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Abstract

The coupling of morphology and DNA barcoding is arguably the most common method combination in modern biodiversity studies. When applied together, they can provide new knowledge on species diversity across a wide range of taxa both within the plant and animal kingdom. This study serves as an assessment of the species diversity within the three marine isopod genera *Idotea*, *Jaera* and, *Janira* in Norway. The assessment is done through a morphological study and DNA barcoding using the mitochondrial gene cytochrome c oxidase subunit 1 (CO1). This was done to evaluate congruency between the two methods in terms of species identification. The geographical distributions for all encountered species within the genera were included to see where in the country the different species can be found. Few studies have been made on this order since the work of Sars (1899), and CO1 sequences for *Jaera* and *Janira* species from Norwegian waters are currently lacking. The material for this study includes 838 specimens collected from 93 different locations along the entire Norwegian coastline. Five *Idotea*, three *Jaera*, and one *Janira* species could be identified from the studied material. A total of 157 specimens were sequenced, producing 118 successful sequences which were used to calculate mean genetic distances and produce haplotype networks for all three genera. *Idotea neglecta* is newly barcoded using CO1 in this study. Detailed species descriptions were made for *Jaera* species as well as remarks on species of *Janira* and *Idotea*. The results show that species of *Idotea* are readily identified through both CO1 barcodes and morphology. Mean genetic distances between species are > 10% and mean within distances are < 1% when using both K2P and p-distance, and diagnostic morphological characters are consistent and easily observed. The three species of *Jaera*, all belonging to the *Jaera albifrons* species complex, show no clear variation in the CO1 gene with both inter and intraspecific genetic distances < 1%. All species also share the highest frequency haplotype which is present in all but one of the Norwegian coastal counties. Diagnostic characters for the three species are consistent with what has been described in the existing literature. The single *Janira* species, *Janira maculosa*, possesses recognizable morphological characters while simultaneously displaying large genetic variations in CO1 forming multiple clades. Genetic distances between these clades vary between 5-30% depending on the substitution model, providing indications of cryptic species. This study shows that there is still much to learn about common species found in the intertidal zone.

Sammendrag

Foreningen av morfologiske undersøkelser og DNA strekkoding, vil for mange regnes som de mest sentrale metodene i moderne studier om biodiversitet. Sammen har disse metodene stor kapasitet til å gi ny kunnskap og innsikt i både plante og dyreriket. Denne studien foretar en vurdering av artsdiversiteten blant de tre marine slektene av Isopoda *Idotea*, *Jaera* og *Janira* slik de forekommer i Norge. Vurderingen er gjort gjennom en morfologisk studie og DNA strekkoding hvor det mitokondrielle genet cytochrom oxidase subenhet 1 (CO1) ble brukt. Dette ble gjort for å undersøke hvorvidt det finnes samsvar mellom de to metodene når det kommer til å identifisere arter. Den geografiske distribusjonen for alle observerte arter i de tre slektene har blitt inkludert for å kartlegge hvor i landet de ulike artene forekommer. Få studier har blitt gjort på denne ordenen siden arbeidet av Sars (1899), og for *Jaera* og *Janira* er det mangel på CO1 sekvenser. Materialet for denne studien omfatter 838 prøver samlet fra 93 lokasjoner langs hele Norskekysten. Fem arter av *Idotea*, tre arter av *Jaera* og én art av *Janira* ble identifisert fra det samlede materiale. Totalt 157 individer fra de tre slektene ble sekvensert hvorav 118 ble vellykkede. CO1 sekvenser for *Idotea neglecta* har nylig blitt produsert som en del av denne studien. Disse vellykkede sekvensene ble brukt for å kalkulere gjennomsnittlige genetiske distanser og for å produsere haplotype nettverk for hver av slektene. I tillegg ble det formulert en detaljert artsbeskrivelse av de tre *Jaera* artene, samt notater om morfologien til de andre artene av *Idotea* og *Janira*. Resultatene viser at arter av *Idotea* lar seg identifisere både gjennom CO1 strekkoder og morfologi. De genetiske distansene mellom artene er > 10% og distansen innad i hver art er < 1% både for K2P og p-distanse, og diagnostiske morfologiske karakterer er både konsistente og lett å observere for alle arter. De tre artene av *Jaera* tilhører artskomplekset *Jaera albifrons* gruppen. Disse artene viser ingen variasjon i CO1 med en inter og intraspesifikk distanse på < 1% for alle artene. Det blir også vist at alle tre artene er representert i haplotypen med høyest frekvens som også er til stede i alle norske fylker langs kysten utenom ett. Diagnostiske morfologiske karakterer for de tre artene samsvarer godt med beskrivelser gjort i den eksisterende litteraturen. Den ene arten av *Janira*, *Janira maculosa*, har gode og gjenkjennbare morfologiske karakterer. Samtidig viser arten stor intraspesifikk genetisk distanse mellom individer basert på CO1 som fordeler seg i ulike klader. Distansene mellom disse kladene varierer mellom 5-30% avhengig av substitusjonsmodell, hvilket indikerer tilstedeværelsen av kryptiske arter. Denne studien viser at vi fremdeles har mye å lære om vanlige arter funnet i tidevannssonen.

Table of contents

List of abbreviations

AFLP	Amplified fragment length polymorphism
BIN	Barcode Index Number
BOLD	Barcode of Life Database
CCDB	Canadian Centre for DNA Barcoding
CO1	Cytochrome *c* oxidase subunit 1
HWN	High-water neaps
HWS	High-water spring
IBOL	International Barcode of Life
K2P	Kimura 2 parameter
LWS	Low water springs
MLWN	Mean low water neaps
mtDNA	Mitochondrial DNA
NBIC	Norwegian Biodiversity Information Centre
nDNA	Nuclear DNA
NJ	Neighbor-joining
NorBol	Norwegian Barcode of Life
NTNU-VM	NTNU University Museum
OUT	Operational Taxonomic Unit
SEM	Scanning electron microscope
WoRMS	World Register of Marine Species
ZMBN	University Museum of Bergen

1 Introduction

1.1 Modern taxonomy and its methods

The mapping of species diversity is considered an important undertaking for the protection and preservation of the world's ecosystems. To better understand the different biological components of the ecosystem, as well as their different functions, it is crucial to first obtain fundamental information on the species themselves (Cardinale, Nelson, & Palmer, 2000; Schlick-Steiner et al., 2010). Discovering and describing new species has been considered an important task for centuries (Godfray, 2002; Winston, 1999b). Due to an increase in habitat destruction, the introduction of invasive species, and climate change, the work of taxonomists have become increasingly necessary in recent times (Zhang, 2011).

Modern taxonomy, which by many is attributed to Carl Linnaeus (Godfray, 2002; Lukhtanov, 2019), not only deals with cataloging, describing and naming new and old species, but also with delimitation and identification of species (Dayrat, 2005). Several disciplines in biology such as ecology, evolutionary, and conservation biology, depend on clear species delimitations and knowledge about species diversity provided through taxonomic work (Dayrat, 2005). Traditionally, a new species would be described as a morphospecies, that is, a species identified based on external morphological characteristics. As such, the species diversity would be considered nothing more than what Dayrat (2005) refers to as morphodiversity.

An exclusively morphological approach to species identification can become difficult when presented with species displaying strong polymorphism (J. P. Wares & Cunningham, 2001), sexual dimorphism (Ernest Naylor & Brandt, 2015), or phenotypic plasticity (Paul D. N. Hebert, Cywinska, Ball, & deWaard, 2003). To resolve such difficulties, the modern taxonomists also need to employ additional data such as ecological, geographical, and genetic or molecular data, to differentiate between species (Cain, 1966). DNA barcoding has become one of the most widely used molecular approaches to species identification. The standard method for this approach uses a 658 base pair region, known as the Folmer region (Folmer, Black, Wr, Lutz, & Vrijenhoek, 1994) of the mitochondrial gene cytochrome *c* oxidase subunit 1 (COI), to distinguish between congeneric species (Paul D.N. Hebert, Ratnasingham, & Waard, 2003; Raupach et al., 2015). Due to the low intraspecific variation and high interspecific variation of the CO1 gene (Casiraghi, Labra, Ferri, Galimberti, & De Mattia, 2010), it has been considered as the standard marker for identifying animal species.

DNA barcoding has the potential to, not only provide a more objective way of identifying species, but also to correct misidentifications and to unveil the presence of cryptic species (Paul D. N. Hebert, Penton, Burns, Janzen, & Hallwachs, 2004; Johnson, Warén, & Vrijenhoek, 2008; Velzen, Bakker, & van Loon, 2007). The cryptic species term will here be understood as individuals with a nearly identical morphology that possesses large genetic variations. When using CO1 barcodes, an interspecific genetic distance greater than 2% (P. Hebert, Ratnasingham, & Dewaard, 2003) or a 10 fold difference between mean intra and interspecific distance (Paul D. N. Hebert, Stoeckle, Zemlak, & Francis, 2004), has been suggested as the standard threshold to recognize one species from another. In some cases known as "gray zones" however, CO1 might provide a false-positive result for species identification where the CO1 based divergence between two specimens is high, but nuclear DNA (nDNA) markers show low divergence (Bochkov, Klimov, Kim, & Skoracki, 2019). Recent speciation events and introgression can also lead to identification issues based on CO1 as the sequences can be highly homogeneous, thereby portraying different species as the same species (Hickerson, Meyer, & Moritz, 2006). To further ensure the value of genetic data for species identification, it has been suggested to include nuclear markers as supplements to CO1 (Raupach et al., 2010).

Phylogeographic studies commonly use genetic data to produce haplotype networks which are often used to illustrate intraspecific genetic differentiation between geographically separated populations, as well as the genetic overlap between them. The haplotypes constitute groups of identical sequences and can therefore be viewed as specific genetic populations within a certain species. By identifying geographical barriers between such populations, one can begin to explain why a species might display a difference in morphology, or the genetic distance between two genetic populations (Yoshino, Yamaji, & Ohsawa, 2018).

Genetic sequences, like CO1, are stored in databases such as the Barcode of Life Database (BOLD) (Ratnasingham & Hebert, 2007). In BOLD, the sequences are grouped together based on the degree of similarity and assigned a Barcode Index Number (BIN) which functions as a stronger representation of a particular species called operational taxonomic units (OTUs) (Ratnasingham & Hebert, 2013).

To increase knowledge on biodiversity, the International Barcode of Life (IBOL) initiative, started in 2008, has set out to ensure progress in the mapping of the world's biodiversity through the building of reference libraries containing DNA barcodes of all known life forms on earth (IBOL, 2021b). Norway is one of the member nations of IBOL where the Norwegian Barcode of Life (NorBol) program, will carry out the registration of species found in the nation as a contribution to IBOL (IBOl, 2021a). The DNA barcodes produced in these efforts are uploaded to BOLD to strengthen its value as a reference library (NorBol, 2021a). The Norwegian Biodiversity Information Center (NBIC) collaborates with NorBol through support and funding of different species projects. One such project is called *Invertebrate fauna on marine rocky shallow-water habitats* (project code HABFA). The overall goal of the project is to expand the knowledge of marine invertebrates, their biodiversity, geographical distribution and to contribute with DNA barcodes to BOLD (NBIC, 2019). This study, focusing on species diversity amongst marine isopods, is written as a contribution to the HABFA project.

1.2 The isopods

The order Isopoda Latreille, 1817 consists of species found in a large variety of habitats both in aquatic and terrestrial biomes (Ernest Naylor & Brandt, 2015; Poore & Bruce, 2012). In 2012 more than 10 300 species were known to science with over 6 250 of them belonging to a marine or estuarine habitat (Poore & Bruce, 2012). Since the review by Poore and Bruce (2012), even more species from the marine environment have been discovered at different locations around the world (Brix, Leese, Riehl, & Kihara, 2014; Kaiser et al., 2021; Khalaji-Pirbalouty & Raupach, 2014). In a recent study on distribution patterns in abyssal isopods by Brix et al. (2020), more than 94 % of the isopod species collected were considered as either new to science or just recently described. Of the 184 species found in Norway, 171 are registered as marine species (Elven, 2016).

Marine isopods can be found all the way from the supratidal zone to the deep hadal zone. They display a wide variety of morphological appearances and feeding strategies with different species being carnivores, herbivores, filter feeders, detrivores, or even parasites (Brusca, 1997; Ernest Naylor & Brandt, 2015; Poore & Bruce, 2012). Many isopods are also successful omnivores capable of feeding on algae, seaweed, and animal waste (Franke & Janke, 1998; Kjennerud, 1950; E. Naylor, 1955b). A common trait shared by all isopods is the presence of a marsupium in which the females keep their eggs until they have hatched, before releasing miniature versions of the adults into the water as juveniles also called muca (Brusca, 1997) (Figure 2C). Species can also vary greatly in size from the 500 mm giant *Bathynomus* A. Milne-Edwards, 1879 species of the deep sea (Lowry & Dempsey, 2006) to the 1.5 mm species of *Jaera* Leach, 1814. While the majority of marine isopods are considered obligate benthic crustaceans, some, like members of *Idotea* Fabricius, 1798 (E. Naylor, 1955a) and Munnopsidae Lilljebjorg, 1864 (Brix et al., 2020) are relatively capable swimmers. The focus of this study will be directed towards species in the three genera *Jaera*, *Janira* Leach, 1814, and *Idotea*. Based on previous observations by Sars (1899) and the report by Elven (2016), the following species presented in Table 1 are expected to be found in this study.

Table 1: Species expected to be found in this study based on the literature.

Order	Suborder	Family	Genus	Species	Authority
Isopoda	Asellota	Janiridae	*Jaera*	*Jaera albifrons*	Leach, 1814
				Jaera praehirsuta	Forsman, 1949
				Jaera ischiosetosa	Forsman, 1949
			Janira	*Janira maculosa*	Leach, 1814
	Valvifera	Idoteidae	*Idotea*	*Idotea granulosa*	Rathke, 1834
				Idotea emarginata	(Fabricius, 1793)
				Idotea neglecta	Sars, 1897
				Idotea balthica	(Pallas, 1772)
				Idotea pelagica	Leach, 1815
				Idotea chelipes	(Pallas, 1766)

1.2.1 Typical marine isopod anatomy

The body of most isopods, here represented by *Idotea granulosa* Rathke, 1834 (Figure 1), *Jaera sp.* and *Jaera albifrons* Leach, 1814 (Figure 2A-D), are divided into cephalon (head), pereon, and the pleon which forms the posterior end of the body. The segments of the pereon are either referred to as pereon somites, pereonites, or tergal plates, with the first segment often fused with the head (Figure 1A). The head is fitted with two pairs of antennae, the shorter primary antenna referred to as the antennule, and the larger secondary antenna. Both antennae consist of a peduncle and flagellum where the antennular peduncle is often shorter than the flagellum. The length of the antennal peduncle and flagellum can vary between different species, but the flagellum is usually the longest component of the antenna (Figure 1B). Apart from the members of the family Gnathiidae Leach, 1814, the pereon consists of seven segments to which the pereopods (walking legs) attach to the ventral side of the body. The lateral margins of the pereonites are often extended by coxal plates which cover the basis of the pereopods (Figure 1A). Coxal plates can be viewed from a dorsal angle, but in some genera such as *Jaera*, they are smaller and only just visible.

Pereopods are divided into six joints. The basis, which is attached to the underside of the pereonite, is followed by the ischium, merus, carpus, propodus, and dactylus (Figure 1B). The pereopods can be of equal function and appearance, but in some genera, the carpus, propodus, and dactylus of the first pereopod pair are modified into claws or gnathopods, though they are rarely addressed as such. Pleon is further divided into pleotelson, a dorsal region consisting of the telson, and the last posterior pleon somite which in some species can be fused with the telson (Figure 1A). The anatomy of the ventral side of the pleon differs between the suborders. Valvifera Sars, 1883 species are recognized by how the uropods form a lid that is mediolaterally split into two forming valves which function as an operculum. Underneath the uropods lies the pleopods which function both in breathing and – in the valviferan species – for swimming. In *Idotea* – a member of Valvifera – the males display an appendix masculina on the inner side of the second pleopod (Figure 2E). Contrary to Valvifera, the species of Asellota Latreille, 1802 shows sexual dimorphism in the ventral anatomy of the pleotelson. The first pair of pleopods are missing in females, and the second pair forms an operculum that covers the rest of the pleopods (Figure 2D). Males of the suborder possess a preoperculum which consists of the first pair of pleopods in combination with the second pair (Figure 2B).

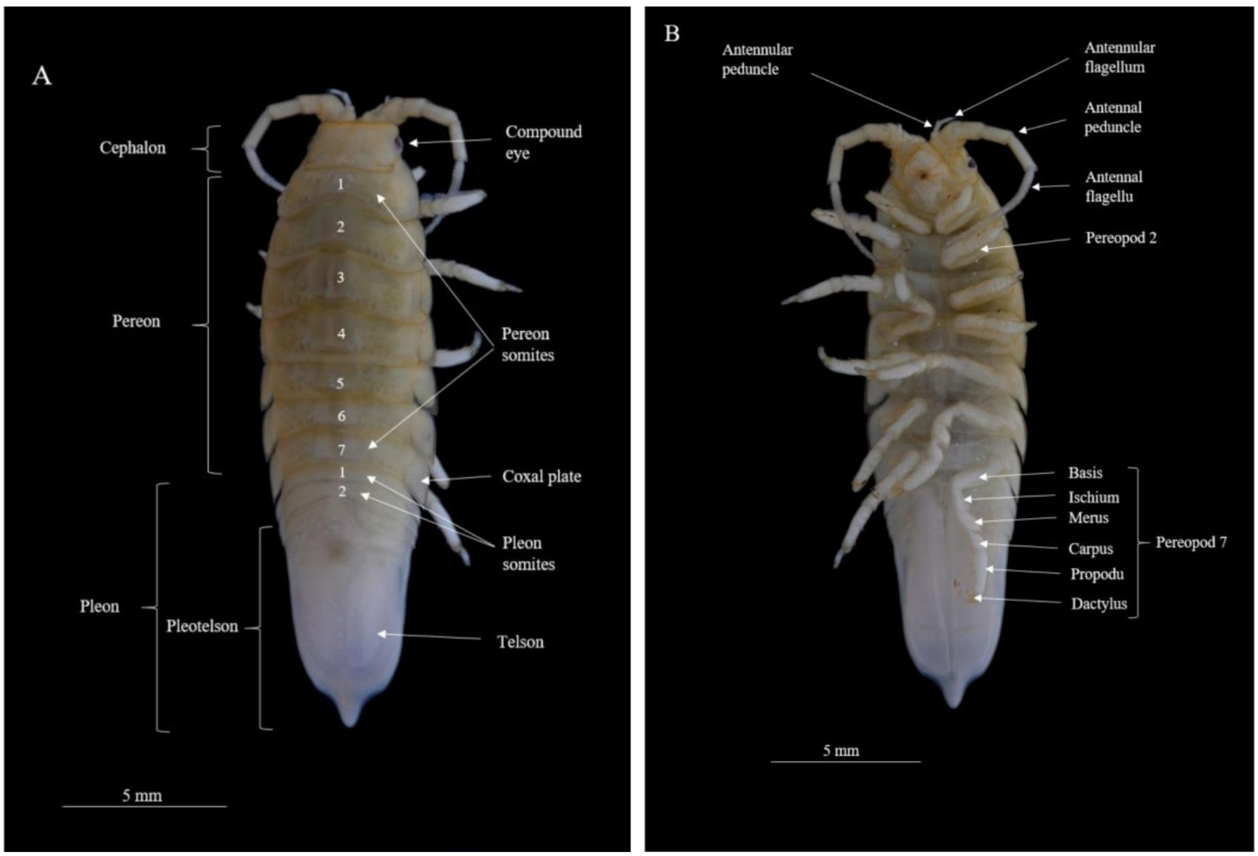

Figure 1: General isopod anatomy represented by I. granulosa*. A) dorsal view. B) ventral view. Photo: August R. Nymoen*

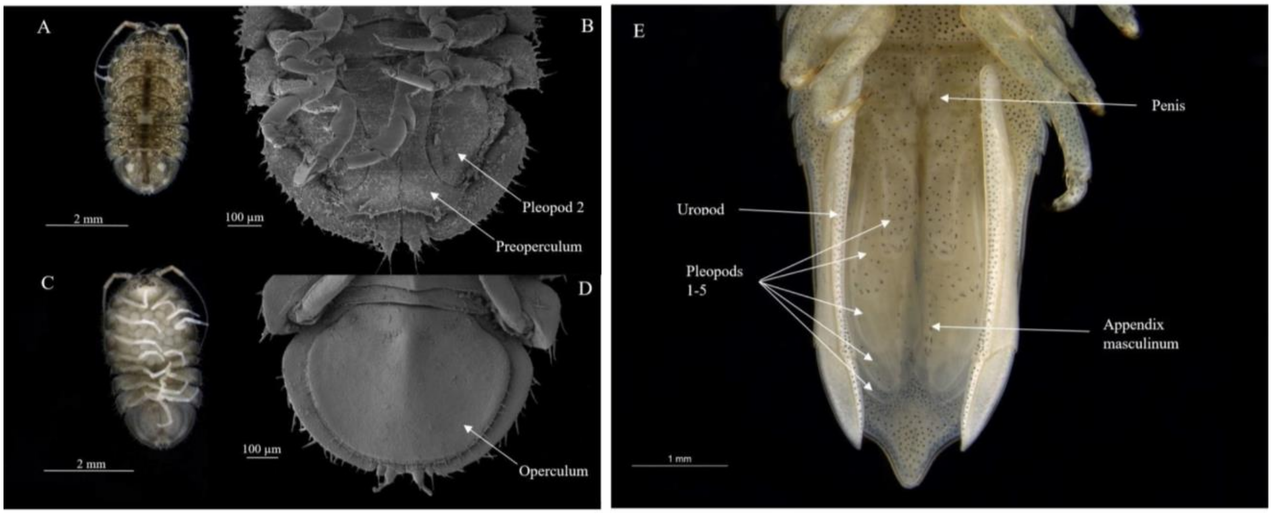

Figure 2: Jaera *illustration. A) Dorsal view of female* Jaera sp. *B) Ventral view of male* Jaera *preoperculum exemplified with* J. albifrons*. C) Ventral view of ovigerous female* Jaera sp. *D) Ventral view of female* Jaera sp *operculum.* Idotea *illustration. E) Ventral view of male pleon in* Idotea *represented by* I. granulosa*. Photo A, C, E: August R. Nymoen. B, D: Katrine Kongshavn*

1.2.2 *Idotea* Fabricius, 1798

The *Idotea* species constitute a considerable percentage of crustacean grazers in shallow waters (Boström & Mattila, 1999; Franke & Janke, 1998; Korpinen & Jormalainen, 2008). According to WoRMS (2021), there are 26 species of *Idotea* worldwide, and when searching for the distribution of Norwegian marine isopod species, only five *Idotea* species are listed. These five species, namely *Idotea balthica* (Pallas, 1772), *Idotea emarginata* (Fabricius, 1793), *Idotea pelagica* Leach, 1816, *Idotea neglecta* G. O. Sars, 1897 and *Idotea granulosa*, were considered as common by Sars (1899) in his work "*An Account of the crustacea of Norway*". He also mentions a 6th species *Idotea chelipes* (Pallas, 1766), to be common in Oslofjorden. The NBIC documents a clear distribution of the six species along the entire Norwegian coastline (NBIC, 2021b).

BOLD contains 821 specimen records for *Idotea* collected in Europe and North America, 535 of which have been mined from GenBank. Despite all the available data, only two studies concerned exclusively with the phylogeny of *Idotea* have been found. In the first study, Panova, Nygren, Jonsson, and Leidenberger (2017) performed a phylogenetic study on 7 out of the 8 European *Idotea* species using CO1 and the nuclear 28S rRNA gene, including specimens gathered from Skagerrak and the Norwegian Sea. The only species they did not find was *I. neglecta*. They found that the north-east Atlantic species of *I. pelagica*, *I. granulosa*, *I. emarginata*, and *I. balthica* forms a monophyletic clade together with *Idotea metallica* Bosc, 1802 and *I. chelipes*. It was, however, found that *Idotea linearis* (Linnaeus, 1767), another north-east Atlantic species, and *Idotea urotoma* Stimpson, 1864 from North America falls outside of this clade. Because of this, the authors could not conclude that *Idotea* is monophyletic. Another study by Xavier et al. (2012) on the phylogeny of *Stenosoma* Leach, 1814 where *Idotea* was used as an outgroup, suggests that *Idotea* is a paraphyletic group based on nuclear data (28S), while mitochondrial data (CO1+ND4) displays *Idotea* as a monophyletic group.

The second study is the unpublished master thesis by Natal (2015) in which the same markers employed by Xavier et al. (2012) were used to assess the phylogeny of *Idotea* in the north-east Atlantic and the Mediterranean Sea. The results from Natal (2015) suggest that *Idotea* is a monophyletic group based on nuclear and concatenated datasets (mt genes CO1+ND4 and mt and nuclear genes CO1+ND4+28S). Her thesis also indicates the presence of cryptic species within *I. balthica* where the CO1 p-distance between specimens from the northeast Atlantic and Mediterranean was 7.2% (Natal, 2015). Other studies also report phenotypic variation in lineages of *I. balthica* from Europe and the North Atlantic (John P. Wares, Sarah, Wetzer, & Toonen, 2007) and noticeable difference in diversity between North American and European populations (J. P. Wares & Cunningham, 2001). There is, in other words, some ambiguity concerning the phylogeny of *Idotea,* as well as the identification of some of its members.

