetae capillaries of one type, smooth but only slightly winged, from chaetiger 1–18. Notochaetae of chaetigers 1–7 in transverse rows, about 20 chaetae in a single row on chaetiger 1, increasing to about 30 irregularly arranged 3-deep on a low parapodial lobe on chaetiger 3. Thereafter notochaetae in each fascicle of similar numbers, but longer. From about chaetiger 12 notochaetae becoming grouped in a tight tuft on a conical parapodial lobe, which becomes longest on far posterior segments, with rows within chaetal tuft with long axis oriented diagonally or longitudinally, sometimes discernibly U-shaped.

Single row of manubriavicular uncini present from chaetiger 1–18, with capitium teeth and subrostral bristles well developed on all uncini, with single row of 5 in-line capitium teeth above rostrum (Fig. 3). In chaetiger 1 uncini subrostral isthmus distal to manubrial constriction 60  $\mu$ m long (Fig. 3A), in posterior chaetiger uncini isthmus 140  $\mu$ m long with larger chaetal capitium (Fig. 3B), otherwise ornamentation similar; uncinal shaft length increases modestly from ~250  $\mu$ m in anterior chaetigers to ~350  $\mu$ m posteriorly. More than 10 uncini in chaetiger 1, with number increasing to about chaetiger 9, so that in a large specimen chaetiger 1 has 16 uncini, chaetiger 3



**FIGURE 2.** *Clymenura snaiko* sp. nov. head, body segments, and pygidium. A–B, anterior lateral head and lateral head, specimen of lot (s.o.l.) 44575; C, lateral anterior to chaetiger 4 (s.o.l. 44600); D, lateral pygidial funnel and 2<sup>nd</sup> achaetous segment (s.o.l. 44600); E, lateral chaetiger 8 (s.o.l. 44599); F, ventral chaetiger 8 (holotype); G, posterior end (s.o.l. 44716); H, pygidial funnel posterior view (s.o.l. 44600). Scale bars 1 mm.



**FIGURE 3.** *Clymenura snaiko* sp. nov. uncini. A, chaetiger 1 row *in situ*; B, chaetiger 14 row *in situ*; C, chaetiger 14 uncinal head; D, chaetiger 15 row *in situ*. A–B at actual relative sizes, scale bars 50  $\mu$ m, C–D scale bars 20  $\mu$ m.

has 27, 5 has 43, and chaetigers 9–18 about 60 uncini in each row. Raised neuropodial rami on chaetigers 3–8, less distinct on chaetigers 9–10, extending around the circumference to meet the ventral midline and increasing in height and bulk over chaetigers 11–13, thereafter of similar size. Chaetal fascicle on chaetigers 1–7 on anterior third of segment, chaetiger 8 fascicle in midsegment, thereafter at posterior of segment. First and second preanal segments about 2/3 and 1/2 length of last chaetigerous segment respectively, with achaetous reduced torus at posterior of each (Fig. 2G). In one specimen second achaetous segment regenerating, without tori.

Pygidial funnel well developed, ending with 16 distinct flattened blunt cirri (n14, range 14–18, mode 16, sd 1.37), well separated and varying little in size except ventral cirrus usually about twice the length of adjacent ones (Fig. 2D, G, H). Holotype funnel length 3.5 mm from callus ring to cirral base, with ventral cirrus 1.8 mm long, other cirri up to 1.0 mm. Medial thickest part of each cirrus distinct as a pale ridge in some specimens (Fig. 2D). Anus terminal without valve, flush, not raised on a cone (Fig. 2H), except as distorted in preservation in some specimens. Ventral midline ridge prominent, from postperistomial segment to end of body (Figs. 1, 2F).

**Type locality.** Intertidal sands of Okains Bay, Banks Peninsula, 43.6946°S, 173.0641°E.

**Etymology.** The word ‘*snaiko*’ is coined to form a sinuous-sounding recombination of the letters of the type locality place name, and is to be treated as a noun in apposition.