1.2.3 *Jaera* Leach, 1814

There are in total 18 marine species of *Jaera* around the world (WoRMS (2021)). The NBIC species name database lists the four *Jaera* species *J. albifrons*, *Jaera ischiosetosa* Forsman 1949, *Jaera praehirsuta* Forsman, 1949, and *Jaera forsmani* Bocquet, 1950 (NBIC, 2021c), but observations have only been recorded for one of them, namely *J. albifrons* (NBIC, 2021d). These four sympatric species (Haahtela, 1965; E. Naylor & Haahtela, 1966) belong to what is known as the *Jaera albifrons* group (E. Naylor & Haahtela, 1966). At first, all members of this group were identified as *J. albifrons* until B. Forsman (1949) published a paper in which he divided the previously named *Jaera albifrons* into the four subspecies *Jaera albifrons albifrons* Leach, 1814 (nominate subspecies), *J. a. ischiosetosa* Forsman, 1949, *J. a. praehirsuta* Forsman, 1949, and the North American *J. a. posthirsuta* Forsman, 1949. Through the examination of specimens collected largely at the east coast of North America and nine localities across Norway as well as other areas in Scandinavia, he discovered consistent morphological differences in male pereopods. A year later, Bocquet (1950) described two additional members to the group named *Jaera forsmani* Bocquet, 1950 and *Jaera syei* Bocquet, 1950 which are also recognized by secondary sexual characters in the pereopods of the males. There is limited information on these two species in the current literature, and since the original descriptions were not obtained, any specific details on *J. forsmani* or *J. syei* were not included here. Bocquet later elevated the subspecies described by Forsman and himself, to species within the superspecies *Jaera* *marina* (Fabricius, 1780) using trinomial names. The six species were thus named *Jaera marina albifrons* Leach, *J. m. forsmani* Bocquet, *J. m. ischiosetosa* Forsman, *J. m. posthirsuta* Forsman, *J. m. praehirsuta* and *J. m. syei* Bocquet 1950 (original articles by Bocquet were not obtained) (E. Naylor & Haahtela, 1966). In their work on the *J. albifrons* group, E. Naylor and Haahtela (1966) suggested the use of the binomial names *Jaera albifrons* Leach, *J. forsmani* Bouquet, *J. ischiosetosa* Forsman, *J. praehirsuta* Forsman, and *J. posthirsuta* Forsman due to their sympatric occurrence. While the species are placed in the *Jaera (Jaera)* subgenus in WoRMS (2021), the accepted alternate nomenclature suggested by E. Naylor and Haahtela (1966) is what is commonly used, and they will therefore also be used throughout this study.

The females of the *J. albifrons* group possess no morphological characters that allow for species identification (Haahtela, 1965; Ribardière et al., 2019). In a study by Khaitov, Kuzmin, and Terovskaya (2007), an attempt was made to separate the females of the different species based on morphometric measurements of the coupling zone (CZ). However, the authors concluded that even though there were significant differences in CZ between groups of female individuals, the sample size would have to be so large, and the effort would be so great, that the method was deemed too cumbersome to perform for most studies.

Apart from the distribution of *J. albifrons*, no reported observations of the other four species have been reported to NBIC. However, there have been performed some studies on the presence of the different members of this group in Norway, primarily in the 1960s. Authors such as Pethon (1968), Brattegard (1966), Sjöberg (1967), and Hussey (1964) provides notes on the ecology and distribution of *J. albifrons* group species from Oslofjorden, Hardangerfjorden, Raunefjorden, and Troms og Finnmark County respectively. The knowledge they provide appears to have been overlooked in recent years, and so the different species are absent from species diversity surveys, except for *J. albifrons*. As the most acknowledged and comprehensive work on marine isopods in Norway was performed by G. O. Sars (1899) before the division by B. Forsman (1949), it might explain how the other species of the group have been overlooked. In his work Sars also provides the only identification key for marine species in Norway where he uses the name *J. marina* instead of *J. albifrons*.

Through a combination of microsatellite genetic structure analysis and field surveys, Ribardière et al. (2017) – supporting the findings by Solignac (1981) – showed that asymmetric introgressive hybridization occurs between *J. albifrons* and *J. praehirsuta* in Normandy, France. In this case, a female hybrid formed from a female *J. praehirsuta* and a male *J. albifrons* can, by mating with a member of its paternal species, insert *J. praehirsuta* mitochondrial DNA (mtDNA) into the *J. albifrons* population gene pool due to the maternal inheritance of mtDNA (Mifsud, 2011; Solignac, 1981). The asymmetry in this case means that it does not happen the other way around. The study by Ribardière et al. (2017) also showed that hybrid specimens would display intermediate phenotypes or mixed morphology. Simultaneously, the study determined that similar sympatric populations (referred to as mixed populations) in Brittany (which is relatively close to Normandy) showed a stronger genetic divergence between the species. Here, the species were observed in more distinct habitats while they in Normandy appeared to share the same habitat (Ribardière et al., 2017). Interspecific hybridization thus appears to occur largely in certain mixed populations, and less so in similar populations blends which are separated by a geographical barrier. Based on these findings there can be expected a high degree of similarity in CO1 sequences between the two aforementioned species. Furthermore, while the original article was not found, Jażdżewski (1969) refers to a discovery by Forsman (1951) who found that crossbreeding easily occurs between *J. albifrons* and the North American *J. posthirsuta*. C. Bocquet (1954) also noted that hybridization between *J. forsmani* and the other *J. albifrons* group members, with the exception of *J. praehirsuta*, could occur.

Authors such as Ernest Naylor and Brandt (2015) have called for a taxonomic revision on the *J. albifrons* group. All species are, as of now, only identified as morphospecies and CO1 sequences for the species are scarce. The few public sequences both from mitochondrial (Raupach et al., 2015) and nuclear (Dreyer & Wägele, 2002; Mohrbeck, Raupach, Martínez Arbizu, Knebelsberger, & Laakmann, 2015) DNA that exists for *J. albifrons*, have not been used strictly for the purpose of species identification.

1.2.4 *Janira* Leach, 1814

Janira is only represented by 5 species, of which *Janira maculosa* Leach 1814 is the only species reported present in Norway (WoRMS (2021)). The NBIC lists two other species under *Janira*, both with synonymized names, namely *Janira breviremis* G. O. Sars, 1883 (accepted name: *Ianiropsis breviremis* (G. O. Sars, 1883)) and *Janira laciniata* G. O. Sars, 1872 (accepted name: *Tole laciniata* (G. O. Sars, 1872)) (NBIC, 2021e). *J. maculosa* is widely distributed in Norway (NBIC, 2021a), but apart from frequent observations and short mentions in a few studies (Christie, Jørgensen, Norderhaug, & Waage-Nielsen 2003; Gulliksen, 1978), no study on species identification of *Janira* was found. As of today, Sars (1899) is the only provider of ecological as well as taxonomic information on the species as it is found in Norway.

Molecular data for *J. maculosa* is scarce. All six CO1 sequences registered in GenBank (Sayers et al., 2020) were gathered in association with the study by Raupach et al. (2015) in the North Sea. The only phylogenetic information that was found concerning this species was a study on isopod mitochondrial genomes by Kilpert, Held, and Podsiadlowski (2012), who noted that *J. maculosa* had showed a strong deviation from the ancestral mitochondrial gene order. As with the *Jaera* species, species identification of *J. maculosa* based on molecular data is currently lacking.

1.3 Aims

The main aim of this study was to identify species belonging to the genera *Idotea*, *Jaera* and *Janira* through morphology and DNA barcoding using the CO1 gene, as an assessment of species diversity within the three genera. The assessment focused on species living along the Norwegian coastline, specifically on hard substrates within the euphotic zone.

CO1-based DNA barcodes are currently lacking for several species of *Jaera* and for *Idotea neglecta*. Therefore, an effort was made to produce good CO1 sequences as a contribution to both NorBol and BOLD.

Aims clearly stated:

- Assess the species diversity of *Idotea*, *Jaera* and *Janira* living along the Norwegian coastline, specifically species living on hard substrates within the euphotic zone through a comparison of genetic and morphological data.
- Create identification keys and species descriptions.
- Defining the geographical distribution for observed members of the previously mentioned genera.

2 Methods

2.1 Study area and distribution

The substrate and geographical area of interest are limited to hard substrates within the euphotic zone (0-40 m) along the Norwegian coastline following the parameters set for the HABFA project. Here, hard substrates refer to algae, rocks, shells, wood, and anthropogenic structures such as concrete, ropes, and buoys.

Samples were gathered from 93 locations along the Norwegian coastline (Figure 3). Location names, coordinates, and depth were noted while on site (Appendix I, Table A1). Most samples were collected during low tide at different times of the year between 2018 and 2020. Sampling at low tides allowed for collections at a variety of tidal levels from high-water spring (HWS) and high-water neaps (HWN), to mean low water neaps (MLWN) and low water springs (LWS). Typical characteristics of the locations included different-sized rocks lying on rocks, intertidal pools, and macroalgae such as *Fucus serratus* Linnaeus, 1753 or other species of *Laminaria* J. V. Lamouroux, 1813. Clusters of *Mytilus edulis* Linnaeus, 1758 were also examined. Exposure level to high seas and salinity levels were also considered when choosing locations for sampling, to increase the chances of finding as many species as possible. Typical locations are illustrated in Figure 4.
ArcGIS Pro Version 2.6.3 was used to showcase the distribution of both species and sampling locations by importing all the relevant coordinates and plot them on an ocean base map.

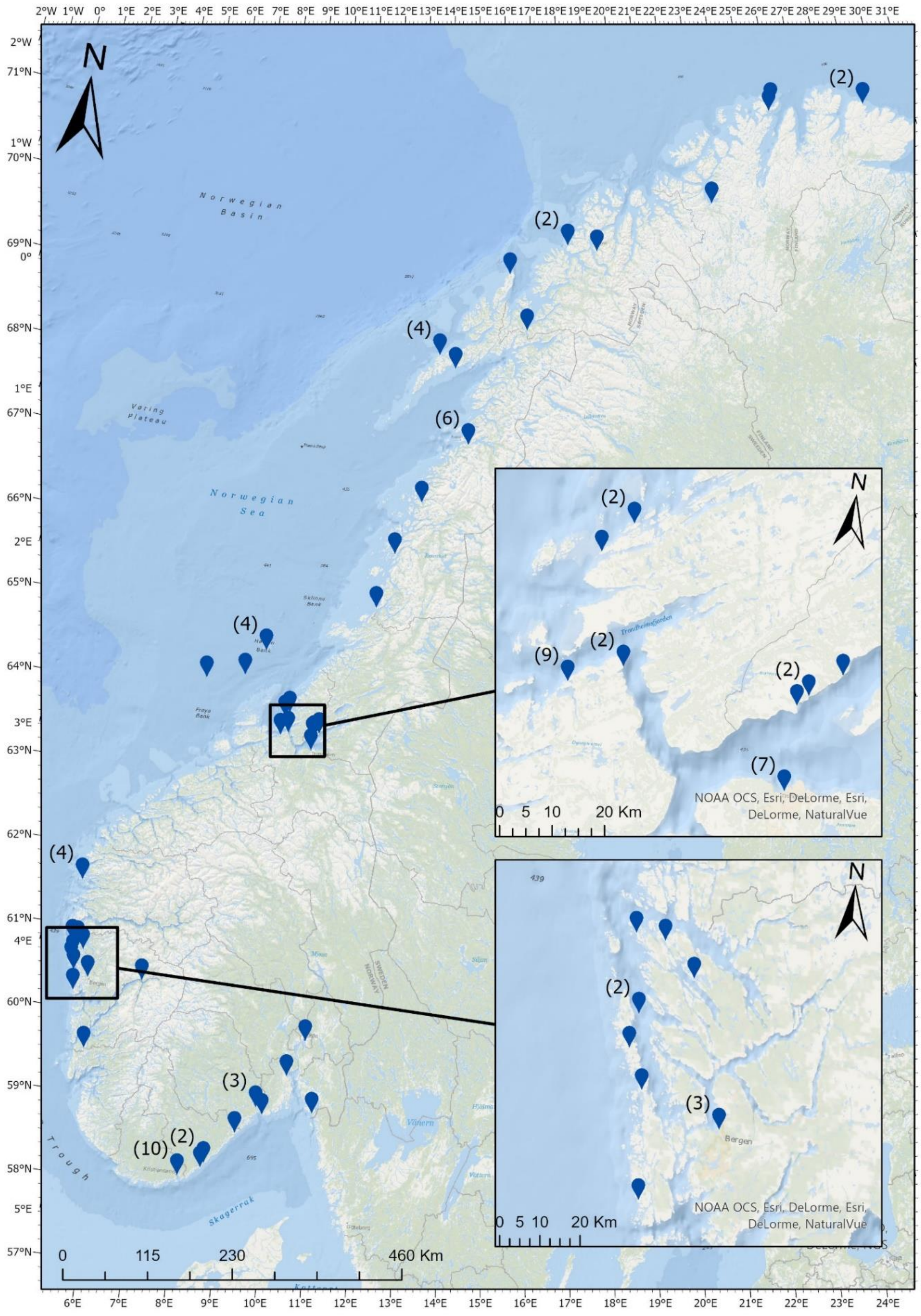

Figure 3: Illustration of sampling locations. The number of sampling sites for each location is noted in parenthesis.

2.2 Samples and sampling methods

All samples collected were stored in 96% ethanol at the NTNU University Museum (NTNU-VM) and the University Museum of Bergen (ZMBN). Sample details can be seen in Appendix I, Table A1. The primary collecting method was intertidal walks (Figure 4). At low tide, a single person or a small team of people would walk along the shore within a small area and collect specimens that were either fixated in 96% ethanol on-site or brought back to the lab for further sorting. Specimens were picked by hand or gathered with different handheld tools such as a long net or small scraping tools to remove epifauna from rocks. Members of the genus *Jaera* were mostly picked using either a pair of fine twicers, a paintbrush, or a pipette often directly from rocks. In some locations, macroalgae were shaken over a white tray to collect specimens hiding amongst the algae. Snorkeling and a dredge were used to collect from depths down to 20 m. Samples from the *Polychaetes in Norwegian Ports: Uncovering Diversity in Coastal Anthropogenic Environments and Assessing Cryptogenic and Non-indigenous Species* (project code PolyPort) and *#sneglebuss Barents Sea* projects were also included. Due to the large vertical distribution of *Janira maculosa*, as described by Sars (1899), specimens from beyond the euphotic zone collected by the MAREANO project will be included for this species.

Figure 4: Typical sampling locations with Hestdalsbukta on the left and Valsøya on the right. The sampling method in these examples was intertidal walks. Photo: Torkild Bakken.

2.3 Morphology

All specimens were identified to the lowest possible taxa based on external morphological characters using a Leica M165C light microscope. Descriptions and identification keys in the following literature were used for identification: *Intertidal Marine Isopods* (Ernest Naylor & Brandt, 2015), *Isolating Mechanisms and Modalities of Speciation in the Jaera albifrons Species Complex (Crustacea, Isopoda)* (Solignac, 1981), *An Account of the Crustacea of Norway* (Sars, 1899), *Weitere studien über die rassen von Jaera albifrons Leach* (B. Forsman, 1949), *The Comparative External Morphology and Revised Taxonomy of the British Species of Idotea* (E. Naylor, 1955a) and *Kräftdjur* (Enckell, 1998). Images were taken with a Leica DFC420 camera attached to a Leica MZ16A light microscope and edited using Gimp version 2.10.22 and Microsoft Word version 2104. Habitus images of *Idotea* species were taken with a Nikon Z6 using a Nikkor 105 mm macro lens. Collages were made at the website Canva.com. All measurements included in the descriptions were made by placing a ruler underneath the specimens. A few specimens from the collections at the NTNU University Museum and the University Museum of Bergen were revised and included for morphological analysis only. These specimens were not included for DNA barcoding as they were too old to extract DNA from. Specimens from museum collections are presented in Appendix I, Table A2.

A Supra 55VP scanning electron microscope (SEM) was used to photograph *J. albifrons*, *J. praehirsuta*, and *J. ischiosetosa* to better study their morphology and to illustrate their diagnostic characters. A selection of specimens were airdried and coated with gold palladium using a Polaron SC502 Sputter Coater to make them electrically conductive. SEM photography was performed at the University Museum of Bergen.

The general structure of the species descriptions follows the guidelines provided by Winston (1999a). Inspiration for isopod-specific descriptions was taken from Brix et al. (2014), Khalaji-Pirbalouty and Raupach (2014), and Doti and Wilson (2010). Due to the absence of morphological characters which would allow for species identification, the females of the *J. albifrons* group are not described in this study. The mouthparts of the species in this group have been determined as identical between the species (Jones, 1972) and will therefore also not be described. Terminology for different setae follows descriptions from Riehl and Brandt (2010) and Garm (2004). The different species of *Idotea* have already been thoroughly described in the existing literature, and so it has been deemed unnecessary to provide a detailed description of each species here. A more thorough description of the *Jaera* species was made due to the difficulties in identifying the different species. Relevant synonyms gathered from WoRMS (2021) have been included for some species.

2.4 DNA extraction and PCR amplification

A 96 well plate containing 49 tissue samples from legs, eggs, half of the body, or the entire body was taken from a variety of species belonging to the three genera of interest. The samples were sent to the Canadian Centre for DNA Barcoding (CCDB) at the University of Guleph. The CCDB performed DNA extraction, PCR, and DNA sequencing according to their standardized methods using the Folmer primer pair C_LepFolF/C_LepFolR (Folmer et al., 1994) for CO1 amplification. The procedure done by the CCDB produced no sequences for the members of *Jaera*, or for *Idotea neglecta*. These species were therefore processed at the genetics laboratory at the University Museum of Bergen, where an initial test was done to identify the optimal method to produce good sequences.

The extraction methods Quick Extract (Epicentre), ENZA (Omega Bio-tek, USA), and DNEasy Blood & Tissue kit (Qiagen, GmbH, Hilden, Germany) and primer pairs jgLCO1490M13/jgHCO2198M13 (Raupach et al., 2015) and COI_Fbalt/COI_Rbalt (Panova et al., 2017) were tested on a total of 20 specimens consisting of 9 *Jaera* sp., 2 *J. ischiosetosa,* 1 *J. albifrons*, 1 *J* cf. *forsmani*, 2 *J. praehirsuta,* and 5 *I. neglecta*. DNEasy Blood & Tissue kit provided good extracts for all specimens. The jgLCO1490M13/jgHCO2198M13 primer pair provided good sequences for *I. neglecta* while COI_Fbalt/COI_Rbalt gave the best results for *Jaera*.

Having determined a suitable extraction method and primer pair, DNA extraction was performed on a total of 96 specimens using the DNeasy 96 Blood & Tissue Kit following the protocol provided by the manufacturer. Tissue samples from 58 *Jaera*, 33 *Janira maculosa*, 1 *Idotea* cf. *metallica* (Bosc, 1802), and 4 *Ianiropsis breviremis* were prepared. For *Jaera*, entire specimens were used, while for *Janira*, *Idotea*, and *Ianiropsis* specimens, a varying number of legs were used. Entire *Janira* specimens were used if the specimens were smaller than 1.5 mm.

For the pre-PCR, 100 µl of each of the primer pair COI_Fbalt and COI_Rbalt (Panova et al., 2017) were prepared by mixing 10 µl primer with 90 µl double distilled water. A master mix containing 16.35 µl double distilled water, 2.5 µl 10xBuffer, 2 µl DNTPs, 1 µl (100 µM) forward primer, 1 µl (100 µM) reverse primer, and 0.15 µl Takara Ex Taq Hot Start DNA Polymerase was made. The volumes for all reagents were multiplied by the number of samples. This yielded 23 µl master mix per PCR-well. 2 µl of the prepared DNA extract was mixed and centrifuged for a few seconds with 23 µl master mix in PCR wells, giving a total of 25 µl for each well. One negative control containing only master mix and one positive control taken from the initial test were included. S-and C1000 Thermal Cycler was used to perform PCR. The PCR cycling is displayed in Table 2.

Table 2: PCR cycling.

Temperature (°C)	Time	Step	Number of cycles
94	5 min	Initiation	x1
94 45 72	45 sec 30 sec 1 min	Annealing	x5
94 50 72	45 sec 30 sec 1 min	Extension	x30
72	10 min	Elongation	x1
6		Cool	

Gel electrophoresis was used for DNA detection post-PCR. A 1 % agarose gel was prepared by mixing 200 ml of 1xTAE buffer and 2 g of agarose. The mixture was heated until it became clear and free of clumps. Gel red (6 µl) was added to 100 ml agarose gel and gently mixed before it was emptied into the gel caster. Loading dye (1 µl) was added to 4 µl PCR product, before adding the 5 µl mixture to the wells of the agarose gel. A 5 µl fast ruler was used as a ladder. The gel electrophoresis was set to 80 V and left for 30 min. The PCR product from all 96 samples was sent to Macrogen Europe B.V for PCR purification and sequencing. All sequences were uploaded to BOLD under the HABFA project.

2.5 Molecular analysis

A neighbor-joining (NJ) tree was generated in BOLD using the Taxon ID Tree analysis with the Kimura 2 Parameter substitution model and the integrated BOLD aligner (Ratnasingham & Hebert, 2007). Process ID, depth, and BIN number were included for all sequences. Sequences with stop codons were excluded.

MEGA X (Kumar, Stecher, Li, Knyaz, & Tamura, 2018) was used to create one alignment and genetic distances for each genus. Alignments were done using MUSCLE (Edgar, 2004), choosing the align by codon option. For *Idotea* and *Jaera*, the sequences were grouped based on species, while sequences from *Janira maculosa* were grouped by clades produced in the NJ tree. Mean genetic distances between and within groups were calculated using both the p-distance and Kimura 2 parameter (Kimura, 1980) (K2P) substitution model for each genus. This was done to illustrate differences between the observed and expected number of mutations and to show the difference between single and multiple mutations. All calculations included a 500 bootstrap, a gamma distribution (shape parameter =1), transitions and transversions, pairwise deletion of gaps, and 1st, 2nd, 3rd, and noncoding codon positions. 31 nucleotide sequences were used for *Janira*, 18 for *Idotea,* and 55 for *Jaera*. Female *Jaera* specimens could not be grouped by species and were therefore excluded from the analysis.

Haplotype networks were made in PopART (Leigh & Bryant, 2015) using the TCS network analysis (Clement, Posada, & Crandall, 1999). Sequences used consisted of 661 sites for *Jaera* and *Janira* and 657 for *Idotea*. TCS was chosen due to its ability to include recombination – a possibility in mtDNA (Ladoukakis & Zouros, 2001) – thus being more suitable when studying genealogies at the population level, especially when there are low divergences between individuals (Clement et al., 1999). The analysis also accounts for potential unobserved haplotypes (Paradis, 2018), which will enable some evaluation of sequence sample size. The same alignment used to calculate genetic divergence was uploaded to DNAsp version 6.12.03 (Rozas et al., 2017) and saved as a haplotype data file in NEXUS format. For *Jaera*, six females were added giving a total of 61 sequences for this genus. The haplotype data file collapses multiple sequences into haplotypes based on 100% similarity. Sites with alignment gaps were not considered and invariable sites were removed. Geographic information was later included in the NEXUS file as a trait block by creating a matrix showing which county each sequence belonged to. Another trait block containing a matrix showing which sequences belonged to which species was also created. Metadata on all specimens can be found in Appendix I, Table A1.

3 Results

3.1 Molecular results

A total of 838 specimens representing five *Idotea*, six *Jaera*, and one *Janira* were identified during this study. From all the 157 sequenced specimens 118 provided successful CO1 sequences (Table 3). The length of the analyzed sequences ranged from 526 to 661 bp.

Table 3: Overview of species that were collected out of species expected to be found. TNL = total number of locations. N = number of specimens, TNs = total number of sequenced specimens, NSs = number of successful sequences.

Genus	Species	Authority	TNL	N	TNs	NSs
Idotea	*Idotea granulosa*	Rathke, 1834	28	140	7	7
	Idotea emarginata	(Fabricius, 1793)	2	35	3	2
	Idotea neglecta	Sars, 1897	5	11	10	4
	Idotea balthica	(Pallas, 1772)	6	12	4	1
	Idotea pelagica	Leach, 1815	11	47	4	3
	Idotea chelipes	Pallas, 1766	-	-	-	-
	Idotea sp.	Fabricius, 1798	1	2	2	1
Jaera	*Jaera albifrons*	Leach, 1814	7	51	21	14
	Jaera praehirsuta	Forsman, 1949	17	63	21	20
	Jaera ischiosetosa	Forsman, 1949	9	69	20	18
	Jaera cf. *forsmani*	Bocquet, 1950	4	10	7	6
	Jaera cf. *syei*	Bocquet, 1950	1	1	-	-
	Jaera sp.	Leach, 1814	23	350	19	7
Janira	*Janira maculosa*	Leach, 1814	19	49	41	35

The purpose of the NJ tree produced in BOLD is to illustrate differences between species and to serve as a tool for identification, not to infer phylogenetic relationships. Sequences belonging to the same species are expected to form one single clade that is separated from other clades by a distance of more than 2% (P. Hebert et al., 2003). The tree in Figure 5 was made using all sequences and shows a total of 12 clades divided between 11 species. Sequences from *Ianiropsis breviremis* (n=7) were included to show misidentifications of *Janira maculosa*. The five *Idotea* species form one separate clade for each species, while all *Jaera* species are placed in one single clade. The single species of *Janira*, *J. maculosa*, form five clades denoted C1-C5 (Figure 5). Since the tree presents a different case for each genus, they will be addressed separately.