**Habitat and ecology.** Worms were present on low-tidal flats on moderately exposed sand beaches (Fig. 4A), occurring sporadically as isolated individuals, or in small groups of estimated maximal density 5–7 m<sup>-2</sup> in a group (Fig. 4B). The beaches are at the head of bays of narrow width, laterally bounded by abrupt basaltic slopes or cliffs, and surrounded by farmland. The largest population was found on the Okains Bay sand beach (Fig. 4A), which is 0.9 km long, the largest beach on which the worm was present. Le Bons Bay sand beach is 0.7 km long, and the sand beach at Decanter Bay extends for less than 200 m. The species was not detected at Little Akaloa Bay, which adjoins Decanter Bay and has a comparable, slightly larger beach.

Surface signs of the worm’s presence included shallow stopings of about 20-mm diameter as well as castings (Fig. 4B). Pieces of worm tube recovered with worms were unlined fragile sandgrain aggregations with a wall thickness about 1–1.5 mm. Two of the 16 specimens were regenerating the head and first chaetiger, suggesting that

*Cly. snaiko* **sp. nov.** may be subject to 'browsing' attacks from predators such as shorebirds and fish. A large *Disconatis accolus* (Estcourt) polynoid scaleworm (NIWA lot 44782) was found as a commensal in the tube of the specimen from station Y10432 in Decanter Bay.



**FIGURE 4.** A, Okains Bay beach type locality, with sampling equipment in foreground; B, cast and stopings of *Clymenura snaiko* **sp. nov.**, Okains Bay beach. Scale bar 20 mm.

**Distribution.** Known only from the intertidal of bays of eastern Banks Peninsula, South Island, New Zealand.

**Remarks.** *Clymenura snaiko* **sp. nov.** and *Cly. longicaudata* from Japan are distinct from other *Clymenura* species (in which chaetiger total is known) in having 18 chaetigers. Most *Clymenura* are subtidal, but remarkably *Cly. longicaudata* occurs from the sandy intertidal of its type locality to 1500 m depth. The two species also share the character states of two preanal segments, a well-developed pygidial funnel with a ring of cirri, fully dentate rostrate uncini on first chaetigers, long nuchal grooves, and well-developed cephalic rims. However, *Cly. longicaudata* differs considerably from *Cly. snaiko* **sp. nov.** in lacking lateral notches in the cephalic rim, having anal cirri of alternating rather than similar length, having ocelli on the palpode, and having ornamented notochaetae present. *Cly. columbiana* from the Canadian Pacific has similar pygidial funnel structure to the above species but has 19 chaetigers with 3 or more preanals. *Cly. lankesteri* from Japan and *Cly. borealis* from Norway also have 19 chaetigers; the former has a very short, pleated pygidial funnel, the latter only an anal cone, but both have a number of very long pygidial cirri. All three species have uncini on the first chaetigers which are few in number and of reduced dentition. *Cly. polaris* from Novaya Zemlya and *Cly. polaris lena* from the Laptev Sea lack cephalic rims and have only one pygidial cirrus. Finally *Cly. aciculata* from Japan and *Cly. cirrata* from Florida are incompletely known, but they possess first chaetiger uncini which are acicular or of reduced dentition respectively, and notably *Cly. cirrata* has a pygidium with four long cirri.

The new *Clymenura* is large and inhabits beaches which, while rather remote of access, are visited frequently for recreation, and also at times for faunal studies. For example, during the years 1950–1980, polychaetes of eastern Banks Peninsula were often collected by G. A. Knox and students from Canterbury University, Christchurch, and the uncommon open beach onuphid *Hartmanonuphis pectinata* (Knox & Hicks, 1973) was first discovered there. As this species was found living on Decanter Bay beach together with *Cly. snaiko* when the beach was visited in 2008, Knox might also have come across the malidanid during visits decades earlier. However, the presence of *Cly. snaiko* has never been noted before, perhaps a consequence of its relatively low densities intertidally and intermittent populations, which currently are too sparse to be conspicuous. No specimens were found in the late Professor Knox's polychaete collection, nor are any Banks Peninsula malidanids entered in his register books (collection and registers held at NIWA). Additionally, in relation to the possible wider distribution of the species, no specimens of it from offshore have been found amongst the New Zealand Maldanidae in the NIWA Invertebrate Collection, derived from over 10,000 benthic samples (Gordon *et al.* 2010). It appears that any significant undetected populations of *Cly. snaiko* **sp. nov.** are most likely to be in the northeastern Banks Peninsula shallows beyond low water in Okains, Le Bons, and Decanter bays.

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