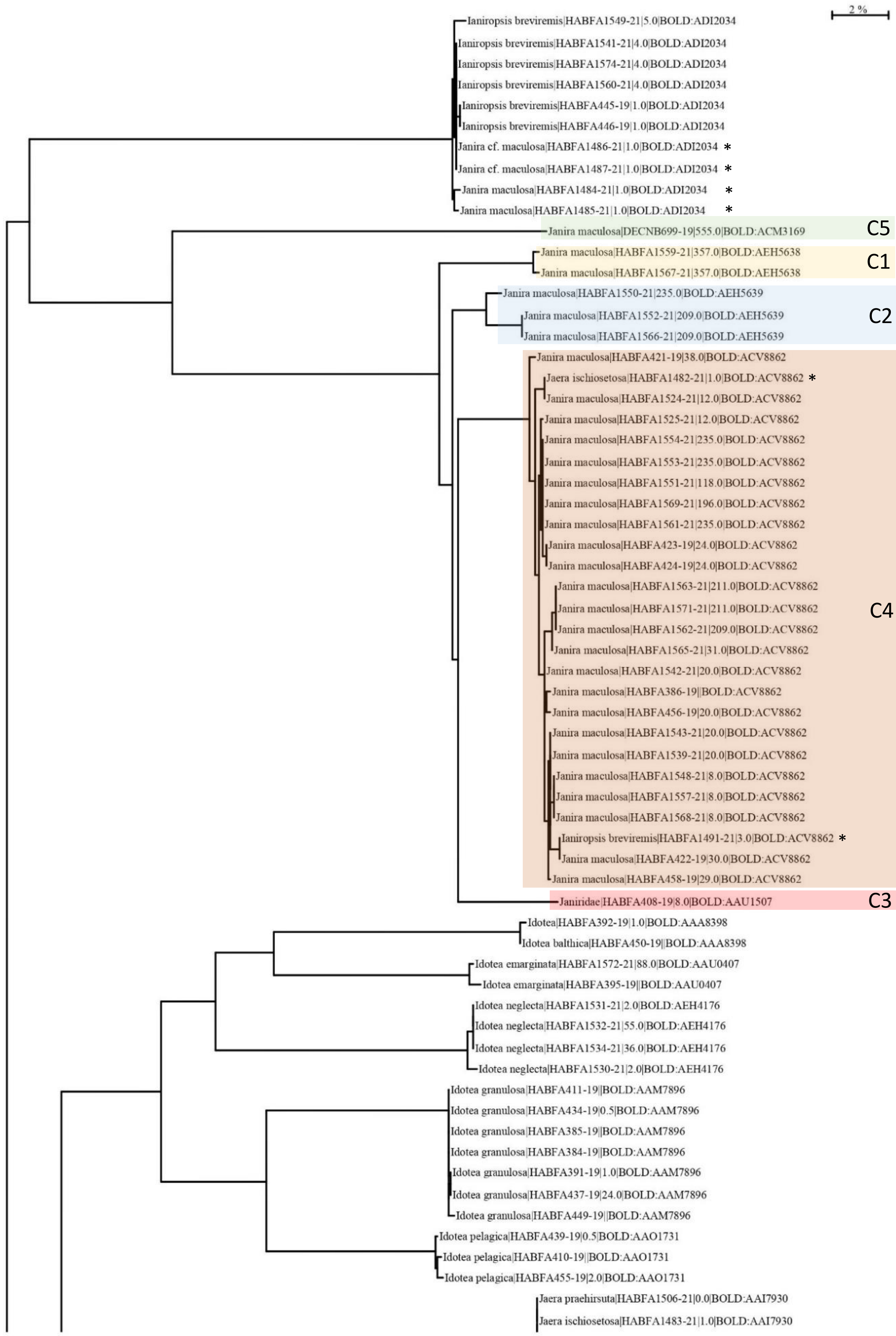
2 %
Ianiropsis breviremis|HABFA1549-21|5.0|BOLD:ADI2034
Ianiropsis breviremis|HABFA1541-21|4.0|BOLD:ADI2034
Ianiropsis breviremis|HABFA1574-21|4.0|BOLD:ADI2034
Ianiropsis breviremis|HABFA1560-21|4.0|BOLD:ADI2034
Ianiropsis breviremis|HABFA445-19|1.0|BOLD:ADI2034
Ianiropsis breviremis|HABFA446-19|1.0|BOLD:ADI2034
Janira cf. maculosa|HABFA1486-21|1.0|BOLD:ADI2034 *
Janira cf. maculosa|HABFA1487-21|1.0|BOLD:ADI2034 *
Janira maculosa|HABFA1484-21|1.0|BOLD:ADI2034 *
Janira maculosa|HABFA1485-21|1.0|BOLD:ADI2034 *
Janira maculosa|DECNB699-19|555.0|BOLD:ACM3169
C5
Janira maculosa|HABFA1559-21|357.0|BOLD:AEH5638
Janira maculosa|HABFA1567-21|357.0|BOLD:AEH5638
C1
Janira maculosa|HABFA1550-21|235.0|BOLD:AEH5639
Janira maculosa|HABFA1552-21|209.0|BOLD:AEH5639
Janira maculosa|HABFA1566-21|209.0|BOLD:AEH5639
C2
Janira maculosa|HABFA421-19|38.0|BOLD:ACV8862
Jaera ischiosetosa|HABFA1482-21|1.0|BOLD:ACV8862 *
Janira maculosa|HABFA1524-21|12.0|BOLD:ACV8862
Janira maculosa|HABFA1525-21|12.0|BOLD:ACV8862
Janira maculosa|HABFA1554-21|235.0|BOLD:ACV8862
Janira maculosa|HABFA1553-21|235.0|BOLD:ACV8862
Janira maculosa|HABFA1551-21|118.0|BOLD:ACV8862
Janira maculosa|HABFA1569-21|196.0|BOLD:ACV8862
Janira maculosa|HABFA1561-21|235.0|BOLD:ACV8862
Janira maculosa|HABFA423-19|24.0|BOLD:ACV8862
Janira maculosa|HABFA424-19|24.0|BOLD:ACV8862
Janira maculosa|HABFA1563-21|211.0|BOLD:ACV8862
Janira maculosa|HABFA1571-21|211.0|BOLD:ACV8862
Janira maculosa|HABFA1562-21|209.0|BOLD:ACV8862
Janira maculosa|HABFA1565-21|31.0|BOLD:ACV8862
Janira maculosa|HABFA1542-21|20.0|BOLD:ACV8862
Janira maculosa|HABFA386-19||BOLD:ACV8862
Janira maculosa|HABFA456-19|20.0|BOLD:ACV8862
Janira maculosa|HABFA1543-21|20.0|BOLD:ACV8862
Janira maculosa|HABFA1539-21|20.0|BOLD:ACV8862
Janira maculosa|HABFA1548-21|8.0|BOLD:ACV8862
Janira maculosa|HABFA1557-21|8.0|BOLD:ACV8862
Janira maculosa|HABFA1568-21|8.0|BOLD:ACV8862
Ianiropsis breviremis|HABFA1491-21|3.0|BOLD:ACV8862 *
Janira maculosa|HABFA422-19|30.0|BOLD:ACV8862
Janira maculosa|HABFA458-19|29.0|BOLD:ACV8862
C4
Janiridae|HABFA408-19|8.0|BOLD:AAU1507
C3
Idotea|HABFA392-19|1.0|BOLD:AAA8398
Idotea balthica|HABFA450-19||BOLD:AAA8398
Idotea emarginata|HABFA1572-21|88.0|BOLD:AAU0407
Idotea emarginata|HABFA395-19||BOLD:AAU0407
Idotea neglecta|HABFA1531-21|2.0|BOLD:AEH4176
Idotea neglecta|HABFA1532-21|55.0|BOLD:AEH4176
Idotea neglecta|HABFA1534-21|36.0|BOLD:AEH4176
Idotea neglecta|HABFA1530-21|2.0|BOLD:AEH4176
Idotea granulosa|HABFA411-19||BOLD:AAM7896
Idotea granulosa|HABFA434-19|0.5|BOLD:AAM7896
Idotea granulosa|HABFA385-19||BOLD:AAM7896
Idotea granulosa|HABFA384-19||BOLD:AAM7896
Idotea granulosa|HABFA391-19|1.0|BOLD:AAM7896
Idotea granulosa|HABFA437-19|24.0|BOLD:AAM7896
Idotea granulosa|HABFA449-19||BOLD:AAM7896
Idotea pelagica|HABFA439-19|0.5|BOLD:AAO1731
Idotea pelagica|HABFA410-19||BOLD:AAO1731
Idotea pelagica|HABFA455-19|2.0|BOLD:AAO1731
Jaera praehirsuta|HABFA1506-21|0.0|BOLD:AAI7930
Jaera ischiosetosa|HABFA1483-21|1.0|BOLD:AAI7930

Figure 5: Neighbor joining tree generated in BOLD. Misidentifications are marked with an asterisk. The separate clades of J. maculosa *are marked C1-C5.*

3.1.1 *Idotea*

The genetic divergence was higher than 10% between all *Idotea* species both when using the p-distance and K2P substitution model. The lowest distance can be observed between *I. granulosa* and *I. pelagica* (p-distance=11.4%, K2P=14.3%), while the highest distance occurs between *I. neglecta* and *I. granulosa* (p-distance=20.1%, K2P=28.7%). Within-group mean distance showed no differentiation between the two models. The lowest and highest within-group distance is represented by *I. granulosa* (0.1%) and *I. emarginata* (0.5%) respectively (Table 4).

Table 4: Mean distance (below diagonal) and standard error (above diagonal) between and within 5 species of Idotea *calculated using the uncorrected p-distance (p-dist) and K2P substitution model for* n *number of specimens. BIN assignments in BOLD with the total number (*N*) of sequences present in each BIN are included.*

Between							**Within**		**BOLD BIN**	**N**
Species	Model	1	2	3	4	5	d	SE		
1. *Idotea granulosa*	p-dist		0.016	0.014	0.013	0.015	0.001	0.001	BOLD:AAM7896	32
(*n*=7)	K2P		0.032	0.030	0.020	0.033	0.001	0.001		
2. *Idotea balthica*	p-dist	0.180		0.015	0.016	0.015	0.002	0.002	BOLD:AAA8398	45
(*n*=2)	K2P	0.246		0.024	0.031	0.029	0.002	0.002		
3. *Idotea emarginata*	p-dist	0.179	0.143		0.015	0.014	0.005	0.003	BOLD:AAU0407	9
(*n*=2)	K2P	0.243	0.183		0.028	0.025	0.005	0.003		
4. *Idotea pelagica*	p-dist	0.114	0.179	0.178		0.015	0.003	0.002	BOLD:AAO1731	14
(*n*=3)	K2P	0.143	0.240	0.239		0.034	0.003	0.002		
5. *Idotea neglecta*	p-dist	0.192	0.179	0.158	0.201		0.002	0.001	BOLD:AEH4176	4
(*n*=4)	K2P	0.268	0.246	0.210	0.287		0.002	0.001		

The haplotype network analysis for *Idotea* yielded 10 observed haplotypes and 10 unobserved haplotypes. The high number of unidentified haplotypes may be a result of low sample size for each species. The number of sequences for each species used in the analysis was 7 *I. granulosa*, 2 *I. emarginata*, 3 *I. pelagica*, 1 *I. balthica*, and 4 *I. neglecta*. Haplotypes contained 182 characters. Haplotype 9 and 8 (Hap_9, Hap_8), consisting of *I. neglecta* shows the highest number of mutations to the nearest haplotype (Hap_10) belonging to *I. emarginata* (Figure 6).

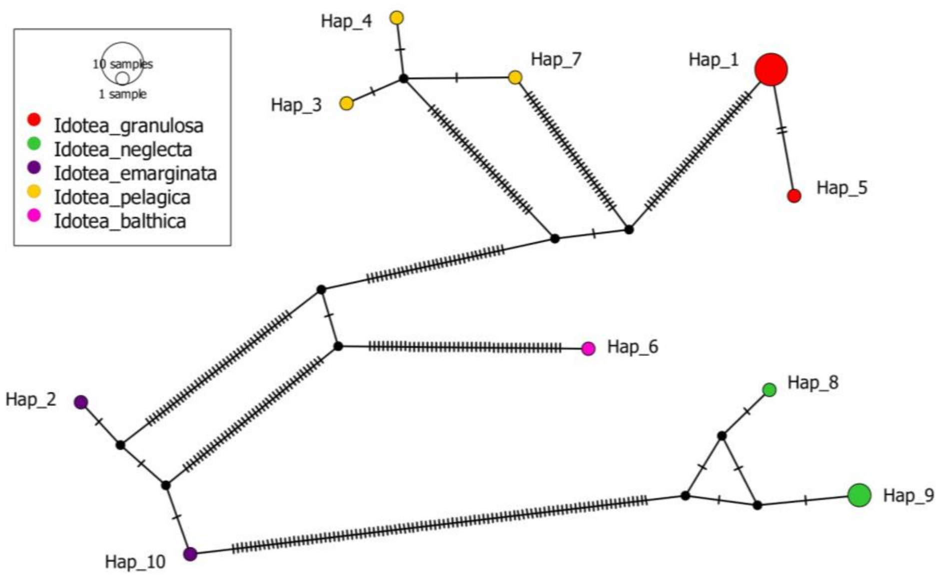

Figure 6: Haplotype network for Idotea *species made using TCS analysis in PopART. Circles at each node represent haplotypes. Small black circles on edges represent missing haplotypes. Lines crossing edges represent mutations.*

3.1.2 The *Jaera albifrons* group

Genetic divergences between and within *Jaera* species are all lower than 1%. The highest and lowest distances are between *J* cf. *forsmani*, *J. praehirsuta,* and *J. ischiosetosa* (0.9%) and between *J. albifrons* and *J. ischiosetosa* respectively (0.3%). Both substitution models provide equal between distances for all species, except for the distance between *J* cf. *forsmani* and *J. ischiosetosa* (Table 5).

Table 5: Mean distance (below diagonal) and standard error (above diagonal) between and within 4 species of Jaera *calculated using the uncorrected p-distance (p-dist) and K2P substitution model for* n *number of specimens. BIN in BOLD with the total number of sequences N and the number of sequences for each species (n) are included.*

	Between					**Within**		**BOLD BIN**	**N(n)**
Species	Model	1	2	3	4	d	S.E		
1. *Jaera ischiosetosa*	p-dist		0.001	0.002	0.003	0.005	0.001	BOLD:AAI7930	82 (16)
(*n*=16)	K2P		0.001	0.003	0.003	0.005	0.002		
2. *Jaera albifrons*	p-dist	0.003		0.002	0.003	0.001	0.001	BOLD:AAI7930	82 (35)
(*n*=14)	K2P	0.003		0.003	0.003	0.001	0.001		
3. *Jaera praehirsuta*	p-dist	0.009	0.008		0.002	0.007	0.002	BOLD:AAI7930	82 (18)
(*n*=18)	K2P	0.009	0.008		0.002	0.007	0.002		
4. *Jaera cf. forsmani*	p-dist	0.009	0.008	0.006		0.007	0.002	BOLD:AAI7930	82 (6)
(*n*=6)	K2P	0.009	0.008	0.007		0.007	0.002		

The haplotype network analysis (Figure 7) for *Jaera* species yielded 21 observed haplotypes and 3 unobserved haplotypes. Produced haplotypes contained 24 characters. The numbers of each species used for this analysis were the same as for the genetic distances in Table 5 with the addition of six female *Jaera* sp.

Of the nine haplotypes with a frequency higher than 1, seven contain individuals from more than one species (Figure 7B). Haplotype 11 (Hap_11), consisting of *J. ischiosetosa* from Trøndelag, shows the highest number of mutations to the nearest haplotype. The geographic distribution of the different haplotypes does not form a noticeable pattern (Figure 7A). This is demonstrated in the haplotype with the highest frequency, haplotype 2 (Hap_2), where individuals from all counties except Agder, are represented. Hap_2 is also represented by all species, suggesting that CO1 is identical between them. The second highest frequency haplotype, haplotype 10, belongs exclusively to Trøndelag. Due to the slight uncertainty of the identification of *J. forsmani* in this haplotype, it may only represent *J. praehirsuta* (Figure 7).

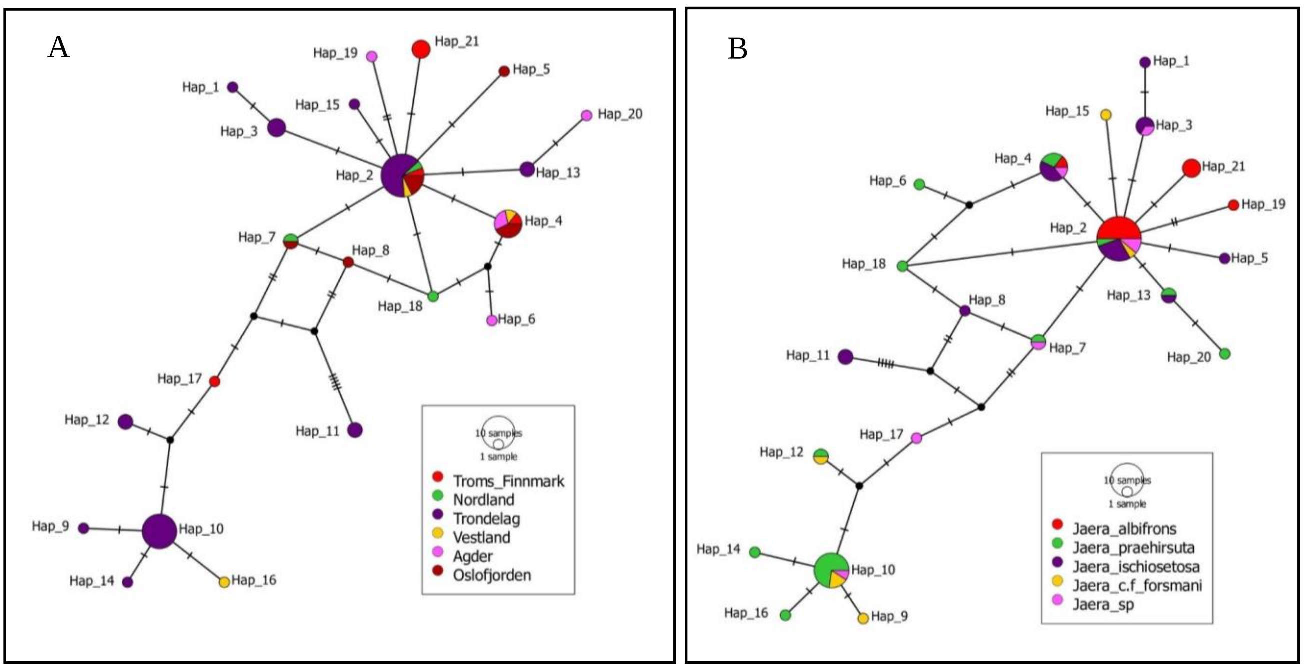

Figure 7: Haplotype networks for Jaera *species made using TCS analysis in PopART, representing geographic affiliation of each haplotype (A) and presence of multiple species in different haplotypes (B). Circles at each node represent haplotypes. Small black circles on edges represent missing haplotypes. Lines crossing edges represent mutations.*

3.1.3 *Janira maculosa*

Genetic distances and haplotype network analysis for *Janira maculosa* is based on the different clades displayed in Figure 5. This was done in order to perform a more thorough investigation of the genetic diversity displayed by the species. Minimum and maximum genetic distance between clades of *J. maculosa* can be observed between clade 4 (C4) and clade 2 (C2) (p-distance=5%, K2P=5.5%), and clade 5 (C5) and clade 3 (C3) (p-distance=21.6%, K2P=33.3%) respectively. No differences between the two substitution models could be observed for the within-group mean distance, where the minimum and maximum genetic distance within groups belong to C1 and C4 (0.5%), and C2 (1.2%) respectively. Because C3 is only represented by one specimen, no within-group distance was calculated for this clade. C5 shows the overall largest distance to the other clades (Table 6).

Table 6: Mean distance (below diagonal) and standard error (above diagonal) between and within the different clades (C1-C5) of J. maculosa *calculated using the uncorrected p-distance (p-dist) and K2P substitution model. n/c=not calculated.* n=*number of specimens from each clade. BIN assignments in BOLD with the total number (N) of sequences present in each BIN are included.*

Between							**Within**		**BOLD BIN**	**N**
Species	Model	C1	C2	C3	C4	C5	d	S.E		
C1. *Janira maculosa*	p-dist		0.008	0.010	0.009	0.015	0.005	0.003	BOLD:AEH5638	2
(*n*=2)	K2P		0.012	0.014	0.012	0.040	0.005	0.003		
C2. *Janira maculosa*	p-dist	0.061		0.009	0.008	0.015	0.012	0.003	BOLD:AEH5639	3
(*n*=3)	K2P	0.068		0.011	0.010	0.041	0.012	0.004		
C3. *Janira maculosa*	p-dist	0.072	0.056		0.009	0.015	n/c	n/c	BOLD:AAU1507	7
(*n*=1)	K2P	0.082	0.062		0.012	0.042	n/c	n/c		
C4. *Janira maculosa*	p-dist	0.063	0.050	0.061		0.015	0.005	0.002	BOLD:ACV8862	34
(*n*=24)	K2P	0.070	0.055	0.069		0.041	0.005	0.002		
C5. *Janira maculosa*	p-dist	0.214	0.216	0.216	0.213		0.000	0.000	BOLD:ACM3169	2
(*n*=2)	K2P	0.323	0.331	0.333	0.325		0.000	0.000		

The haplotype network analysis for *J. maculosa* yielded 16 observed haplotypes and 4 unobserved haplotypes (Figure 8). A total of 32 sequences were used and the haplotypes contained 150 characters.

C1 forms two haplotypes, both from 357 m in the Norwegian Sea, which are separated from C4 and C5 with a high number of mutations (Figure 8, Figure 9).

C2 also forms two haplotypes from deep locations in the Norwegian Sea. Hap_13 consists of two sequences from 209 m, while Hap_12 is only represented by one sequence from 235 m. While they can still be viewed as a group, they are separated by slightly more mutations than the haplotypes of the other clades (Figure 8, Figure 9).

C3 is only represented by Hap_3 consisting of one specimen from 8 m, which is separated by many mutations from an unobserved haplotype. The closest haplotypes belong to C2 (Figure 8, Figure 9).

C4 forms the most haplotypes (n=10) among all the clades and the fewest mutations between haplotypes. It is also the most widely distributed clade both horizontally and vertically being present in all geographic areas. The shallowest haplotype could be found at 8 m and the deepest at 235 m. Haplotype 9 (Hap_9) showed the larges vertical distribution among all haplotypes, being present at both 12 and 235 meters (Figure 8, Figure 9).

C5 is represented by Hap_1 containing two specimens from 555 m and 262 m. This clade has the highest number of mutations between itself and the nearest clade which is C4 and C1 (Figure 8, Figure 9).

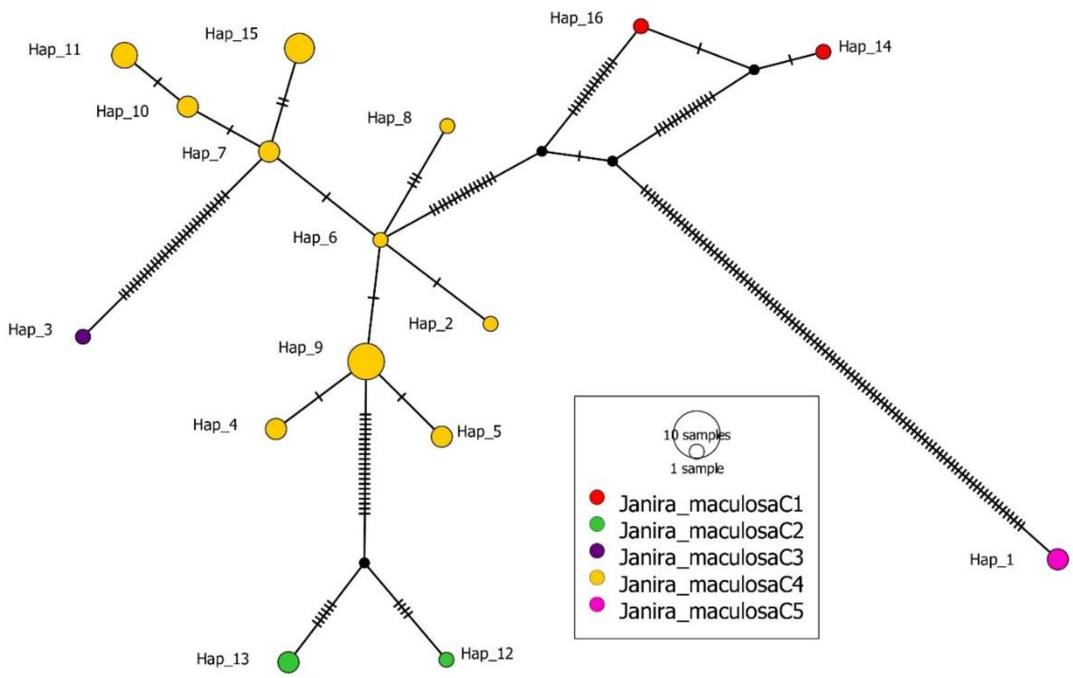

Figure 8: Haplotype networks for J. maculosa *clades made using TCS analysis in PopART. Circles at each node represent haplotypes. Small black circles on edges represent missing haplotypes. Lines crossing edges represent mutations.*

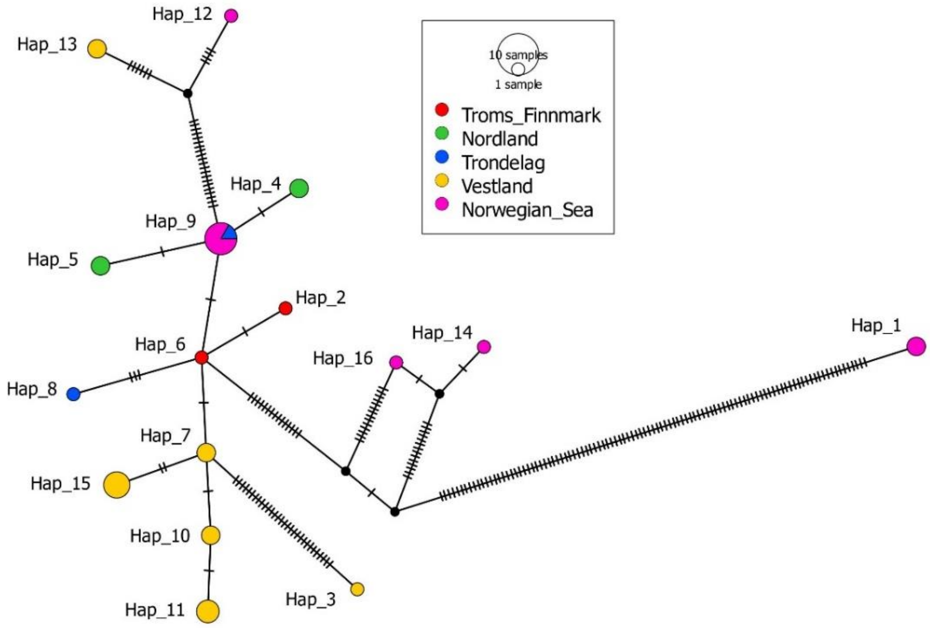

Figure 9: Geographical distribution of haplotype networks for J. maculosa *clades made using TCS analysis in PopART. Circles at each node represent haplotypes. Small black circles on edges represent missing haplotypes. Lines crossing edges represent mutations.*

3.2 Morphological analysis

A total of nine species were confidently identified to species level through morphology. Species of the genus *Idotea* are readily distinguished by morphological variations in the pleotelson which can be observed with the naked eye in adult specimens. The existing literature and identification keys can be considered as satisfyingly comprehensive in describing these variations. It is only in smaller specimens (≤ 5 mm) that identification can prove to be difficult, due to the late development of the necessary morphological characters. Juvenile specimens of *I. granulosa* and *I. pelagica* and one *I. balthica* however, displayed recognizable characters which allowed for species identification. Small juveniles of *I. granulosa* are typically slenderer with a long pleotelson which, even in the smallest individuals, display the concave anterolateral margins. Small *I. pelagica* are much more compact, with shorter and wider pleotelson and antennae, as is typical also for adult specimens. In the smaller specimens of *I. balthica*, the apical border of telson will display a white trident-shaped line which marks the early development of the diagnostic character for this species.

Species of *Jaera* offered the biggest challenge in terms of morphology-based identification. The three species *J. albifrons, J. ischiosetosa,* and *J. praehirsuta*, are only recognizable based on secondary sexual characters in male pereopods in the form of small setae or a lobe. These characters were best observed by orienting the specimen in a way that allowed for a profile view of the desired pereopods with a dark background.

Of all the collected *Jaera* specimens, nine have been identified to *Jaera* cf. *forsmani* or *Jaera forsmani* but due to later uncertainties in the identification, a detailed description of this species was not made. *J. forsmani* is only recognizable through the presence of a carpal spine at both pereopod 6 and 7. Ernest Naylor and Brandt (2015) mention the presence of curved seta on propodus, carpus, and merus as typical for *J. forsmani*, which is also a diagnostic character for *J. praehirsuta*. It is therefore my belief that the potential *J. forsmani* in the material presented in this study might be poorly developed *J. praehirsuta*. One specimen was identified as *Jaera* cf. *syei* Bocquet, 1950, but as with *J. forsmani*, no description was made due to uncertainties in the identification.

To firmly establish the presence of these two species, it would be necessary to perform a more thorough morphological investigation than what was possible in this study due to time restrictions. To familiarize oneself with the diagnostic characters of both *J. syei* and *J. forsmani*, I suggest removing pereopod 6 and/or 7 and study the distal portion of carpus under a microscope. One such test was performed on NTNU_VM_80048 (Appendix I, Table A1) which was believed to be *J* cf. *syei* (Figure 10). Even though the specimen displayed a large carpal lobe with more than 15 setae, which is the main diagnostic character described for this species (Harvey & Naylor, 1968), I could not with certainty identify the specimen as *J. syei*. When studying other *J. albifrons* specimens, I noticed that the size of the carpal lobe varies with the size of the entire animal. A larger animal thus displayed a larger lobe. This observation has made me reluctant to assign a different name to a specimen I would identify as *J. albifrons*, just because it is a large adult.

Figure 10: Pereopod 6 of specimen NTNU_VM_80048 believed to be J. syei *due to the large carpal lobe. Photo: August R. Nymoen.*

A certain portion of previously collected samples of *Jaera* stored at the NTNU University Museum in Trondheim and the University Museum of Bergen has also been revised where 236 specimens identified as *Jaera albifrons* were renamed (Appendix I, Table A2).

Janira maculosa was primarily identified through the concave lateral border of pereon somite 2-4 as most specimens studied were lacking the characteristically long uropods and antennal flagellum. The identification difficulties offered by this species is separation from *I. breviremis* which, when lacking antennal flagellum and/or uropods shows high morphological similarity to *J. maculosa*. Male specimens of both species are however readily distinguishable based on the differences in the preoperculum. Male *J. maculosa* possesses a quadrilobate posterior border of the preoperculum, while *I. breviremis* display a flattened inverted T-shape in the same location. This character thus provides safe identifications even when uropods and/or antennae are missing from the specimens.

C5 (Table 6) is composed of two sequences with Sample IDs ZMBN_126397 (Figure 11) and UMBergen_NB_iso04 (Figure 12), the last of which was not possible to include in the NJ tree (Figure 5). Unfortunately, I was unable to observe these specimens before they were used for DNA sequencing, but the images uploaded to BOLD show some morphological distinctions between them and other specimens of the species. UMBergen_NB_iso04 is clearly female due to the presence of eggs, but for ZMBN_126397 there are no ventral images that would allow for a determination of the sex. Certain details presented in the lateral images show some deviations from the typical morphology of *J. maculosa*. Firstly, the pereon somites are more convex than what is usually observed. Secondly, the anterior border of the cephalon has an acute upwards bend (Figure 11, Figure 12). As these specimens are presented in BOLD, only ZMBN_126397 is identified as *J. maculosa* while UMBergen_NB_iso04 has not been identified further than to Isopoda. Using the sequence for UMBergen_NB_iso04, a search with the Identification engine in BOLD gives a 100% match with two *J. maculosa* sequences, one of which is ZMBN_126397. I will therefore address UMBergen_NB_iso04 as *J. maculosa*.

Figure 11: Lateral view of J. maculosa *(Sample ID: ZMBN_126397). Photo: Trond R. Oskars. Accessible in BOLD*.

Figure 12: Lateral view of Isopoda (Sample ID: UMBergen_NB_iso04). Photo: Katrine Kongshavn. Accessible in BOLD.

3.2.1 Identification key

An identification key for the Norwegian marine species within the family Janiridae found in shallow waters is given below.

1. Apical border of telson invaginated where short uropods are inserted.
   ………………………. ***Jaera Leach, 1814***

   A1. Pereopods 1-4 with long, curved setae on merus, carpus, and propodus. Pereopod 6 with reduced carpal spine. Pereopod 7 with large carpal spine.

   …………..……***Jaera praehirsuta Forsman, 1949***

   A2. Propodus, carpus, and merus without curved setae on pereopods 1-4.

   ………..…………………………...B

   B1. Pereopods 6 and 7 with comb of setae on distal side of ischium.

   ……………..…***Jaera ischiosetosa Forsman, 1949***

   B2. Pereopods 6 and 7 without comb of setae on ischium

   ……………...…………………......C

   C1. Pereopods 6 and 7 with a distinguished lobe on distal side of carpus.

   ……………..……. ***Jaera albifrons Leach, 1814***

   C2. Pereopods 6 and 7 without carpal lobe.

   ………….…………………………D

   D1. Pereopod 6 and 7 with a well-developed spine on distal portion of carpus.

   ………………….***Jaera forsmani Bocquet, 1950***

2. Antennas about 1 ½ the length of the body. Apical border of telson without invagination. Long and forked uropods.
   …...………………………***Janira Leach, 1814***

A1. One species. Sides of pereonites 2-4 concave. Posterior end of male preoperculum quadrilobate posteriorly.

………………..……***Janira maculosa Leach, 1814***

3. Antennas shorter, equal to or shorter than the length of the body. Short and forked uropods.
……………………..…….***Ianiropsis Sars, 1899***

A1. One species. Sides pf pereonites 2-4 slightly concave. Male preoperculum with an inverted T-shape posteriorly. Uropods short biramous.

……...………..…***Ianiropsis breviremis (Sars, 1899)***

Identification key for Norwegian marine species within *Idotea* found in shallow waters is given below.

1. Pleon with two separate and one partial somite.
……………….***Idotea Fabricius, 1798***

A1. Pleotelson broad with a medially centered keel. Telson with reduced medial process at apical margin.

…………………***Idotea neglecta Sars, 1897***

A2. Pleotelson less broad and without medially centered keel.

….…………………………………B

B1. Antennal flagellum thick and shorter than peduncle with a dense circular row of small setae in adult males. Pereopods 2-7 with dense patches of small setae in adult males. Juveniles appears with a slightly shorter, more rounded pleotelson and a significantly short and stubby antennal flagellum.

..………………..***Idotea pelagica Leach, 1815***

B2. Antennal flagellum thin and without setae. Pleotelson longer.

…….………………………………C

C1. Lateral margin of pleotelson straight. Apical border of telson straight. Antennal flagellum shorter than peduncle.

…….…………..***Idotea metallica* Bosc, 1802**

C2. Apical border of telson not straight. Antennal flagellum longer than peduncle

…...………………………………..D

D1. Telson apical margin forms a medially located acute process. Anterolateral margin noticeably concave, both in adults and medium-sized juveniles (3-5 mm).

………………..…***Idotea granulosa* Rathke, 1834**

D2. Anterolateral margin of pleotelson rounded convex or straight. Telson apical margin with another distinguished shape.

……………………..………………E

E1. Pleotelson apical border concave. Body broad with coxal plates of pereonite 3-6 wider than pleotelson.

….……………..***Idotea emarignata* (Fabricius, 1793)**

E2. Pleotelson apical border tridentate.

…..…………….***Idotea balthica* (Pallas, 1772)**

3.2.2 Species descriptions

Order Isopoda Latreille, 1817

Suborder Asellota Latreille, 1802

Superfamily Janiroidea G. O. Sars, 1897

Family Janiridae G. O. Sars, 1897

Genus *Jaera* Leach, 1814

Diagnosis: Broad and flattened body shape. Uropods short, hardly projecting beyond apical border of pleotelson.

***Jaera praehirsuta* Forsman, 1949**

Figure 14

Jaera albifrons praehirsuta Forsman, 1949, p. 458

Material examined. NTNU_VM_80014 (2 specimens), NTNU_VM_80023 (2), NTNU_VM_80021 (3), NTNU_VM_80024 (3), NTNU_VM_79776 (1), NTNU_VM_80000 (1), NTNU_VM_80017 (4), NTNU_VM_80006 (2), NTNU_VM_79999 (2), NTNU_VM_80015 (1), NTNU_VM_79930 (1), NTNU_VM_79957 (1), NTNU_VM_79927 (1), NTNU_VM_79924 (1), NTNU_VM_79996 (1). A total of 26 specimens were examined for this description (Appendix I, Table A1).

Diagnosis of adult male. Preoperculum forms an inverted T-shape. Body 1-1.6 mm; usually smaller than female. Pereopods 1-4 with ventral side of carpi, proximal half of propodi and distal half of meri densely covered with long, curved setae (Figure 14C).

Description of male

Antenna (Figure 14B). Uniramous, 1.5-1.7 mm. Flagellum 20-29 articles increasing in length from article 2 to end article. Article 1 longer and wider than article 2. Each article with 3-4 short, grouped setae distally. Peduncle 5-articlulate; article 5 with 4 long lateral setae; equal length to article 1-4 combined.

Antennula (Figure 14A/B). Uniramous, 0,2 mm. Barely reaching beyond article 4 of antennal peduncle. Antennular peduncle 2-articulate. Reduced antennular flagellum 3-articulate; setae at distal end of article 3 same length as article.

Cephalon (Figure 14B). Significantly wider than long; anterior margin sinuate with medial convexity. Round, somewhat large, slightly protruding eyes at posterior margin towards lateral margin.

Pereon (Figure 14A/B). Somites narrow anteriorly widening towards posterior end; lateral margins rounded, sparsely fringed with setae. Coxal plates only visible from ventral view.

Pereopod 1-7 (Figure 14A) Uniramous, 0.6 – 1.1 mm. Bases 0.2 – 0.3 mm, longer than wide, laterally flattened and without setae. Ischium in all pereopods slender and laterally flattened, pereopods 1 and 2 with 1 small spine positioned mediodorsally. Pereopods 1-4 with large spine distoventrally on merus. Pereopods 5-7 with two large spines medially centered distoventrally on merus. Pereopods 1-4 carpi with smooth dorsal margin; dense, long, curved setae along ventral side of carpi, proximal half of propodi and distal half of meri (Figure 14C). Pereopods 5-7 carpi with few long, thin setae in fan formation distodorsally. Reduced carpal spine centered distoventrally on pereopod 6, prominent carpal spine on same location on pereopod 7.

Pleotelson (Figure 14B/D) Pleon with two somites. Lateral margin of telson fringed with short setae. Telson semicircular or rounded inverted trapezoid with invagination at posterior margin where uropods are inserted. Uropods very short, biramous, endopod larger than exopod. Both rami with long apical setae.

Preoperculum (Figure 14D) Preoperculum formed by the fused first and second pleopods, extending posteriorly in an inverted T-shape with extensions moving bilaterally to lateral margin of the telson.

Remarks. The male *J. praehirsuta* is distinguishable from the other male members of the *J. albifrons* group by its long, curved setae on propodus and carpus on pereopod 1-4 (Figure 14C). If these setae are missing from the specimen, however, it will become significantly harder to distinguish the species from *J. forsmani*, which has equally long carpal spines on pereopod 6 and 7. It is still worth mentioning that there is a very low chance of losing all the long setae on pereopod 1-4. The general body shape of the males can appear either rounded trapezoid, rounded oval, or stretched oval with straighter lateral margins of the pereon. Still, most specimens that were examined possessed a body shape that is slightly narrow anteriorly and wider posteriorly, placing them in the rounded trapezoid category. Depending on the age of the specimen, the curved setae on pereopod 1-4 might be denser and/or longer. The coloration of *J. praehirsuta* can vary from a slightly pale yellow to light grey with unpigmented white spots. A few specimens displayed a transversely striped color pattern on their dorsal side (Figure 14B). In some adult males, the carpi on pereopods 1-4 are swollen making the propodi appear cone shaped. The antenna of *J. praehirsuta* is on average longer and has a flagellum with a more uniform article count than *J. albifrons*.

Ecology. The existing literature reports that *J. praehirsuta* is commonly found on *Fucus* Linnaeus, 1753 (B. Forsman, 1949) and *Fucus serratus* Linnaeus, 1753 (Ernest Naylor & Brandt, 2015), and in some cases on the underside of stones in the upper sections of the intertidal zone. The species can be found between the HWS and LWS tidal levels but is most common at the HWN tidal level. *J. praehirsuta* is described as a euryhaline species often occurring on sheltered shores (E. Naylor & Haahtela, 1966). Observations made during this study corresponds with the existing literature, however, some specimens were collected at more exposed locations. *J. praehirusta* was seldom found when investigating the rocks in the intertidal zone, but at Bjugn different species of wrack were shaken over a white tray releasing several individuals of the species.

Distribution in Norway. The existing literature reports a distribution from the west coast of Norway, Tromsø, Herdla, Stavanger (B. Forsman, 1949), Olderfjorden (Hussey, 1964), Raunefjorden (Sjöberg, 1967), Hardangerfjorden (Brattegard, 1966) and Oslofjorden (Pethon, 1968). In this study, *J. praehirsuta* was found in 17 locations depicted in Figure 13.

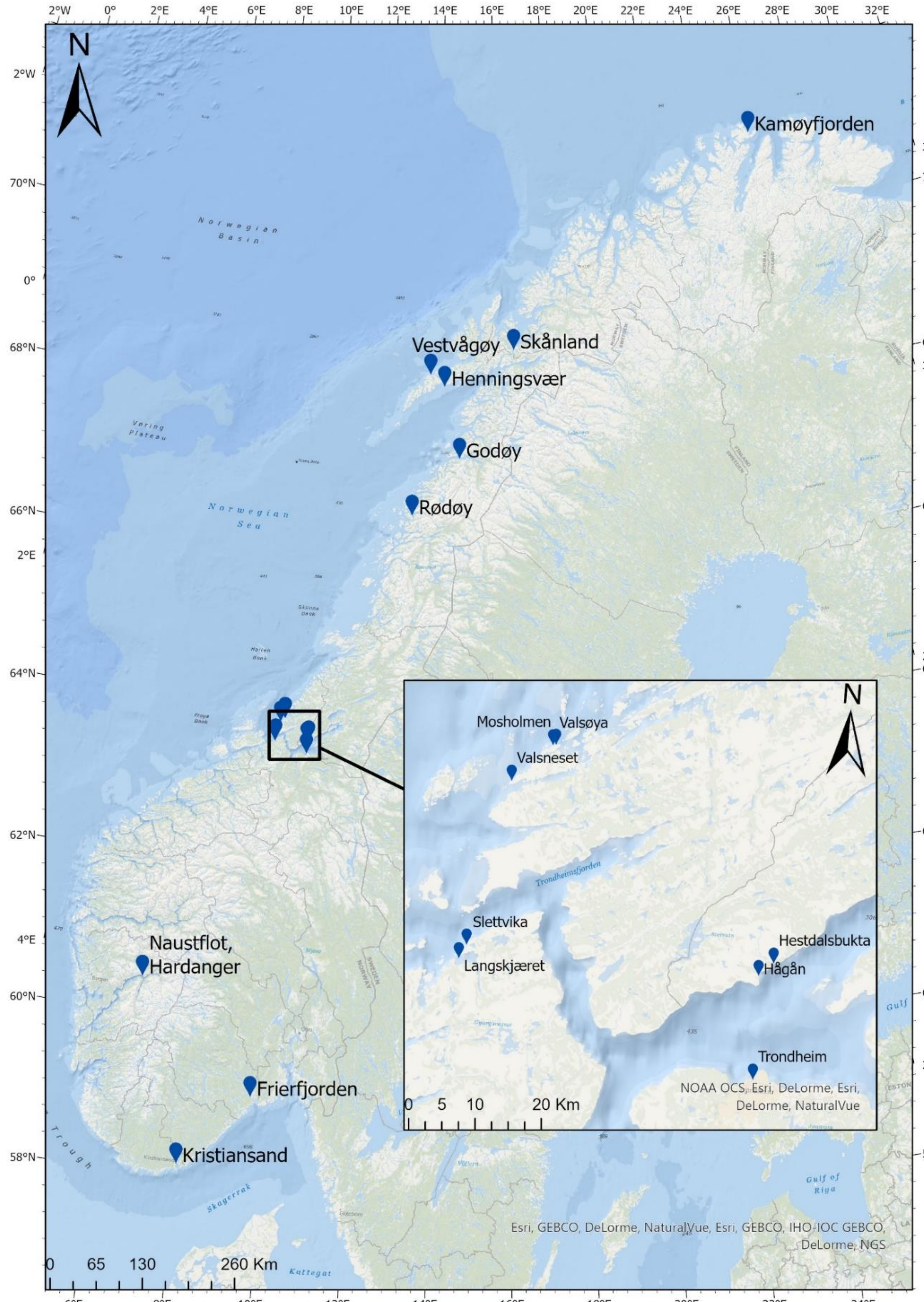

Figure 13: Locations at which J. praehirsuta *was found during this study.*

Figure 14: Male J. praehirsuta*. A) Ventral view. B) Dorsal view. C) Display of curved setae on propodus, carpus, and merus on pereopod 3. D) Male preoperculum. Photo A, B, and D: August R. Nymoen. C: Katrine Kongshavn.*

***Jaera albifrons* Leach, 1814**

Figure 16

Jaera albifrons albifrons Forsman, 1949, p. 455-456

Jaera marina (Fabricius, 1780)

Material examined. NTNU_VM_79973 (1 specimen), NTNU_VM_79974 (1), NTNU_VM_79972 (1), NTNU_VM_79965 (1), NTNU_VM_79978 (4), NTNU_VM_79976 (1), NTNU_VM_79962 (1), NTNU_VM_79977 (1), NTNU_VM_79975 (1). A total of 12 specimens were examined for this description (Appendix I, Table A1).

Diagnosis of adult male. Preoperculum forms an inverted T-shape. Body 1.5-2.2 mm; usually smaller than females of the *Jaera* genus. Lobes with short, straight simple setae placed distoventrally on carpi of pereopods 6 and 7 (Figure 16C/D).

Description of adult male

Antenna (Figure 16A/B). Uniramous, 1 mm or less; left and right often of subequal length. Flagellum 11-27 articles with increasing length distally. Small, grouped setae distally on each article. Antennal peduncle 5-articulate. Articles 1 and 2 of antennal peduncle with large spine at distolateral margin.

Antennula (Figure 16A/B). Uniramous, 0.2 mm. Barely reaching beyond article 4 of antennal peduncle. Antennular flagellum reduced 3-articulate. Setae at distal end of article 3 longer than the article. Antennular peduncle 2-articulate.

Cephalon (Figure 16A). Significantly wider than long; anterior margin concave sinuate with medial convexity. Round, somewhat large, slightly protruding eyes placed at the posterior margin towards lateral margin.

Pereon (Figure 16A). Pereon somites of equal transversal length; lateral margin rounded. Lateral margin of body fringed with small setae. Coxal plates only visible from ventral view.

Pereopods 1-7 (Figure 16B). Uniramous, 0.7-0.9 mm. Basis 0.2 mm, wide with no setae. Ischium slender. Pereopods 1-5 with a large spine distoventrally on merus, pereopods 6 and 7 with two large spines in same location. Pereopods 1-4 with few, very small setae on ventral side of propodus and carpus. All pereopods with fan-like setae distodorsally on caprus; fan-like setae with large spine in same location on pereopods 6 and 7. Large carpal lobes with small setae distoventrally on pereopod 6 and 7 (Figure 16C/D).

Pleotelson (Figure 16A). Pleon with two somites. Lateral margin of telson fringed with small setae. Telson semicircular or rounded inverted trapezoid with invagination at posterior margin where uropods are inserted. Uropods very short biramous with uropodal endopod larger than the exopod. Both uropodal rami with long setae at apical margin.

Preoperculum (Figure 16D). Preoperculum formed by the first and second pairs of pleopods which are fused together. Extends posteriorly to form a noticeable inverted T-shape with extensions moving bilaterally to the lateral margin of the telson.

Remarks. All the male specimens that have been reviewed in this thesis have maintained at least two of the 4 pereopods that are necessary to identify this species. Because the characteristic lobe is placed distally on pereopods 6 and 7, *J. albifrons* can be considered one of the more easy-to-identify species in the *J. albifrons* group. As previously mentioned, the main issue lies in the differentiation between *J. albifrons* and *J. syei*.

The coloration can vary from the more usual lighter brown grayish to a black color. All color variations include white unpigmented spots randomly distributed on the dorsal side of the animal. Though the pereonites in most cases are of equal transversal length, some specimens express a body shape that is in resemblance to *J. praehirsuta*. Other specimens, like ZMBN_136798 and ZMBN_136800 (Appendix I, Table A1), are much larger even than the average female and have a more oval and compact body shape. The telson of *J. albifrons* can often appear to have a lip along the entire margin which appears as a shelf when the animal is studied from a lateral view. This same lip can in some cases also be observed along the lateral margin of pereon.

Ecology. The existing literature reports that *J. albifrons* is commonly found under stones (B. Forsman, 1949; Haahtela, 1965; Hussey, 1964; Ernest Naylor & Brandt, 2015; E. Naylor & Haahtela, 1966; Pethon, 1968; Sjöberg, 1967) between tidal level MTL and HWS, and in some cases amongst algae such as *F. serratus*, *Mastocarpus stellatus* Guiry, 1984 and *Ascophyllum nodosum* (Linnaeus) Le Jolis, 1863 above MLWN (E. Naylor, Slinn, & Spooner, 1961), though this is considered rare (Sjöberg, 1967). E. Naylor et al. (1961) report a large amount of *J. albifrons* found on *Fucus ceranoides* Linnaeus, 1753 above MTL. A large number of specimens were found amongst *Mytilus* Linnaeus, 1758 at MTL in Oslofjorden (Pethon, 1968). The preferred habitats are often in the presence of fresh or brackish water (E. Naylor & Haahtela, 1966) in sheltered shores (Ernest Naylor & Brandt, 2015) and locations with a varying degree of wave exposure (Pethon, 1968). Hussey (1964) only found *Jaera* in fully marine water with no impact from freshwater, or locations with more brackish water. Almost half of the specimens collected were found in the river outlet at Hestdalsbukta together with *Fucus vesiculosus* Linnaeus, 1753 and *Mytilus* on rocks where the water was almost completely fresh. The other half were collected in the fully marine, more exposed area at Sommarøy, indicating that *J. albifrons* can be considered a highly euryhaline species.

Distribution in Norway. The existing literature reports a distribution from Sørvær, Stavanger, Ølen, Tromsø, Herdla, Utnefjorden, Drøbak, Grøtsund (B. Forsman, 1949), Olderfjorden, Bergen (Hussey, 1964), Raunefjorden (Sjöberg, 1967), Oslofjorden (Pethon, 1968) and Hardangerfjorden (Brattegard, 1966). In this study, *J. albifrons* was observed at 7 locations depicted in Figure 15.

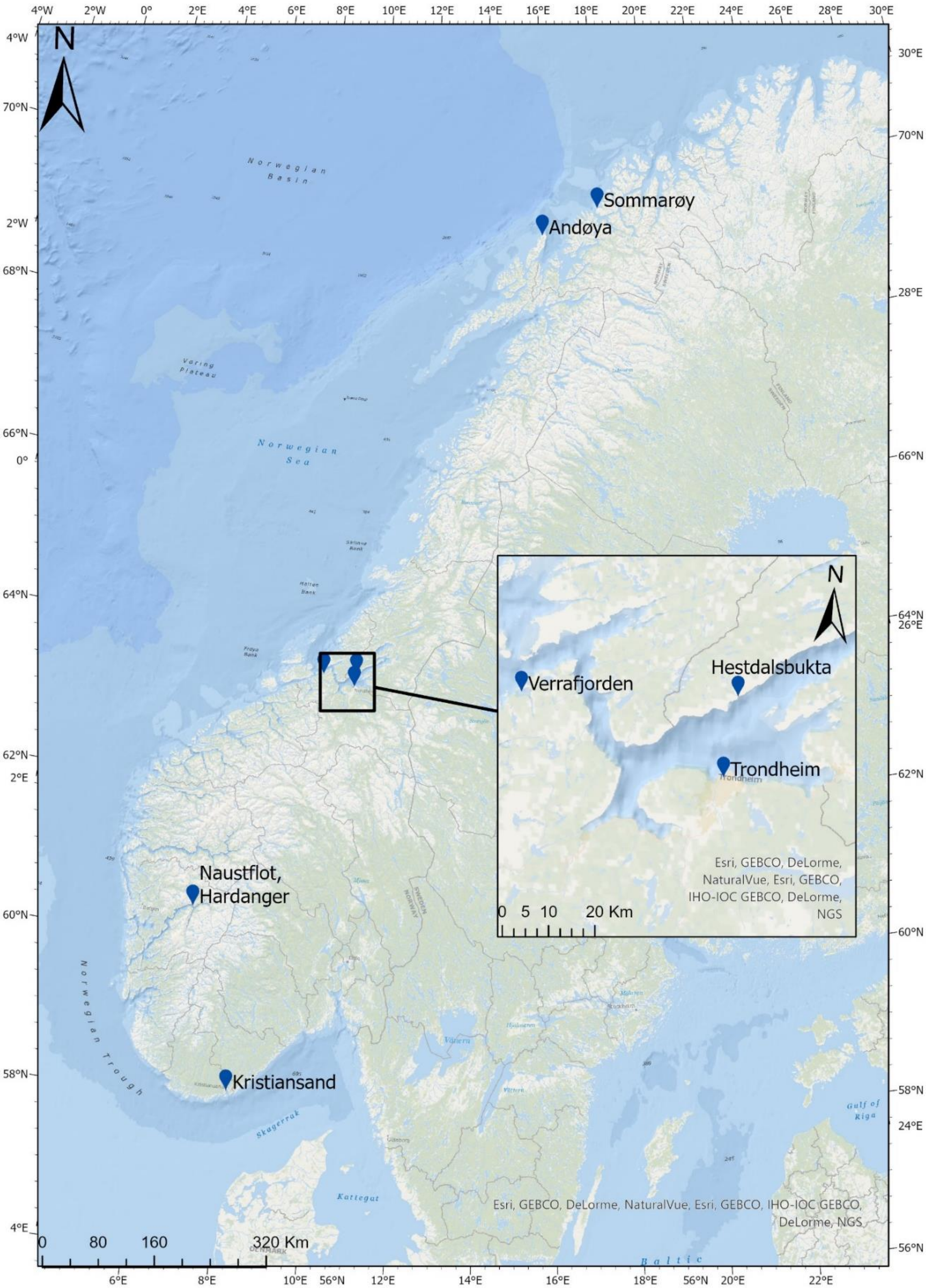

Figure 15: Locations where J. albifrons *was found during this study.*

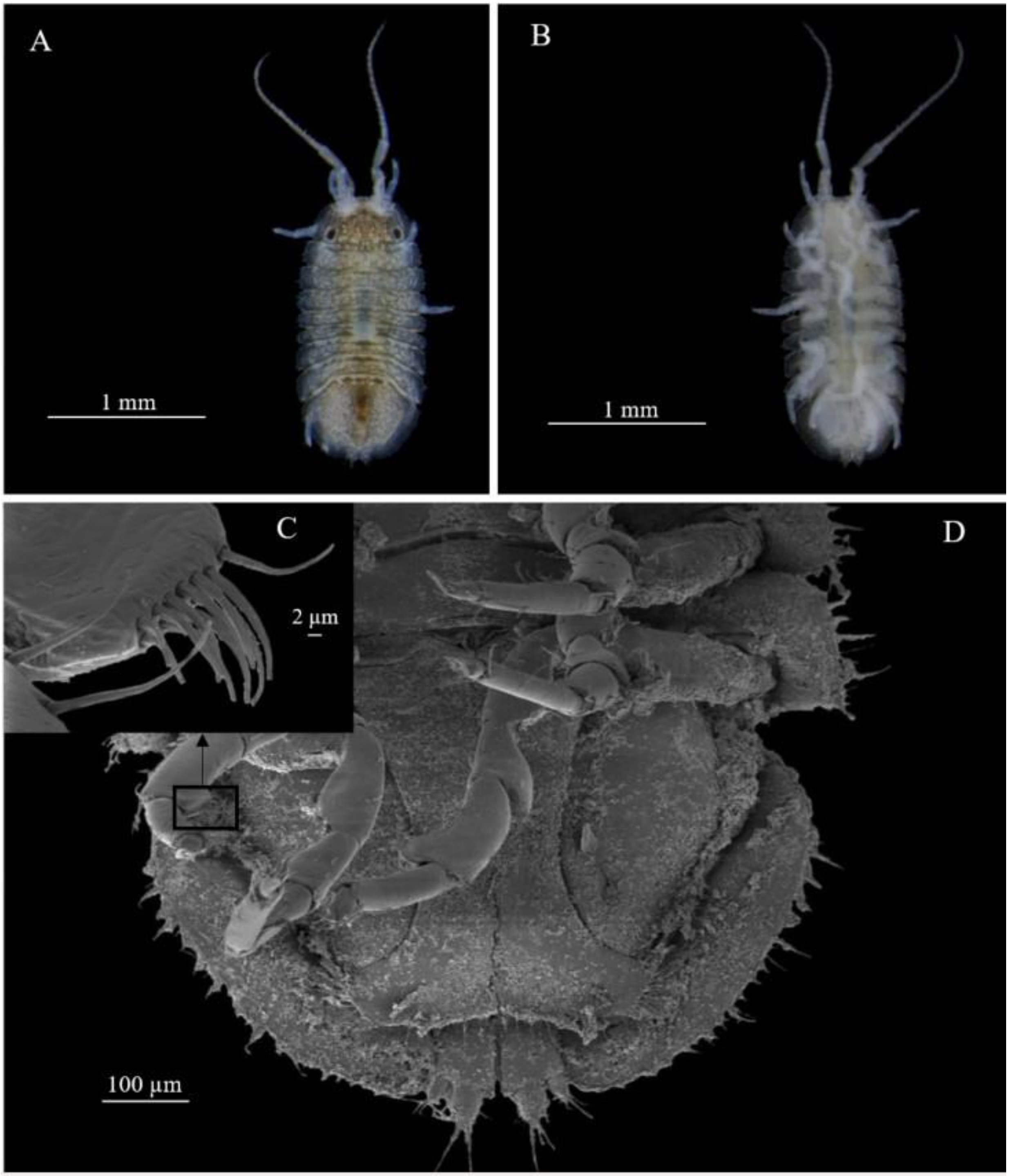

Figure 16: Male J. albifrons. *A) Dorsal view. B) Ventral view. C) Display of carpal lobe on pereopod 6. D) Male preoperculum. Photo A and B: August R. Nymoen. C and D: Katrine Kongshavn.*

***Jaera ischiosetosa* Forsman, 1949**

Figure 18

Jaera albifrons ischiosetosa Forsman, 1949, p. 456-457

Material examined. Base description from NTNU_VM_79866 (1 specimen) and NTNU_VM_79867 (1). Additional material examined: NTNU_VM_79869 (1), NTNU_VM_79782 (1), NTNU_VM_79781 (1), NTNU_VM_79988 (1), NTNU_VM_79986 (1), NTNU_VM_79991 (1), NTNU_VM_79990 (1), NTNU_VM_79987 (1), NTNU_VM_79992 (1), NTNU_VM_80008 (1), NTNU_VM_80016 (10), NTNU_VM_80009 (6), NTNU_VM_79735 (1), NTNU_VM_79864 (1), NTNU_VM_79736 (1), NTNU_VM_79862 (1), NTNU_VM_79733 (1), NTNU_VM_79738 (1), NTNU_VM_79772 (1), NTNU_VM_79744 (1), NTNU_VM_79749 (1), NTNU_VM_79740 (1), NTNU_VM_79773 (1), NTNU_VM_79745 (1), NTNU_VM_79734 (1), NTNU_VM_79741 (1), NTNU_VM_80066 (3). A total of 45 specimens were examined for this description (Appendix I, Table A1).

Diagnosis of adult male. Preoperculum forms an inverted T-shape. Body 1.5-2.2 mm; usually smaller than females. Pereopods 6 and 7 with comb of setae ventrally on ischium (Figure 18C).

Description of adult male

Antenna (Figure 18A/B). Uniramous, 1-1.6 mm; left and right about equal length. Flagellum 14-27 articles with increasing length distally; primary article of greatest length. 2-3 small simple setae grouped distally on each article, interspersed with longer, thinner simple setae. Antennal peduncle 5-articulate. Article 2 of antennal peduncle with large spine at distolateral margin. Article 5 distal margin with several longer simple setae.

Antennula (Figure 18A/B). Uniramous, 0.2 mm. Not reaching beyond article 4 of antennal peduncle. Antennular flagellum reduced 3-articulate. Setae at distal end of article 3 longer than the article. Antennular peduncle 2-articulate.

Cephalon (Figure 18A/B). Significantly wider than long; anterior margin concave sinuate with medial convexity. Round, somewhat large, slightly protruding eyes placed at the posterior margin towards lateral margin. Bilateral margin with unevenly distributed setae.

Pereon (Figure 18A/B). Pereon somites of equal transversal length; lateral margin rounded. Lateral margin of body fringed with small setae. Coxal plates only visible from ventral view.

Pereopods 1-7 (Figure 18). Uniramous, 0.6-1.1 mm. Basis 0.3 mm, wide with long, small, thin setae dorsally and ventrally on pereopod 6 and 7. Ischii of equal width; slender with one large mediodorsally centered spine in pereopods 1-5; comb of short simple setae distoventrally on pereopod 6 and7. Pereopods 1-5 with large spine distodorsally on meri, pereopods 6 and 7 with two large spines in same location. Pereopods 1-4 with few, small setae ventrally on carpi and propodi.

Pleotelson (Figure 18A). Pleon with one somite. Margin of telson fringed with small setae. Telson semicircular or rounded inverted trapezoid with invagination at posterior margin where uropods are inserted. Telson with medially centered slightly protruding ridge. Uropods very short biramous with uropodal endopod larger than the exopod. Both uropodal rami with long setae at apical margin.

Preoperculum (Figure 18B/C). Preoperculum formed by the first and second pairs of pleopods which are fused together. Extends posteriorly to form a noticeable inverted T-shape with extensions moving bilaterally to the lateral margin of the preoperculum.

Remarks. This species is only recognizable from the comb of setae on ischii of pereopods 6 and 7 found in the males. Because of the way many specimens often curl their legs when placed in 96% ethanol, it is often necessary to remove either pereopod 6 or 7 to perform a certain identification. If the legs are not too entangled in each other, the characteristic setae can be observed if the specimen is held in a position that allows for a lateral view. This, however, can often be somewhat challenging. In some cases, the seta can be flattened, making it much harder to observe even after the removal of the necessary leg. It is often easier to identify *J. ischiosetosa* by eliminating the characters of *J. albifrons* and *J. praehirsuta*, which are often easier to detect without removing the legs.

The body shape of *J. ischiosetosa* appears as more uniform with specimens often possessing an oval body shape where the pereon somites are of equal transversal length, while cephalon and pleotelson get narrower anteriorly and posteriorly respectively. This species can often be perceived as broader and thicker than *J. albifrons* and *J. praehirsuta*, and some specimens, like NTNU_VM_79735 (Appendix I, Table A1), can even precede 1 mm in width which more often occurs in the ovigerous female *Jaera*. The coloration varies between black to different shades of gray with white, unpigmented spots unevenly distributed on the dorsal side of the body. In some instances, as with specimen NTNU_VM_80008 (Appendix I, Table A1), the species can possess a bright orange color, while others display a dark reddish-brown or dark steely purple color.

While all specimens of this species possess a quite densely setose margin along the entire body, the setae themselves can differ. Specimen NTNU_VM_79735, in addition to being among the largest specimens reviewed for the description of this species, displays densely grouped pappose and broom setae along the entire margin, including the cephalon and pleotelson (Appendix II, Figure B1). The antennal peduncle of this specimen also displays a larger amount of slender simple setae than previously observed. Other specimens like NTNU_VM_79738, NTNU_VM_79740, NTNU_VM_80066, and NTNU_VM_79734 (Appendix I, Table A1), only show indications of pappose and broom setae along the lateral margin of pereon, cephalon, and pleotelson, as well as a more setose antennal peduncle, but not nearly to the same degree as NTNU_VM_79735.

Ecology. The existing literature reports that *J. ischiosetosa* can often be found underneath stones (B. Forsman, 1949; Haahtela, 1965; Ernest Naylor & Brandt, 2015; E. Naylor & Haahtela, 1966; Pethon, 1968; Sjöberg, 1967) sometimes together with *J. albifrons* (B. Forsman, 1949; Sjöberg, 1967), or on algae (B. Forsman, 1949; E. Naylor & Haahtela, 1966) close to streams of freshwater (E. Naylor & Haahtela, 1966) in low to medium exposed areas (Pethon, 1968). E. Naylor and Haahtela (1966) considered *J. ischiosetosa* as a very euryhaline species usually occupying the tidal levels above LWN. Haahtela (1965) stated that the species can also be found in tidal pools, an observation also made by B. Forsman (1949). In this study, *J. ischiosetosa* was also found in abundance under stones in tidal pools at Djupvika and Mølen. It was not found, as is mentioned several places in the literature, in association with fresh or brackish water. Many locations at which this species was found were more exposed and marine than what has been mentioned previously.

Distribution in Norway. The existing literature reports a distribution from Moskenesøya, Herdla, Drøbak (B. Forsman, 1949), Olderfjorden (Hussey, 1964), Oslofjorden (Pethon, 1968), Raunefjorden (Sjöberg, 1967) and Hardangerfjorden (Brattegard, 1966). In this study, *J. ischiosetosa* was found in 9 locations depicted in Figure 17.

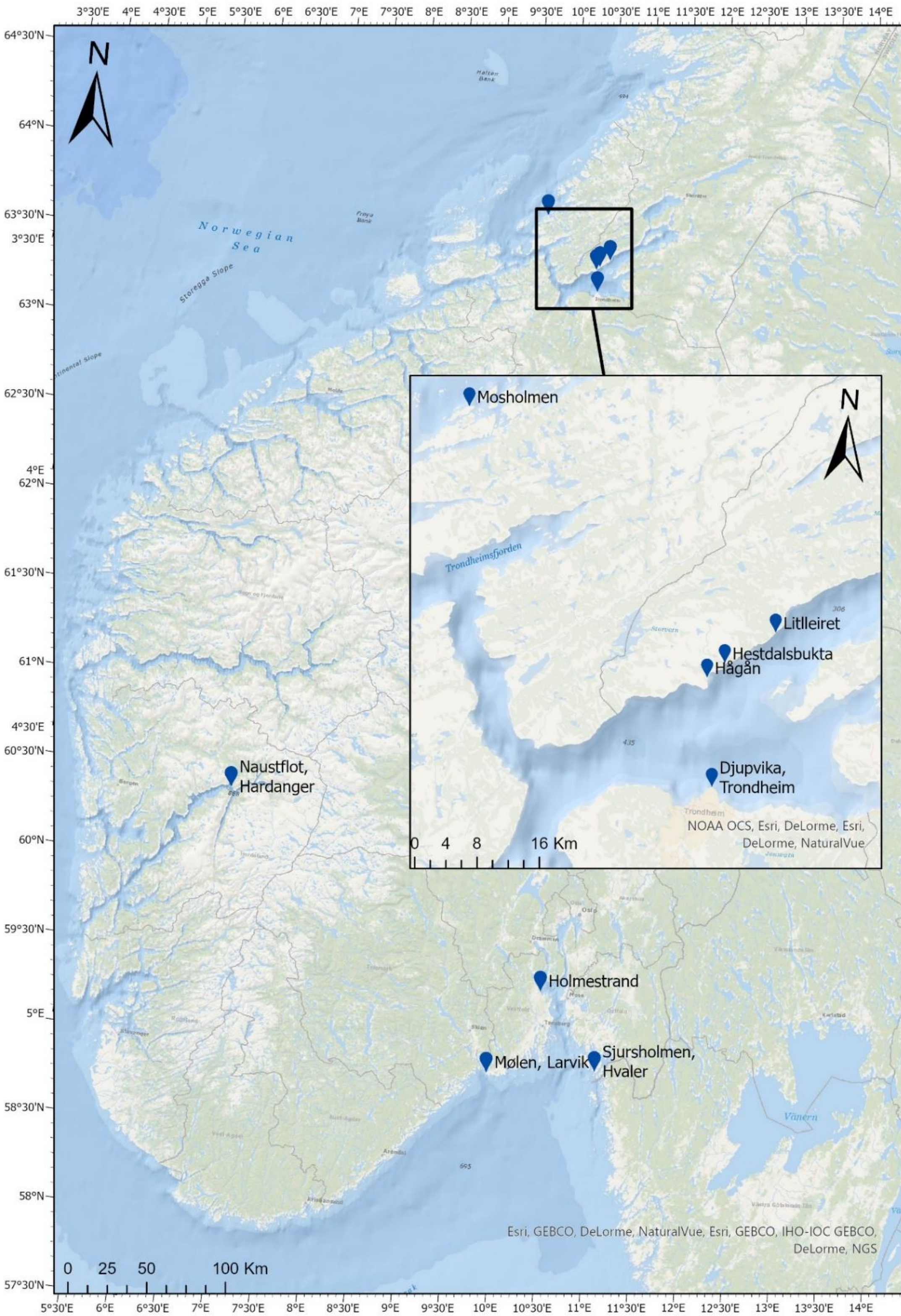

Figure 17: Locations at which J. ischiosetosa *was found during this study.*

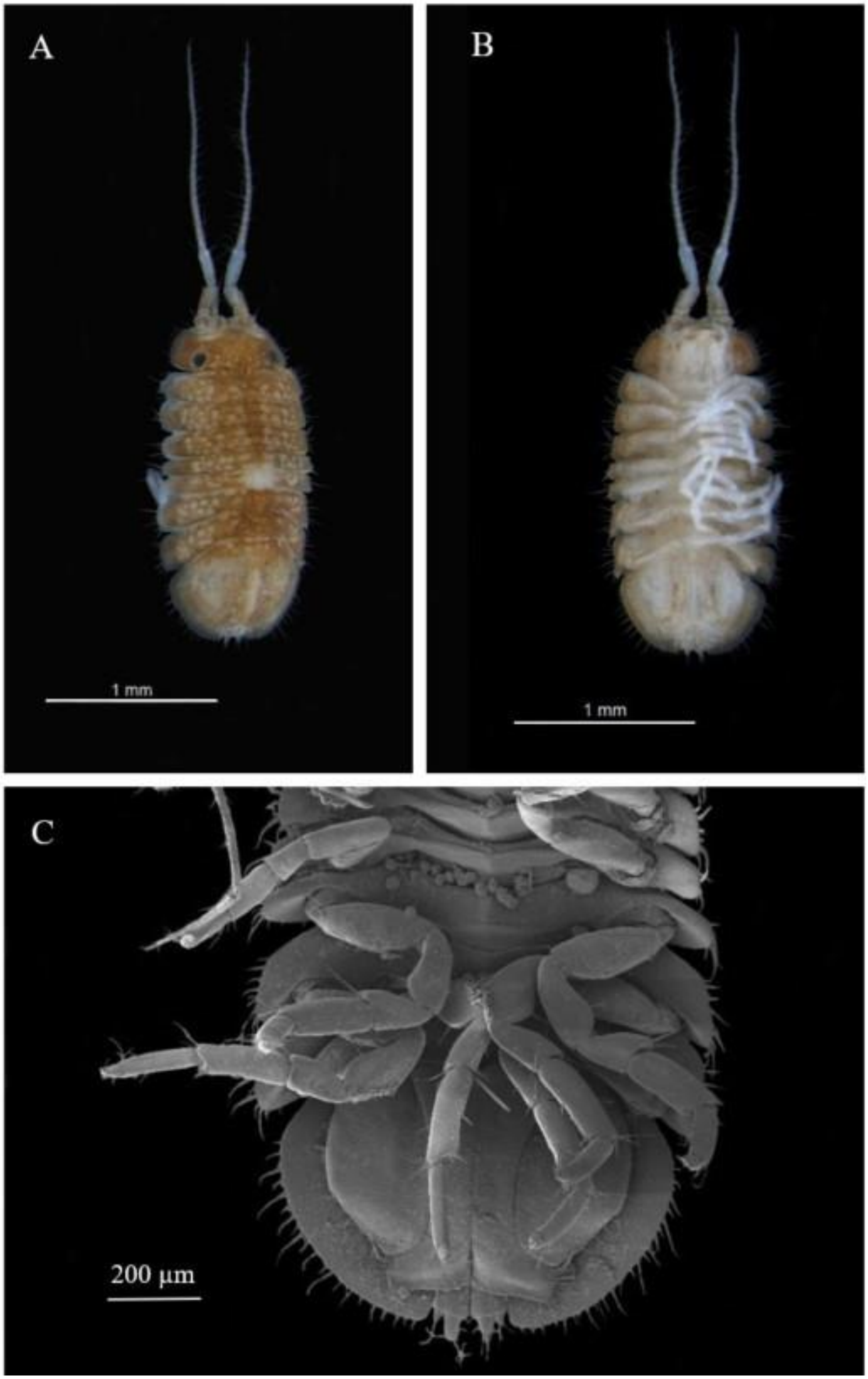

Figure 18: Male J. ischiosetosa*. A) Dorsal view. B) Ventral view. C) Comb of straight setae on ventral side of ischium on pereopod 6. Photo A, B: August R. Nymoen. C: Katrine Kongshavn.*

Order Isopoda Latreille, 1817

Suborder Asellota Latreille, 1802

Superfamily Janiroidea G. O. Sars, 1897

Family Janiridae G. O. Sars, 1897

Genus Janira Leach, 1814

Diagnosis: Uropods biramous; long. Antenna longer than body.

Janira maculosa **Leach, 1814**

Figure 20

Janira hanseni Menzies, 1962, p. 181

Material examined. NTNU_VM_63742 (1 specimen), NTNU_VM_63740 (1), NTNU_VM_63739 (1), NTNU_VM_63741 (4), NTNU_VM_63743 (2), NTNU_VM_62926 (4), NTNU_VM_62927 (12), NTNU_VM_62928 (3), NTNU_VM_80059 (3). A total of 31 specimens were examined (Appendix I, Table A1).

Diagnosis (Figure 20). Uropods biramous; long. Lateral margin of pereonites 2-4 concave exposing bilobate coxal plates. Male preoperculum quadrilobate at posterior margin. Antenna longer than body.

Remarks. *Janira maculosa* is recognized by the concave lateral borders of pereonite 2-4 where bilobate coxal plates protrude. The antennae can be very long where the antennal flagellum is equal to or longer than the length of the body. The species also has quite long forked-shaped biramous uropods and a semicircular telson with a serrated posterolateral margin (Figure 20A/C). It can easily be confused with *Ianiropsis breviremis* which has a highly similar appearance. Should the specimen be male, the two species can easily be separated through the preoperculum which is quadrilobate at the posterior margin in *J. maculosa* (Figure 20C), while in *I. breviremis* it takes the shape of an inverted T similarly to the males of the *J. albifrons* group. The apical border of the telson in *I. breviremis* is not serrated and more acute than in *I. maculosa.* It is quite common that the specimens have lost the antennae and/or uropods as they both can be quite fragile. In such cases, my preferred method of identification is to study the lateral borders of pereonite 2-4 (Figure 20D). If the specimen has maintained the antennae, *I. breviremis* has noticeably shorter antennae with a flagellum not surpassing the body in length.

The general body shape of *J. maculosa* is that of a slender oval shape with ovigerous females being noticeably wider transversely anteriorly. Some specimens have a fan of long simple setae and one broom setae distodorsally on carpus on pereopod 4-6 while others have not. The species possesses a slightly pale-yellow grayish color.

Ecology. *J. maculosa* can be found under stones (W. E. Leach, 1813) in association with Hydroidolina Collins, 2000 and *Polyzoa* Lesson, 1831 (Sars, 1899) as well as the holdfasts and stipes of *Laminaria hyperborea* (Gunnerus) Foslie, 1884 (Christie et al., 2003). Sars (1899) collected samples of this species at depths between 55 and 182 m (30-100 fathoms) on rocky bottom while Gulliksen (1978) collected samples from 2-12 m. In this study, *J. maculosa* was found in association with *Laminaria* J.V. Lamouroux, 1813 holdfasts, *Modiolus modiolus* (Linnaeus, 1758), and on rocky intertidal areas between 8 and 30 m. Specimens collected during the MAREANO project were found between 100 and 555 m.

Distribution in Norway. The existing literature reports a distribution along the entire coastline from Oslofjorden to Vadsø (Sars, 1899). Gulliksen (1978) also collected this species at Loppkalven and Kvænangen while Christie et al. (2003) found it at various locations from Skagerrak to Molde. In this study, *J. maculosa* was sampled at 19 sites in 15 locations depicted in Figure 19.

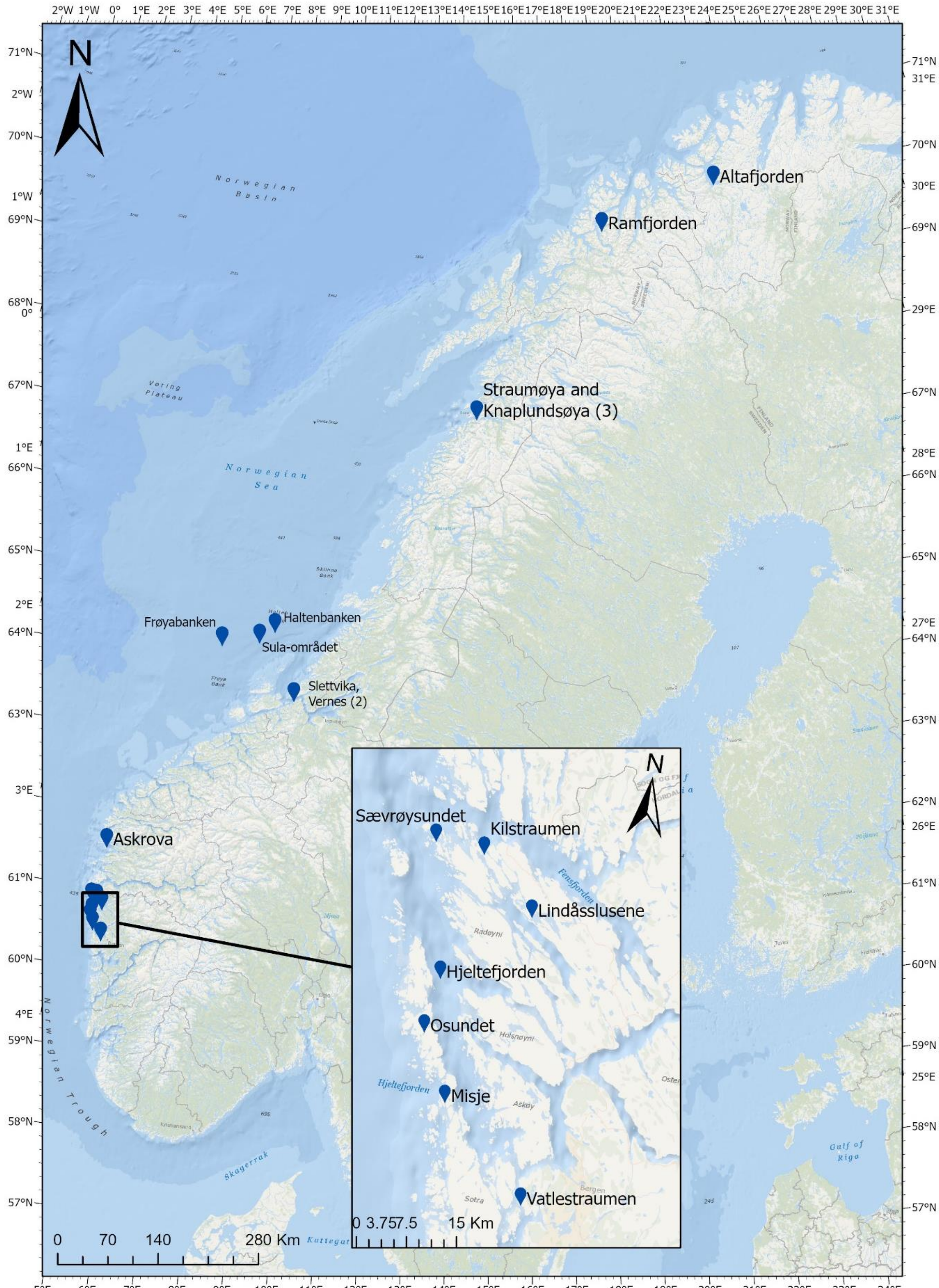

Figure 19: Locations at which J. maculosa *was found during this study. Numbers in parenthesis indicate the number of sampling sites at each location.*

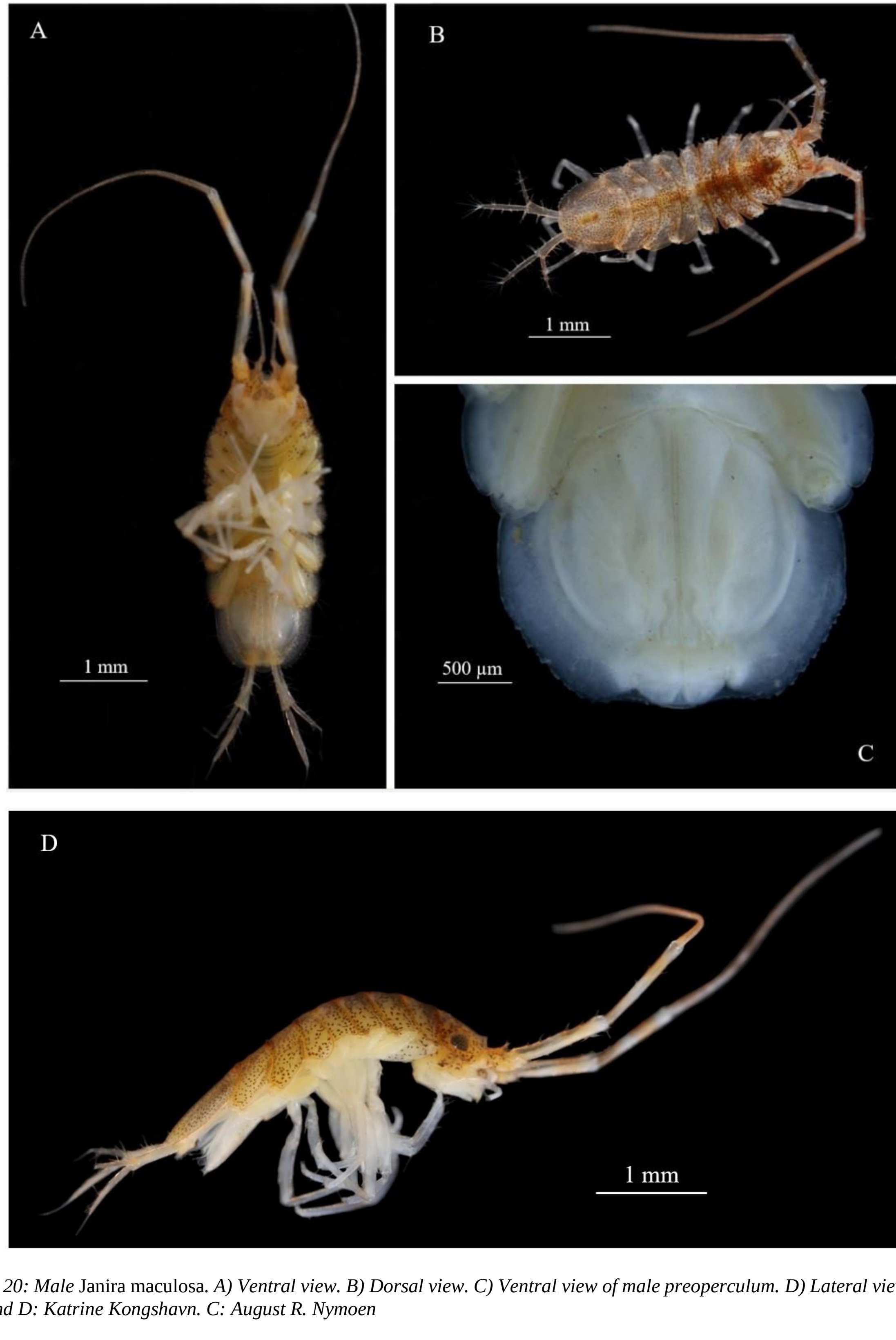

Figure 20: Male Janira maculosa. *A) Ventral view. B) Dorsal view. C) Ventral view of male preoperculum. D) Lateral view. Photo A, B and D: Katrine Kongshavn. C: August R. Nymoen*

Order Isopoda Latreille, 1817

Suborder Valvifera Sars, 1883

Family Idoteidae Samouelle, 1819

Genus Idotea Fabricius, 1798

Diagnosis: Partial suture of the 3rd pleon somite.

***Idotea granulosa* Rathke, 1843**

Figure 22**,** Figure 23

Material examined. NTNU_VM_79994 (5 specimens), NTNU_VM_80056 (18), NTNU_VM_80025 (3), NTNU_VM_79995 (2), NTNU_VM_80010 (10), NTNU_VM_ 80057 (10), NTNU_VM_80020 (5), NTNU_VM_80045 (3), NTNU_VM_80053 (10), NTNU_VM_80007 (3), NTNU_VM_80067 (1), NTNU_VM_80068 (4), NTNU_VM_80055 (1), NTNU_VM_ 80047 (1), NTNU_VM_79888 (1), NTNU_VM_80044 (14), NTNU_VM_80074 (3), NTNU_VM_79885 (1), NTNU_VM_79886 (1), NTNU_VM_80069 (4), NTNU_VM_80073 (2), NTNU_VM_80070 (6), NTNU_VM_80042 (15), NTNU_VM_80075 (3), NTNU_VM_80072 (4), NTNU_VM_80071 (2), NTNU_VM_57635 (27). A total of 159 specimens were examined (Appendix I, Table A1).

Diagnosis. Anterolateral margins of pleotelson noticeably concave. Apical margin of telson extended to a sharp point (Figure 22, Figure 23).

Remarks. *I. granulosa* can grow to be > 2 cm and is identifiable at 2.5 mm. This species mostly appears in a green color, but can also occur with different shades of brown, brownish-red, or yellow. The color is mostly uniform, occasionally with mediodorsally centered white lines or spots. *I. granulosa* can be confused with *Idotea chelipes* (Pallas, 1766) which has a similar telson and body shape as *I. granulosa*. E. Naylor (1955a) noted that the number of aesthetasc at the distal region of the last article of the antennule can serve as a diagnostic character for the distinction between the two species. In *I. chelipes* there is only one larger aesthetasc at the distal end, while *I. granulosa* appear with two aesthetascs in this location (E. Naylor, 1955a; Ernest Naylor & Brandt, 2015). *I. chelipes* was not found in this study, but some specimens from the museum collection at the University Museum of Bergen were studied to make identification in the future, should the species be found. Further characters that can aid in the separation of the two species are the slightly keeled and less pointy apical border of telson, the uniformly slender body with coxal plates 1-4 not reaching the posterior border of their associated pereonites in *I. chelipes*.

Ecology. *I. granulosa* is considered as a predominantly tidal, neustonic species (Tullyand & Céidigh, 1986) often found in association with *Ascophyllum* Stackhouse, 1809, *Fucus* (Brattegard, 1966; Kjennerud, 1950; E. Naylor, 1955a), *Cladophora* Kütsing, 1843 and *Polysiphonia* Greville, 1823 (E. Naylor, 1955a). Some specimens have also been found on drift weed (E. Naylor, 1955a) at highly exposed shores (Leidenberger, Harding, & Jonsson, 2012) affected by strong waves (Salemaa, 1987). This species is largely considered as an herbivore species feeding mostly on *Fucus* (E. Naylor, 1955b; Salemaa, 1987; Strer, Hammrich, Gutow, & Moenickes, 2016) and *Cladophora* (E. Naylor, 1955b). In this study, *I. granulosa* was mostly found together with *F. serratus, F. vesiculosus,* and *A. nodosum* at the high to low mid tidal levels on the shore.

Distribution in Norway. The existing literature reports a distribution from Kristiansund, Trondheim (Rathke, 1843), Oslofjorden (Sars, 1899), Hermansverk (Kjennerud, 1950) Bømlafjorden and Eidfjorden (Brattegard, 1966). During this study, *I. granulosa* was found at 28 locations depicted in Figure 21.

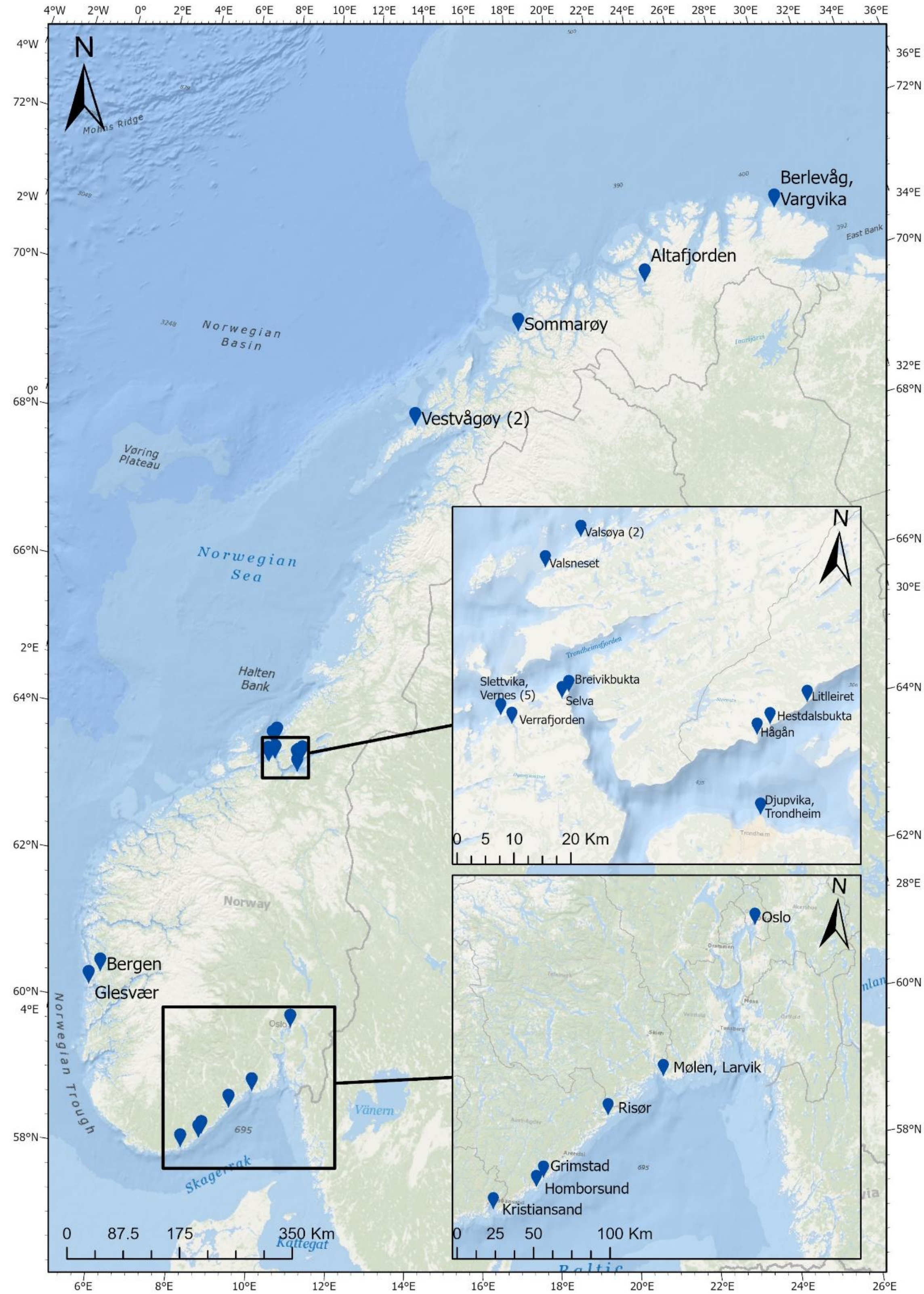

Figure 21: Locations at which I. granulosa *was found during this study. Numbers in parenthesis indicate the number of sampling sites at each location.*

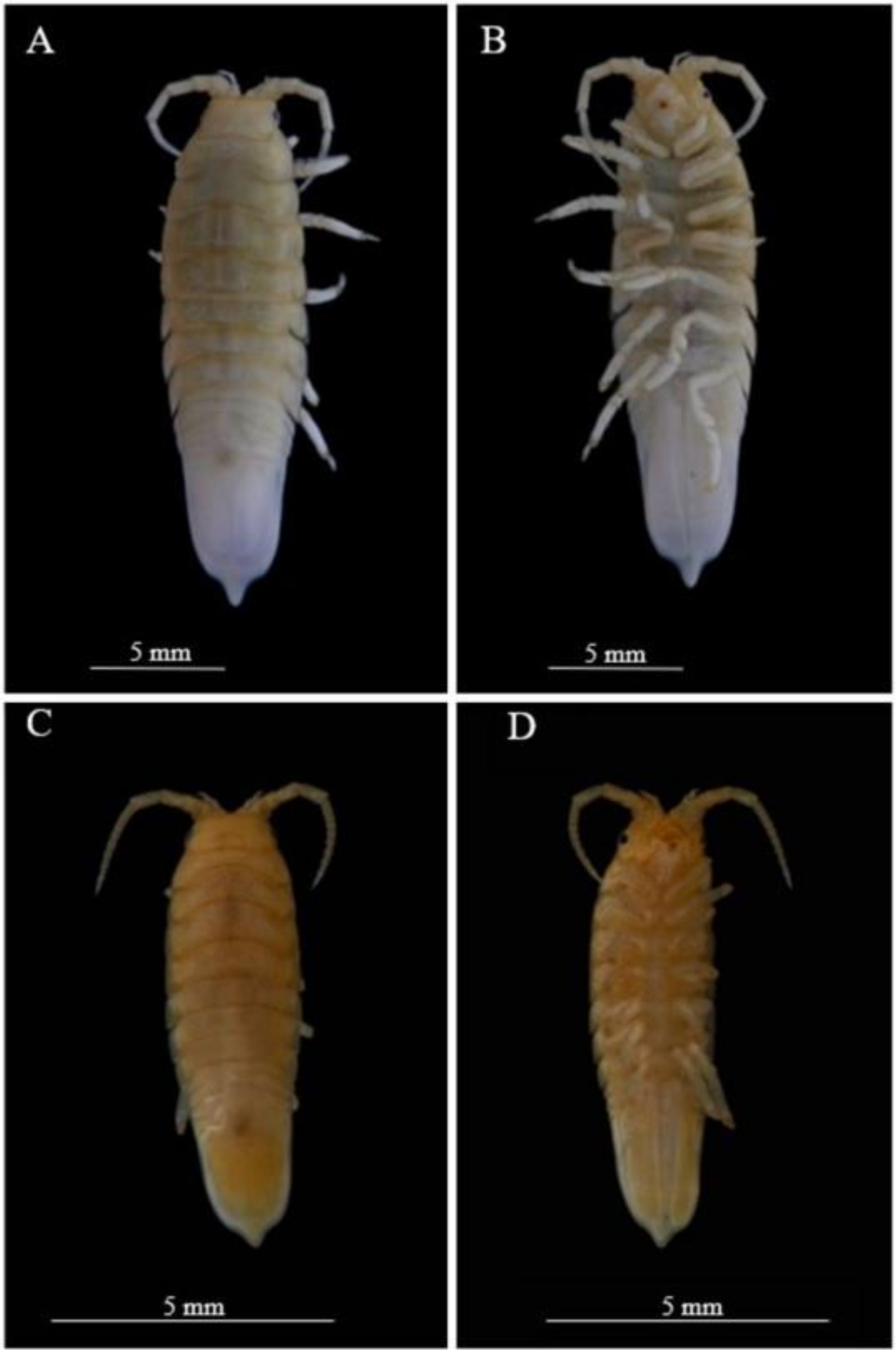

Figure 22: I. granulosa. *A) male dorsal view. B) male ventral view. C) female dorsal view. D) female ventral view. Photo: August R. Nymoen*

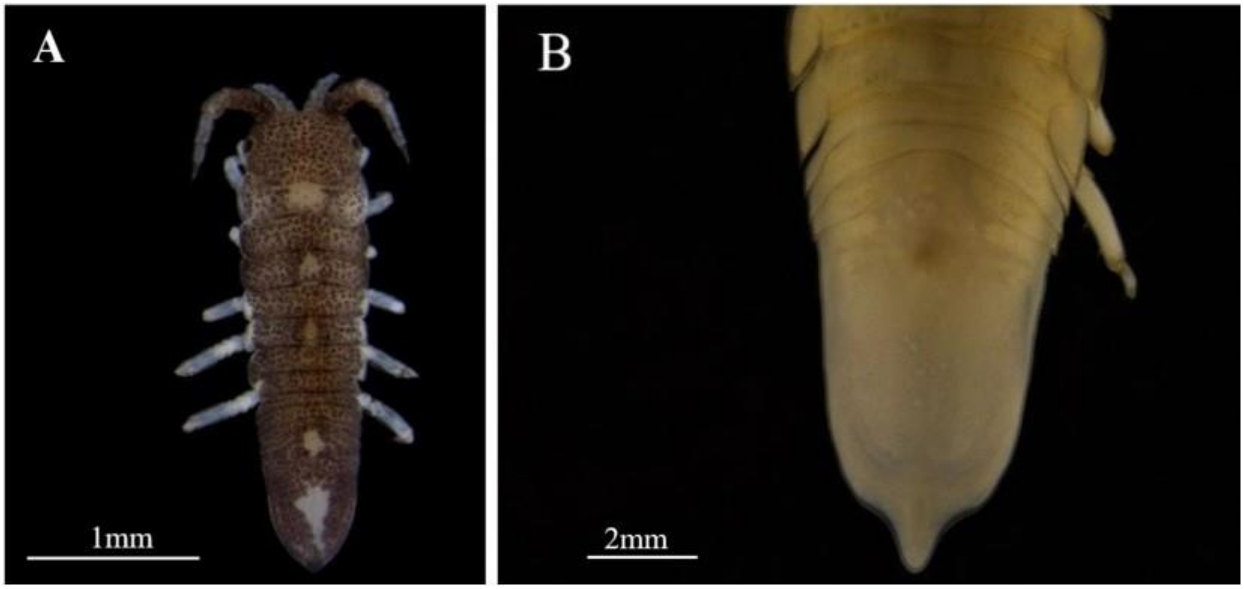

Figure 23: I. granulosa. *A) dorsal view of juvenile. B) dorsal view of male pleotelson.*

***Idotea balthica* (Pallas, 1772)**

Figure 25

Idotea baltica Pallas, 1772 (misspelling)

Material examined. NTNU_VM_79882 (1 specimen), NTNU_VM_79881 (1), NTNU_VM_79889 (1), NTNU_VM_80011 (1), NTNU_VM_79879 (1), NTNU_VM_79880 (1), NTNU_VM_79887 (1), NTNU_VM_79883 (1), NTNU_VM_80079 (1), NTNU_VM_81056 (1), NTNU_VM_81055 (2), NTNU_VM_81051 (1), NTNU_VM_57636 (4), NTNU_VM_57637 (3). A total of 20 specimens were examined (Appendix I, Table A1).

Diagnosis. Apical border of telson tridentate (Figure 25).

Remarks. *I. balthica* is easily identified from the characteristic end of telson which appears with three posteriorly directed points which clearly distinguishes it from other members of *Idotea*. Identification is possible in specimens as small as 4 mm though this is often more difficult than identifying large adults which can be > 1.5 cm in length. The coloration of this species may vary from a slightly dark purple brown to opaque yellow or green, often with different markings. The species can also display a white line centered mediodorsally running from cephalon to telson.

Ecology. *I. balthica* occurs amongst algae (Sars, 1899) such as *Fucus* (Pallas & Christianus Fridericus Voss et, 1767) particularly *F. vesiculosus* (Salemaa, 1987), *Fucus radicans* L.Bergstrøm & L.kautsky, 2005 (Leidenberger et al., 2012), and on *Cladophora glomerata* (Linnaeus) Kützing, 1843, *Zostera marina* Linnaeus, 1753 (Leidenberger et al., 2012) as well on drift weed (E. Naylor, 1955a; Strer et al., 2016) and decomposing algae on the seafloor (Strer et al., 2016). *Z. marina* and *F. vesiculosus* serves as the main food sources (Douglass, Duffy, & Canuel, 2011), but *I. balthica* also prays on smaller zooplankton (Strer et al., 2016). This species can be considered as sublittoral (E. Naylor, 1955a), euryhaline (Strer et al., 2016), with noticeable swimming capacities (Strer et al., 2016; Tullyand & Céidigh, 1986). *I. balthica* will in all cases be outcompeted by *Idotea emarginata* due to higher conspecific predation of juveniles amongst *I. balthica* as well as predation from *I. emarginata* (Franke & Janke, 1998). In this study, *I. balthica* was found predominantly in shallow waters on *F. vesiculosus*.

Distribution in Norway. The existing literature reports a frequent occurrence from Oslofjorden to Tromsø (Sars, 1899), other areas in northern Norway (Ernest Naylor & Brandt, 2015), as well as in Skagerrak (Leidenberger et al., 2012) and Hardangerfjorden (Brattegard, 1966). During this study, *I. balthica* has been found at six locations depicted in Figure 24.

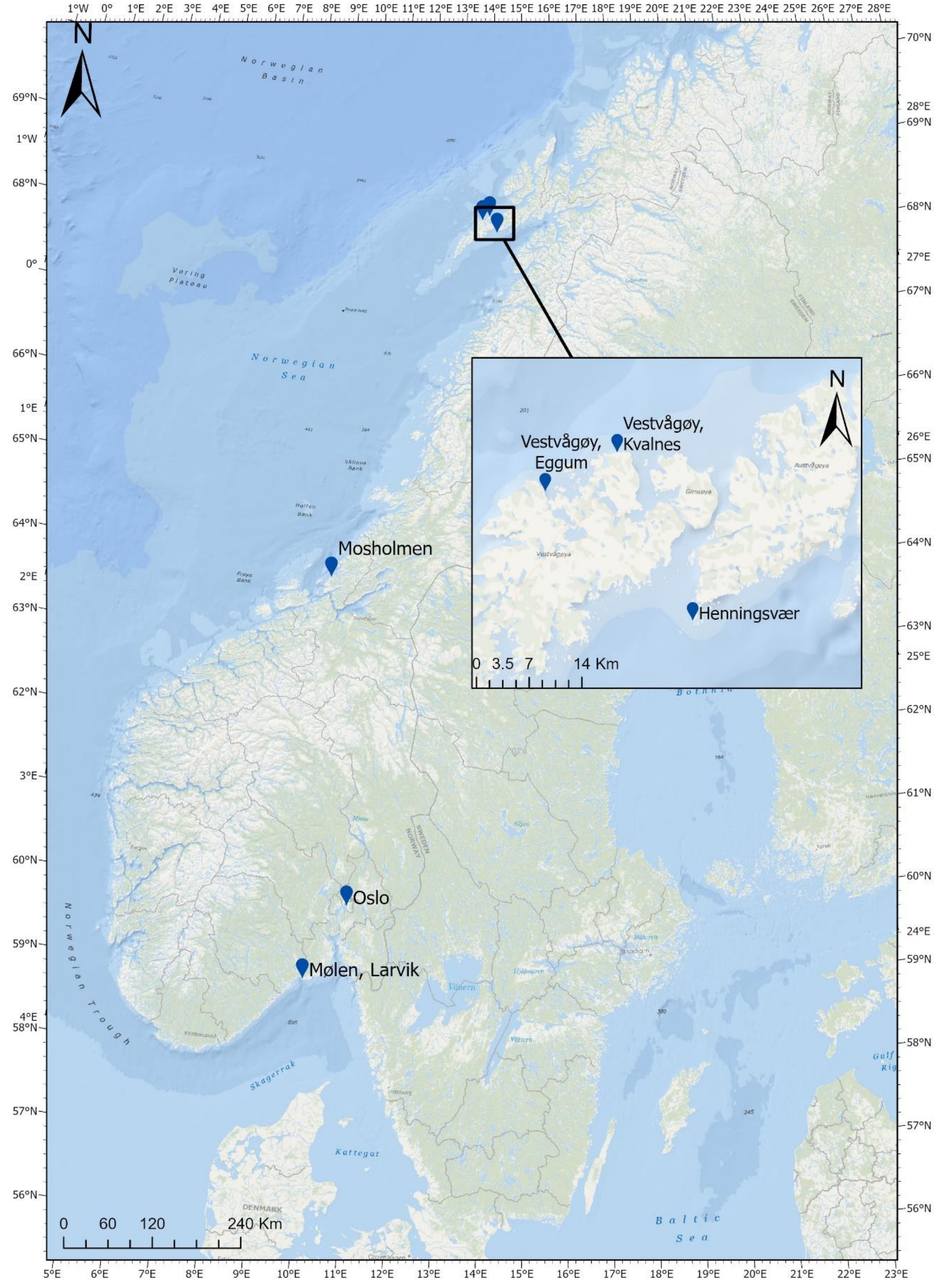

Figure 24: Locations at which I. balthica *was found during this study.*

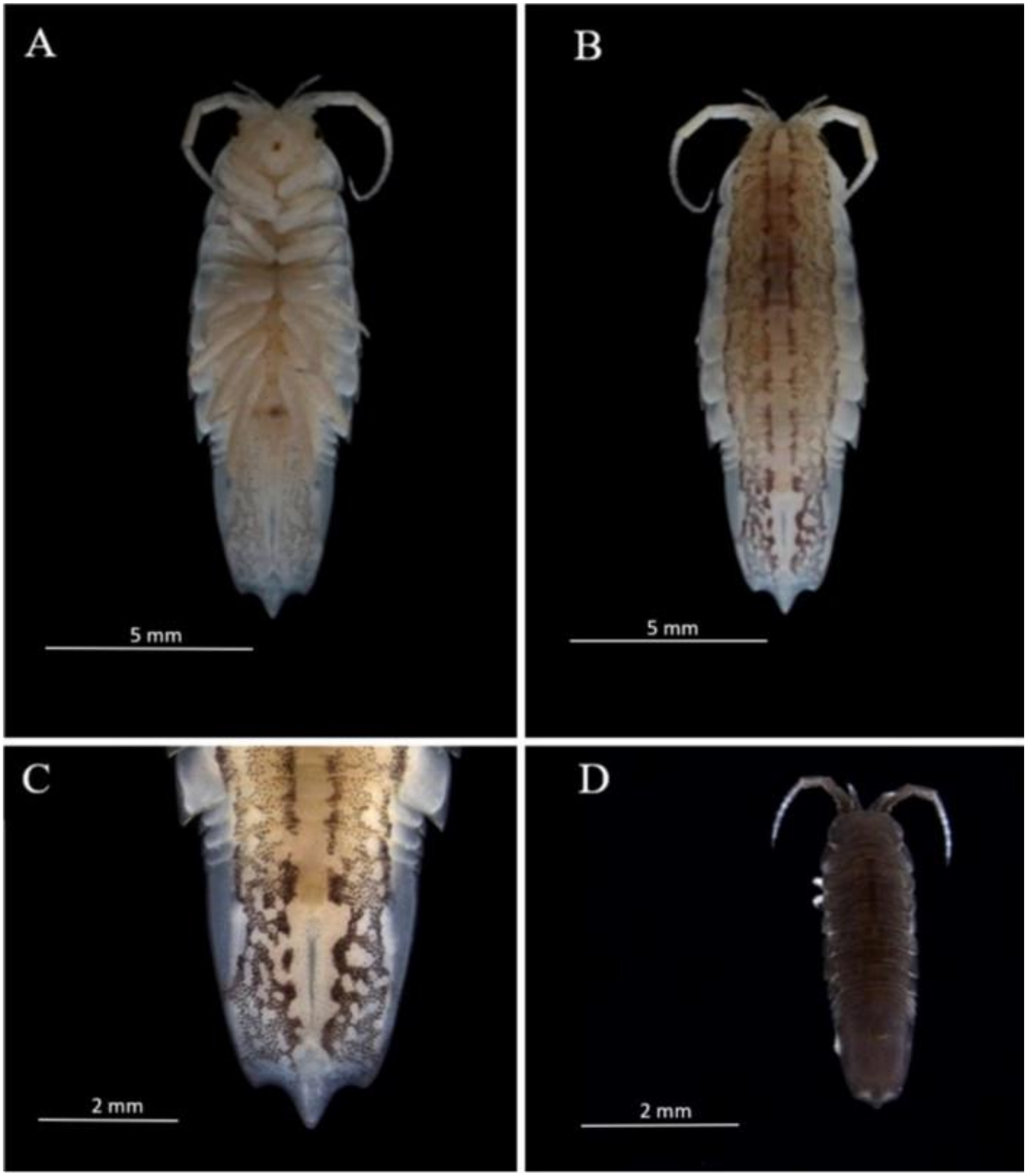

Figure 25: I. balthica*. A) male ventral view. B) male dorsal view. C) male pleotelson. D) juvenile dorsal view. Photo: August R. Nymoen*

***Idotea emarginata* (Fabricius, 1793)**

Figure 26, Figure 27

Material examined. NTNU_VM_44083 (20 specimens) (Appendix I, Table A1).

Diagnosis of adult. Apical border of telson concave (Figure 26, Figure 27).

Remarks. As the collected specimens for this species were stored in Bergen, specimens from the museum collection at NTNU University Museum were used for this description *I. emarginata* can be identified by the concave apical border of the telson which is quite prominent in most specimens investigated. The males of this species grow to be > 2.5 cm and appear as very broad with large coxal plates, which make it resemble adult male *I. neglecta*. The females appear more slender and not as large as the males. Should the posterior edge of telson in females be somehow deformed or less concave, this species can be confused with *I. metallica* which has a similar looking telson with a straight apical border. In sample ZMBN_132545 (Appendix I, Table A1), which contained a large amount of *I. emarginata*, there were found two specimens, one male and one female, showing a different morphology of the telson than the rest. These two specimens could not definitively be identified as either *I. emarginata* or *I. metallica* due to the morphological difference in the telson. Because all the specimens in this sample were found in the same location, they are most likely deformed *I. emarginata*.

Ecology. *I. emarginata* can occur as free-swimming (Tullyand & Céidigh, 1986) among decaying algae in sublittoral areas (Franke & Janke, 1998; Sars, 1899) at roughly 9 m (E. Naylor, 1955c) down to 36 m (Sars, 1899), sometimes together with *I. neglecta* (E. Naylor, 1955c; Sars, 1899; Tullyand & Céidigh, 1986). The species does not seem to be affected by seasonal variations in sea temperature and can appear year-round (Tullyand & Céidigh, 1986). *I. emarginata* will feed on *Laminaria*, scallops, *Arenicola* Lamarck, 1801, and dead fish (E. Naylor, 1955b) and in some cases juveniles of other isopods as well as juvenile conspecifics (Franke & Janke, 1998).

Distribution in Norway. Sars (1899) reports a somewhat frequent occurrence along the Norwegian coastline with a larger number of individuals observed at Ferder. During this study, the species was found at Rekstra and Vestvågøy. Because it was only found at two locations, a distribution map has not been made for this species. Specimens collected at Rekstra were found at 88 m, while specimens from Vestvågøy were found at 1 m.

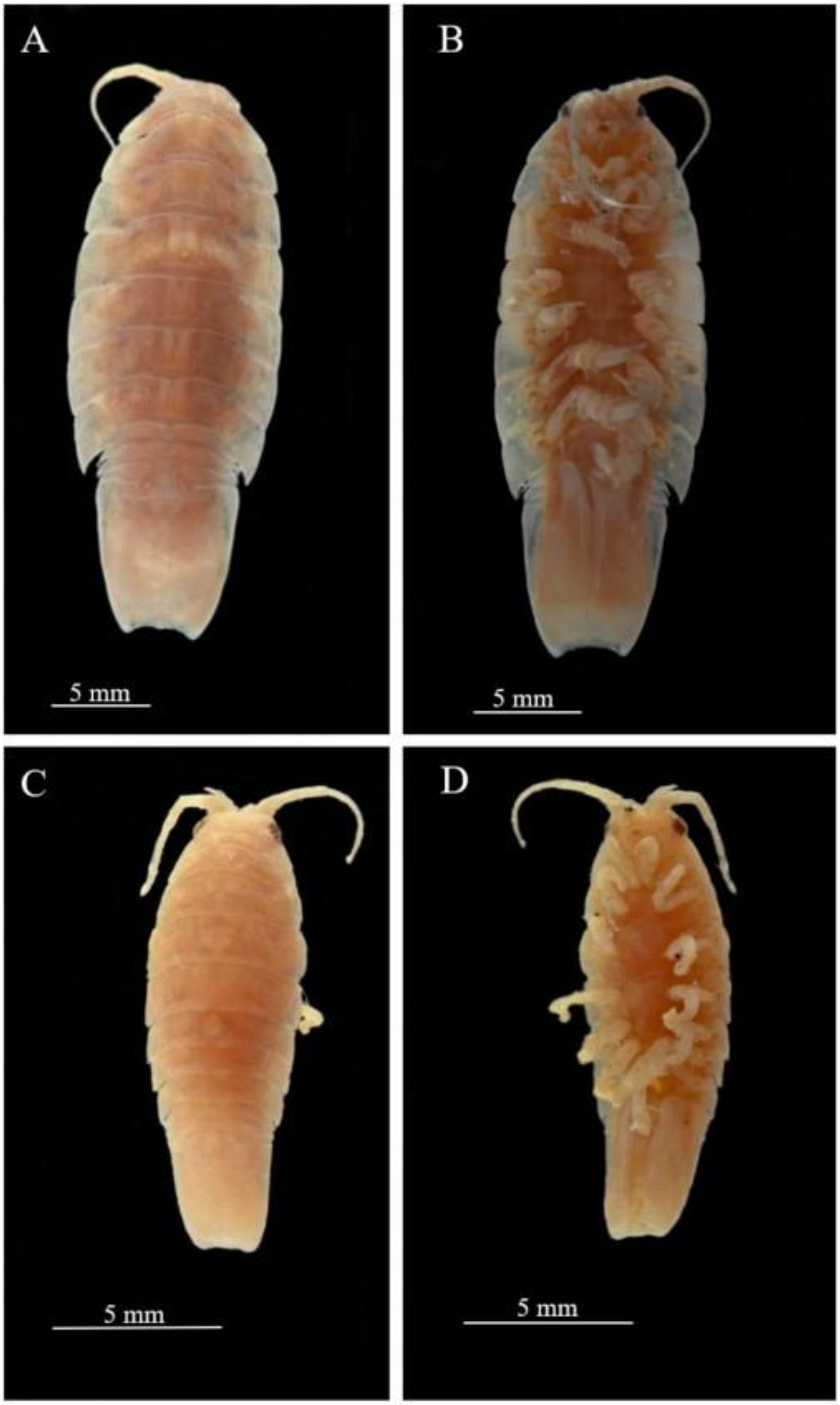

Figure 26: I. emarginata. *A) male dorsal view. B) male ventral view. C) female dorsal view. D) female ventral view. Photo: August R. Nymoen*

Figure 27: I. emarginata. *A) dorsal view of female telson. B) dorsal view of male telson. Photo: August R. Nymoen*

***Idotea neglecta* G. O. Sars, 1897**

Figure 29**,** Figure 30

Material examined. NTNU_VM_80046 (5 specimens), NTNU_VM_79884 (1), NTNU_VM_46389 (1). A total of 7 specimens were examined (Appendix I, Table A1).

Diagnosis of adult. Pleotelson very broad, keeled with a small point at the apical border (Figure 29A, Figure 30A).

Remarks. *I. neglecta* can be > 2 cm in length and is identified quite easily from its broad and keeled telson. Identification in young juveniles with a length < 7 mm can be quite challenging. The males of the species are often, in their adult form, very broad and compact with large coxal plates that extend beyond the lateral margin of pleotelson transversely. The females are much slenderer than the males but can still be considered broad compared to the other *Idotea* species. Females can in some cases be confused with *I. granulosa* if the anterolateral margin of pleotelson in *I. granulosa* is not noticeably concave. In such cases, the medially centered keel in the telson of *I. neglecta* can be used to make safe identifications as this is not present in *I. granulosa*. The coloration may vary from a white spotted dark purple to a greener yellowish color. They can also appear in greyish tones.

After examining sample NTNU_VM_46389 (Appendix I, Table A1) which originally contained two specimens determined as *Idotea* sp. later determined as *I. neglecta* and *I. chelipes*, it became apparent that the young adults of these two species can be quite difficult to separate morphologically, especially if the *I. neglecta* is a female. In this case, it was the large singular aesthetasc at the distal end of the antennular flagellum in the *I. chelipes* specimen which made a separation between the two species possible.

Ecology. *I. neglecta* can be found amongst decaying algae at the seafloor between 11-36 m (Sars, 1899). Brattegard (1966) found this species on *Ascophyllum* and *F. serratus* in the lower tidal zone. Kjennerud (1950) notes that *I. neglecta* largely is associated with decaying organisms and other substrates such as mud. To some extent, *I. neglecta* can also be considered as an ectoparasite on fish caught in nets (Kjennerud, 1950). Diet consists of *Laminaria* (E. Naylor, 1955b), dead fish, and fish waste (Kjennerud, 1950). In this study, *I. neglecta* has been found in the upper sections of the tidal zone amongst *F. vesiculosus*.

Distribution in Norway. Appears from Oslofjorden to Vadsø (Sars, 1899) and has also been found at Vågen of Bergen and Hermansverk (Kjennerud, 1950). In this study, *I. neglecta* was found at five locations depicted in Figure 28.

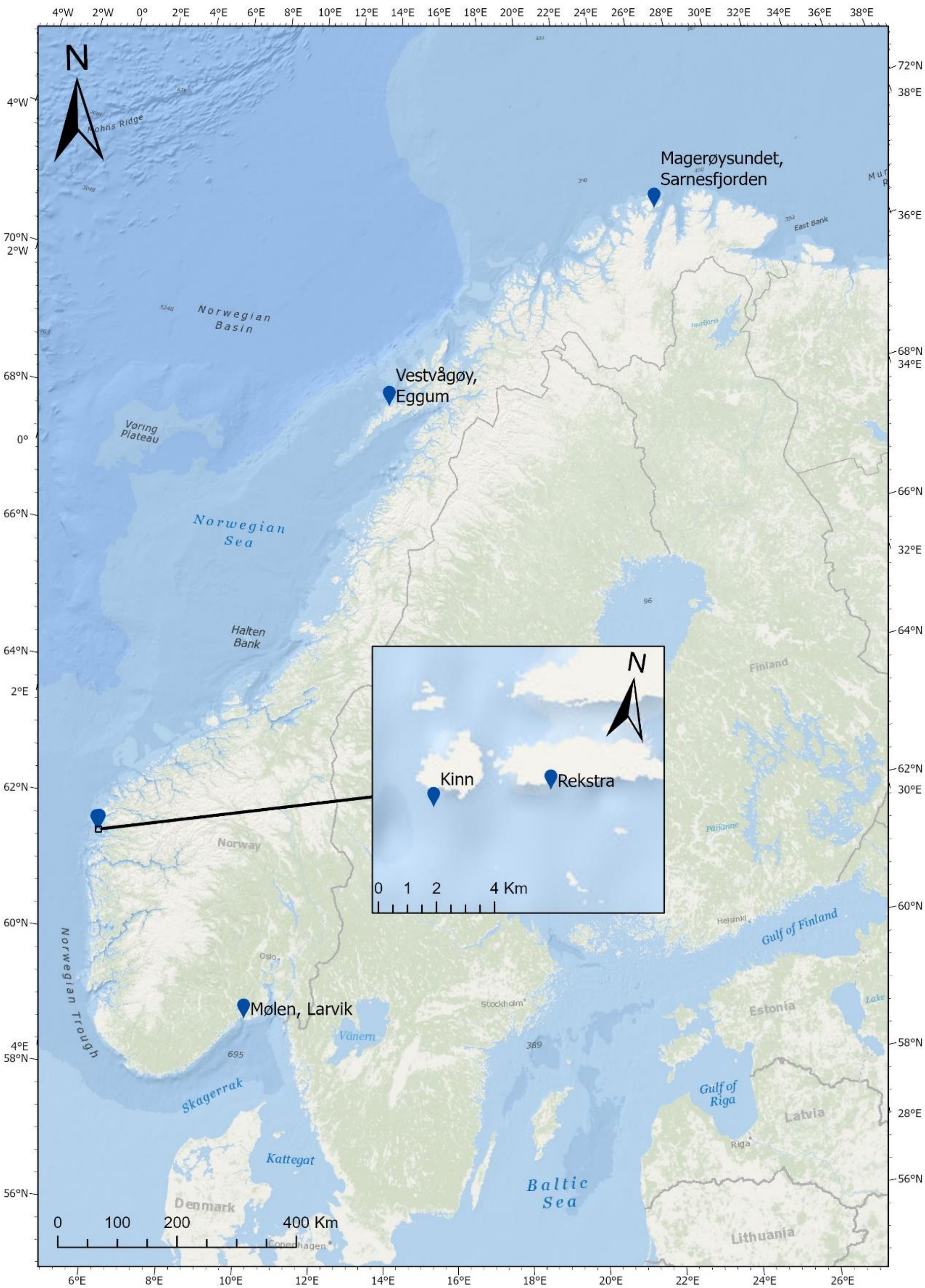

Figure 28: Locations at which I. neglecta *was found during this study.*

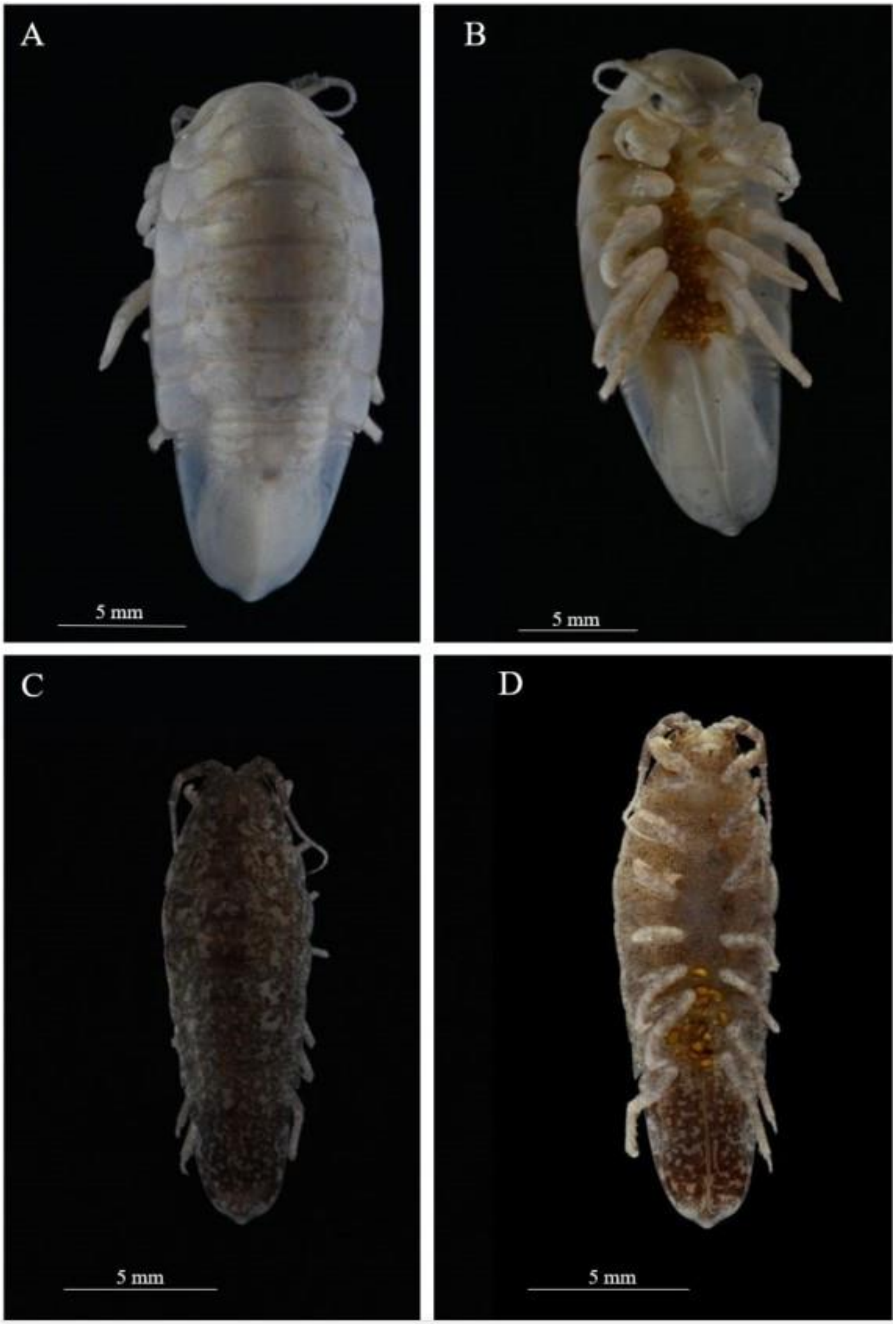

Figure 29: I. neglecta. *A) male dorsal view. B) male ventral view. C) female dorsal view. D) female ventral view. Photo: August R. Nymoen*

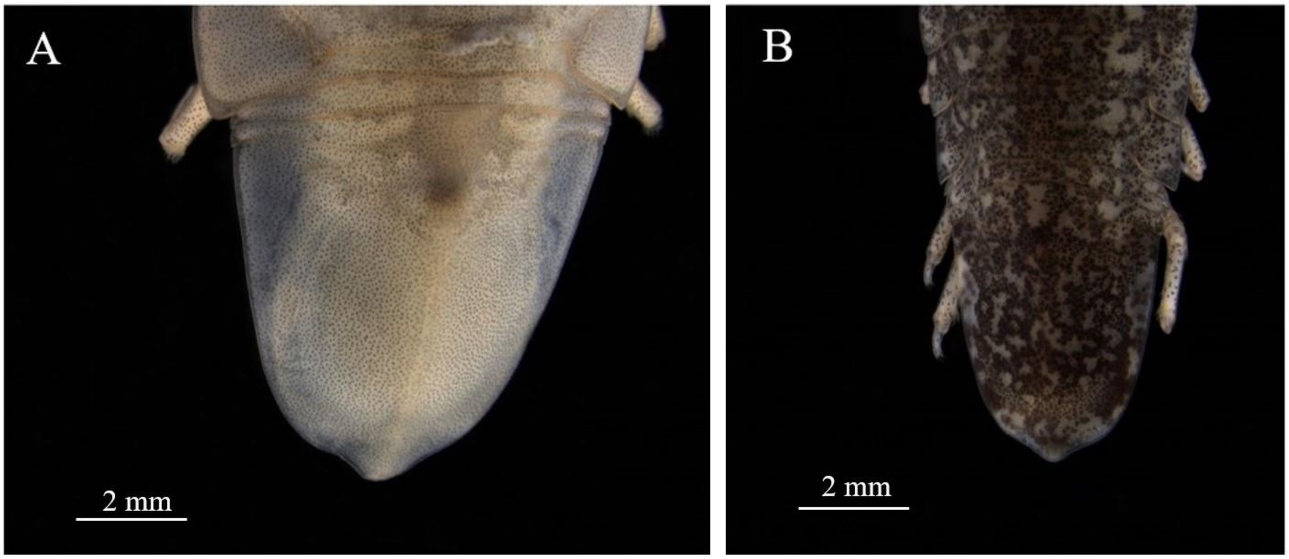

Figure 30: I. neglecta. *Dorsal view of male (A) and female (B) pleotelson. Photo: August R. Nymoen*

***Idotea pelagica* Leach, 1816**

Figure 32**,** Figure 33

Material examined. NTNU_VM_80078 (1 specimen), NTNU_VM_80043 (13), NTNU_VM_80040 (6), NTNU_VM_80041 (18), NTNU_VM_80076 (3), NTNU_VM_80077 (1). A total of 42 specimens were examined (Appendix I, Table A1).

Diagnosis of adult. Antennal flagellum heavily setose and much shorter than peduncle. Pleotelson short with rounded lateral margins and a reduced point at apical margin (Figure 32, Figure 33).

Remarks. *I. pelagica* can be > 2.5 cm and is easily identified based on its short and setose antennal flagellum and the short, blunt, and slightly keeled telson. Identification of specimens as small as 2 mm is possible, though more difficult. If the antennae are missing, the species can be confused with *I. neglecta* which has a similar telson. In such cases, male adults of *I. pelagica* have thick patches of setae on carpi, meri, and ischii on all pereopods which can be used for identification. A female *I. pelagica* who has lost both antennae, on the other hand, can be quite difficult to separate from *I. neglecta*. Usually, adult *I. neglecta* are much larger, have a slightly longer and more strongly keeled telson with a more prominent point at the apical border than *I. pelagica*. The coloration of *I. pelagica* is almost always a dark shade of blue sometimes with a white mediodorsally centered line running from cephalon to telson and/or white lateral edges of the pereonites.

Ecology. William Elford Leach (1815) found *I. pelagica* in abundance in a log full of cavities left by *Limnoria* Leach, 1814. *I. pelagica* also appears in association with *Mytilus* (Brattegard, 1966; Sars, 1899), *Ascophyllum*, *F. serratus*, *Corallina* Linnaeus, 1758, *Balanus* Costa, 1778, *F. vesiculosus* and mussels (Brattegard, 1966) often around barnacles on which it feeds (E. Naylor, 1955a, 1955b).

Distribution in Norway. The existing literature reports a distribution from Bømlafjorden, Utnefjorden, Espegrend (Brattegard, 1966), Sognefjorden (Kjennerud, 1950), Kristiansund and Lillesand (Sars, 1899). In this study, *I. pelagica* was found at 11 locations depicted in Figure 31.

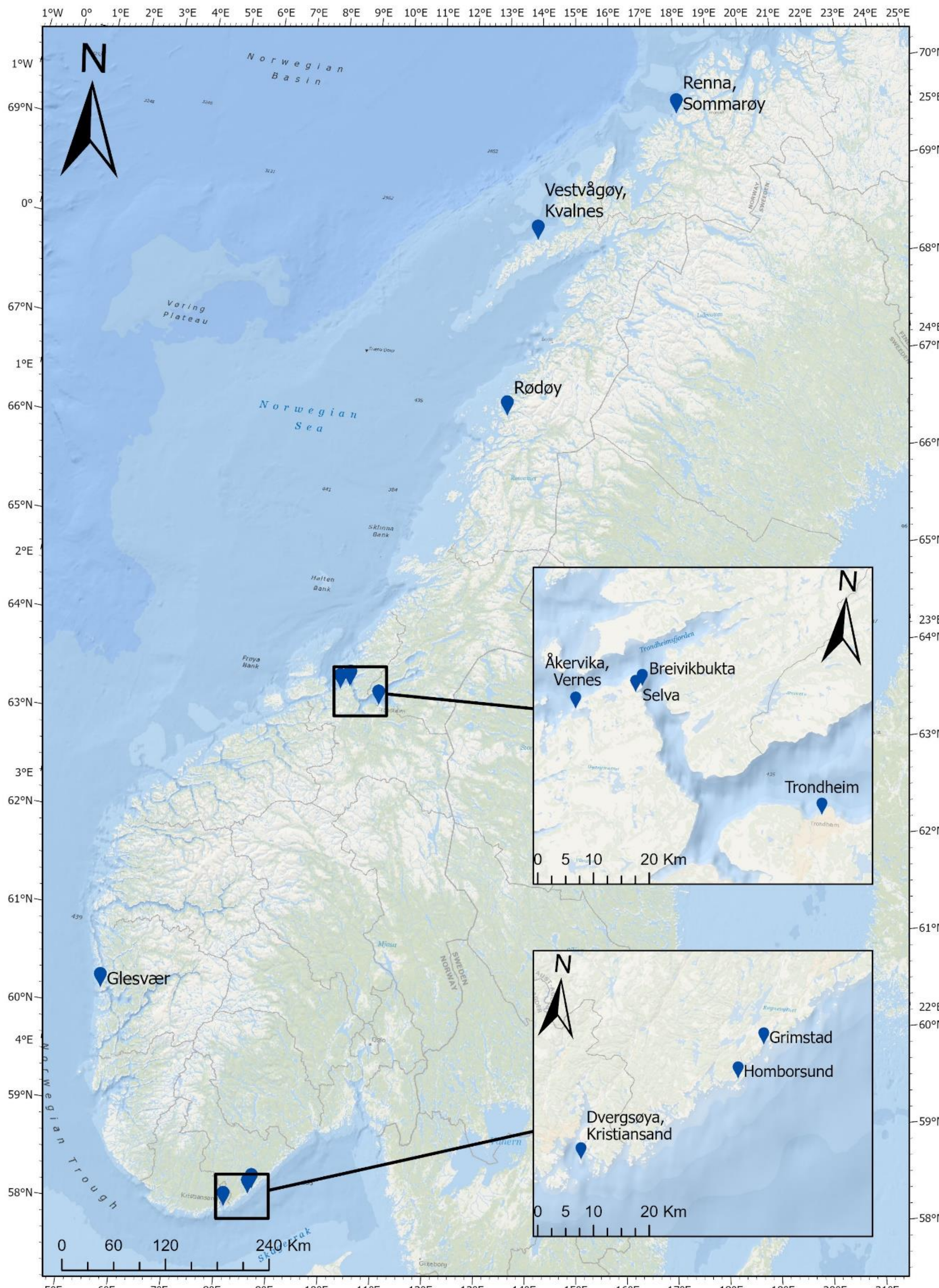

Figure 31: Locations at which I. pelagica *was found during this study.*

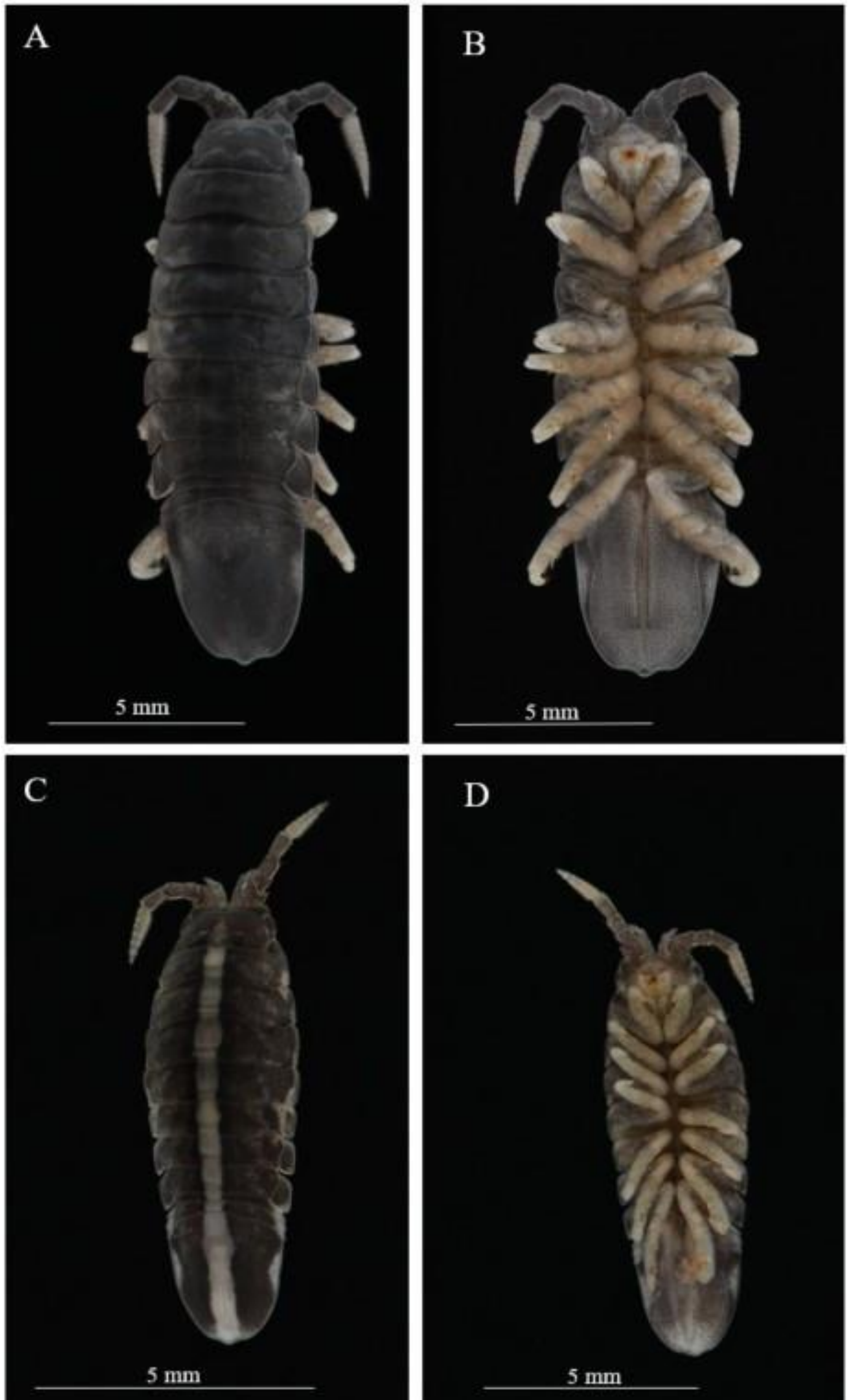

Figure 32: I. pelagica. *A) male dorsal view. B) male ventral view. C) female dorsal view. D) female ventral view. Photo: August R. Nymoen*

Figure 33: I. pelagica. *A) juvenile dorsal view. B) dorsal view of male pleotelson. C) dorsal view of male antennal flagellum. D) ventral view of male displaying patches of setae on carpi, meri, and ischii. Photo: August R. Nymoen*

4 Discussion

Results from this study provide three very different scenarios. *Idotea* species are easily distinguishable based on both morphology and CO1 barcodes, while *Jaera* and *Janira* provide two opposite cases. Identification of species in the *J. albifrons* group based on CO1 is impossible due to the large degree of interspecific similarity between sequences. Despite this, identifications can be made through secondary sexual characters in males as they are described in the literature. Analysis of the CO1 sequences for *Janira maculosa* shows large intraspecific genetic divergences between individuals, suggesting the presence of cryptic species. Though some specimens were confused with *I. breviremis*, most individuals were correctly identified to *J. maculosa* based on descriptions of morphological characters in the literature.

4.1 Genetic and morphological identification of *Idotea* species

The NJ tree (Figure 5), haplotype network (Figure 6) and genetic distance analysis (Table 4) performed for *Idotea* clearly distinguish between the five collected species. In the tree presented in Figure 5, each species is shown as a clearly defined clade that is noticeably separated from the others. Genetic distances between all species are above 10% when using both the p-distance and K2P model which further indicates that they are distinguishable using CO1 (Table 4). The K2P values are higher, as is expected, due to the inclusion of potential multiple substitutions in the analysis. The intraspecific genetic distance based on K2P is expected to not exceed 2% (P. Hebert et al., 2003; Paul D. N. Hebert et al., 2003), and in this case, all species exhibit a distance that is $\leq$ 0.5%. A 10x difference or higher between intraspecific and interspecific genetic distance has previously been suggested as the standard threshold for CO1 based species identification (Paul D. N. Hebert, Stoeckle, et al., 2004; Ratnasingham & Hebert, 2013; Shen, Guan, Wang, & Gan, 2016). This can be observed for all five *Idotea* species included in this study. The lowest genetic distance occurs between *I. granulosa* and *I. pelagica* which was also reported by Natal (2015).

The haplotype network for *Idotea* display a clear distinction between the different species which are separated by a high number of mutations. The TCS analysis provided a high number of unobserved, or unsampled, haplotypes (Joly, Stevens, & van Vuuren, 2007), which could be explained by a low sample size for each species. None of the species display a noticeable cluster of haplotypes connected to one central, or ancestral, haplotype which is often expected to be found. This again can be a result of a restricted sample size for each species.

The morphological study of the five *Idotea* species shows that adolescent and adult specimens are easily identified to species level based on diagnostic characters described in the existing literature. Juvenile specimens still offer the biggest challenge in terms of the morphological distinction between most of the species due to the late development of diagnostic characters. Among the smallest specimens of the five species, *I. granulosa*, *I. pelagica*, and one *I. balthica* offered the most recognizable diagnostic characters.

The distribution of the five species has already been thoroughly documented along the Norwegian coastline as can be seen from the information provided by the NBIC. The most frequently collected species gathered at several locations along the entire coastline, *I. granulosa*, follows previously observed distribution patterns. The species was found in association with *Fucus* and *Ascophyllum*, thereby conforming with previous observations (Brattegard, 1966; E. Naylor, 1955a). *I. balthica* was only collected at six locations in this study while Sars (1899) noted a dense distribution from Oslofjorden to Tromsø. The collected specimens were in general found in association with *Fucus* which is also stated by Pallas and Christianus Fridericus Voss et (1767). *I. emarginata* was reported as common in Norway by Sars (1899), however in the present study the species was only found at two locations. Most specimens collected were found at Rekstra at a depth of 88-30 m using a triangular dredge, conforming to the vertical distribution mentioned by Sars (1899). Other studies define a much shallower vertical distribution of this species (Franke & Janke, 1998; E. Naylor, 1955c), and WoRMS (2021) describes a distribution down to 20 m. The vertical distribution for *I. emarginata* thus appears greater than for most of the *Idotea* species. Present observations on habitat preferences and distribution of *I. neglecta* agree with observations made in the existing literature. *I. pelagica* was found in relatively high abundance and, as with *I. neglecta*, observations made concerning distribution and ecology reflect what has previously been described for the species.

When comparing the results from this study with existing data in BOLD, the sequences produced for *I. balthica* in this study all fall within the BIN BOLD:AAA8398 (Table 4). This BIN also contains several sequences with the misspelled nomenclature *Idotea baltica*. In addition, there are two extra BINs present for *I. balthica*, of which the first is BOLD:ADB2394 containing four sequences from North America. A quick review of the morphology presented in the specimen images connected to these sequences all suggests that the sequences belong to *I. balthica*. The second BIN, BOLD:ADK0537, contain three sequences from the Mediterranean Sea, but since specimen images were not included, a morphological evaluation could not be made. These observations give some support to the notion of cryptic species within *I. balthica* between North northeast Atlantic, North American, and Mediterranean specimens (Natal, 2015; John P. Wares et al., 2007) as previously described in chapter 1.2.2 *Idotea* Fabricius, 1798. The sequences from this study were gathered exclusively from the northeast Atlantic and thus could not be expected to display any significant intraspecific genetic divergence.

4.2 The *Jaera albifrons* group: multiple or single species

4.2.1 Genetic similarities between species

As can be seen in the NJ tree (Figure 5), the distance values presented in Table 5 and the haplotype network in Figure 7B, CO1 does not differentiate between the different *Jaera* species. Interspecific genetic distances between all species are less than 1%, and there is almost no difference between intraspecific and interspecific genetic distances for each species (Table 5). Because of this, the species do not comply with the previously mentioned criteria for distance-based species separation suggested by Paul D. N. Hebert, Stoeckle, et al. (2004), and Paul D.N. Hebert et al. (2003). Similar overlap between interspecific and intraspecific genetic distances, as well as low divergence rates based on DNA barcoding using CO1 has been documented by previous studies on a range of different taxa (Elias et al., 2007; Rach et al., 2017). The suggested solution for clarifying such cases has been to include nuclear markers as well.

In contrast to the haplotype network for *Idotea* (Figure 6) the network for *Jaera* does not display any clear separation between the different species. The fact that several haplotypes contain sequences from multiple species further underlines the similarity between them considering that the haplotypes are made based on 100% sequence similarity. When producing haplotypes using 16S rDNA taken from 81 male *Jaera* collected in the UK, Ireland, and the US, Mifsud (2011) found a total of 12 different haplotypes within the *J. albifrons* group, where the most common haplotype was found present in all species of the group. Such findings have later been supported by Ribardière et al. (2017). Results from these studies reflect what is shown for haplotype 2 (Hap_2) in Figure 7B which contains sequences from all the group members and is present in all but one of the Norwegian coastal counties.

Using amplified fragment length polymorphism (AFLP) as a nuclear marker, Mifsud (2011) constructed a NJ tree that displayed a distinct division between the species, unlike the results based on 16S where a maximum likelihood tree provided similar results as in Figure 5. Such discordance between nDNA and mtDNA markers could come as a result of introgressive hybridization, previously observed between species of the *J. albifrons* group (Ribardière et al., 2017). This could lead to similarities in mtDNA, but not necessarily nDNA. Sexual isolation through courtship behavior has been suggested as the primary barrier that prohibits substantial genetic exchange between species in mixed populations (Mifsud, 2011; Ribardière et al., 2017; Solignac, 1981), but it still does not completely exclude interspecific gene flow (Ribardière et al., 2019). Such findings contribute to the explanation of why mtDNA in this case does not distinguish between species. It is certainly possible that introgressive hybridization occurs between two or more species of *Jaera* in one or several mixed populations in Norway, however, the results presented in this study do not provide any conclusive evidence for this possibility.

The degree of habitat overlap between species of the *J. albifrons* group has been found to vary between different locations (C. Bocquet, 1954; E. Naylor & Haahtela, 1966), and populations have therefore been described as either monospecific, regularly zoned, or intermingled (Solignac, 1981). At Djupvika, Trondheim only *J. ischiosetosa* was found suggesting a monospecific population of this species. Furthermore, on the other side of the fjord at Hestdalsbukta, all three species were found indicating that in this location the three populations might be regularly zoned or intermingled. The observations made here leans towards the suggestions presented by Solignac (1981) concerning the variability in ecological isolation between species of this group, which question its functionality as an isolating barrier. Still, the results from this study are insufficient to make any definitive conclusions on this matter.

4.2.2 Morphological distinctions and distribution

In this study, the species *J. albifrons*, *J. praehirsuta*, and *J. ischiosetosa* could be identified based on morphological characters. Diagnostic characters described for the three species in chapter 3.2.2 Species descriptions are in accordance with previous descriptions (B. Forsman, 1949; Haahtela, 1965; Ernest Naylor & Brandt, 2015; E. Naylor et al., 1961). The observation of pappose and broom setae along the sides of *J. ischiosetosa* (Appendix II, Figure B1) has not been made previously. These types of setae are very small and easily damaged which would explain why they are not observed more often. Since they were only observed for a few specimens, I can make no statement of whether they can serve as diagnostic characters or not. Large uncertainties concerning the identifications of *J. syei* and *J. forsmani* caused them to be excluded from the study, but it does not necessarily mean they are not present in Norway. Hussey (1964) reported the observation of *J. syei* in Olderfjorden as the first of this species in Norway. It is, therefore, possible that a more thorough investigation of specimens included here, as described in chapter 3.2 Morphological analysis, would reveal more individuals of this species. Previous evaluations on the identification of *J. syei* have suggested that typical *J. albifrons* morphology merges into the morphology of *J. syei*, which complicates morphological identification of the species (E. Naylor & Haahtela, 1966; E. Naylor et al., 1961). This merging of morphological characteristics can be related to my observation of carpal lobe size variations in *J. albifrons*. These difficulties in separating *J. syei* from *J. albifrons*, led

Harvey and Naylor (1968) to the conclusion that, without further molecular investigations, *J. syei* should not be regarded as a distinct species.

J. forsmani is described by other authors to thrive in exposed areas with small temperature and salinity variations, and the species is reported to be widely distributed along the shore of the UK (E. Naylor & Haahtela, 1966). Considering the wide geographical distribution of the other members of the group and their habitual preferences, I think it highly likely that *J. forsmani* is also present in Norway, but as with *J. syei*, a more thorough investigation is needed.

All sequences belonging to the *J. albifrons* species group were placed within the same BIN in BOLD (Table 5). This BIN also contains sequences from Canada, the North Sea, Germany, Russia, Portugal, and Spain, all of which belong to specimens identified as *J. albifrons*. The NJ tree offered on the BIN page places all the sequences in the same clade in a similar fashion to what is portrayed in Figure 5. Similarities in the CO1 gene thus apply to populations of the *J. albifrons* group on each side of the Atlantic Ocean, conforming to the results for 16S as portrayed in the study by Mifsud (2011).

4.3 Genetic diversity and morphological homogeneity in *Janira maculosa*

The CO1 sequences differentiated between five clades for *Janira maculosa*, indicating the presence of multiple species instead of one. As is shown by the genetic distances between the five clades and indicated through the assignment of different BINs for each of them in BOLD, there is a large intraspecific divergence in CO1 for this species. Distances between all clades from C1-C4 vary between 5% and 8% depending on the substitution model, while for C5, they are even higher (Table 6). C5 presents the strongest deviation from the other clades with a genetic distance of more than 20% for p-distance and 30% for K2P. Such results have also been found in similar studies on terrestrial isopods. Large intraspecific genetic divergences of 14% in *Spherillo grossus* (Budde-Lund, 1885) (Lee, Ho, Wilson, & Lo, 2014), and 13.2-26.7% in *Ligia occidentalis* (Dana, 1853) (Eberl, Mateos, Grosberg, Santamaria, & Hurtado, 2013; Markow & Pfeiler, 2010) show indications of hidden diversity, or cryptic species, in other isopod species. In their work on *L. occidentalis*, Markow and Pfeiler (2010) comment on how such large interclade K2P distances in CO1 for the same species are indicative of cryptic species, an important note to consider regarding the results in the present study. In addition, distances for the different clades presented in Figure 5, also conform to the distance-based identification criteria of 2% (Paul D. N. Hebert et al., 2003) and the 10x rule (Paul D. N. Hebert, Stoeckle, et al., 2004). The results for *Idotea* produced in this study further demonstrates how large interspecific distances serve as indications of distinctions between separate species. Thus, the presented genetic distances for *J. maculosa* strongly suggest the presence of cryptic diversity.

It is worth mentioning that the necessary threshold value between intra- and interspecific distance needed to make clear distinctions between species may vary depending on the group in question (Brix et al., 2014). Since there are few studies on assellote species using genetic distances as a means of species delimitation, it would be rash to exclude the possibility of large intraspecific variation in CO1 among *J. maculosa* as typical for the species. Even though the distances between all clades from C1-C4 can be considered as high, they do not display a difference akin to distances shown for the *Idotea* species. Instead of providing indications of cryptic species, these distances might reflect genetic variability caused by differences in environmental adaptations (Xu, Zhang, Wang, Wang, & Li, 2019). It is also possible that the CO1 gene underwent evolutionary changes in two previously separated populations that have later been rejoined, causing the variations to be expressed within the same population today. The K2P and p-distance expressed between C5 and the other clades, however, are large enough to potentially represent the difference between two genera (Brix et al., 2014).

The morphological analysis of *J. maculosa* shows that the species can readily be identified based on morphological characters as they are described in the existing literature. In some cases, however, the separation from *I. breviremis* has been difficult and, as can be seen in the NJ tree (Figure 5), some misidentifications have been made. These are cases of female specimens where both antennae and uropods are missing, which makes identification significantly harder. Depending on the angle at which the specimen is observed, it may be difficult to evaluate the degree of the concave lateral borders of pereonite 2-4. The two specimens in C5 display some morphological deviation from what can be considered normal for *J. maculosa*. The lateral view of UMBergen_NB_iso04 (Figure 12) displays more convex pereonites and a sharper point anteriorly on the cephalon, compared to the lateral view presented in Figure 20D where these areas have a smoother appearance.

The specimens included in this study were collected from 8 to 555 m which expands the vertical range described by Sars (1899). Both C5 specimens were collected at two relatively close locations at 555 m (ZMBN_126397) and 262 m (UMBergen_NB_iso04). Even though they are represented in the same haplotype, a vertical separation of 293 m should not come as a surprise considering C4 has a vertical distribution of 8-235 m. An interesting observation for C4 is the vertical distribution of Hap_9 (Figure 9) which is present at 12-235 m. Like most marine isopods, *J. maculosa* has no swimming capabilities, is quite small and the females carry the eggs until they are hatched. As a result, they do not show substantial dispersal capabilities which could explain their vertical and horizontal distribution. Hap_9 could then represent a very widespread population, or the single individual collected at 232 m might have been brought out from the coast by currents or perhaps through human transportation. In this case, the last option would seem more likely.

BOLD has registered a total of seven BINs for *J. maculosa* five of which consist of sequences from specimens collected in Norway. One BIN from the north of Spain also contains only one specimen (Sample ID: IM12DEVOTE_REDCAL_063). A Distance summary analysis performed in BOLD shows that this specimen has a K2P distance of 25-26% to other specimens gathered at < 30 m from Norway and Germany, and 25.5% to ZMBN_126397. From the records already present in BOLD, it can also be seen that specimen ZMBN_130581 gathered at 8 m depth outside Bergen (Appendix I, Table A1), falls within the same BIN (BOLD:AAU1507) as several other specimens from Germany, giving a total of 7 members in this BIN (Table 6).
The total available data from BOLD, including the data produced in this study, show that *J. maculosa* has a wide genetic divergence both within and outside of Norwegian waters. Additionally, the vertical distribution also seems to vary a lot for this species.

4.4 Future studies

The species of the *J. albifrons* group not only provides an example of incongruency between morphological and genetic data. As the results for CO1 show such a high level of similarity between species, the continued work on this group should include a deeper look at their phylogeny, and a species delimitation analysis using nDNA in combination with already existing mtDNA data. I would consider the current knowledge on morphology for these species to be adequate, and so future work would benefit from a more comprehensive study of genetic data. Based on the results and general observations made in the present study, in addition to descriptions of overlapping habitat use, breakable isolation barriers, hybridization and the occurrence of mixed morphological traits made even by Forsman and Bouquet, it is my impression that the delimiting criteria for members of the *J. albifrons* group, needs reinforcement. If the criteria cannot be improved through future work, an argument could be made for the reassembly of the *J. albifrons* group into one single species. In the possible event of such a reassembly, I would suggest the restoration of the name *Jaera albifrons* Leach, 1814 for all the member species as it is the most established name.

To truly establish the presence of cryptic species of *J. maculosa* in Norway, I recommend collecting more specimens from the deeper clades like C1, C2, and C5, make a thorough species description and perform more specific species delimitation analysis including nuclear markers. The inclusion of nuclear markers can exclude the possibility that this is a “grey zone” case, while detailed SEM imaging could provide useful information for future morphological investigations.

While collecting specimens for this study, several isopods from different families and genera were collected and sequenced for posterity. From *Munna* Krøyer, 1839, six species were collected all of which were assigned between two and four BINs in BOLD. A barcode gap analysis performed in BOLD shows that max intraspecific distance ranges from 13-40% between three of the species in this genus. Another interesting case is presented by the deep-sea isopod *Ilyarachna hirticeps* G. O. Sars, 1870 which has been assigned seven BINs in BOLD for only eight barcodes (NorBol, 2021b). These additional findings further demonstrate the lack of knowledge on marine isopods.

5 Concluding remarks

This study has shown that the three genera *Idotea*, *Jaera*, and *Janira* pose three different scenarios in terms of species identification. The five encountered *Idotea* species are readily identified using both traditional morphological methods and through DNA barcoding using CO1. In the *J. albifrons* group, three species were identified from multiple locations along the Norwegian coastline, all of which can be identified through secondary sexual characters in male pereopods as described in the existing literature. CO1 sequences, however, do not distinguish between the different species, and due to haplotype similarities across vast geographical regions, it can be questioned whether there are several or only one species in this group. *Janira maculosa* can be identified based on existing descriptions of morphological characters, while genetic distances for this species show large intraspecific divergencies, suggesting the presence of cryptic species. Thus, the species diversity within this genus might be larger than previously thought. The result for *Janira* and *Jaera*, shows that there is still more knowledge to be gained from common species found in the intertidal zone. The findings presented here reflect the importance of projects such as HABFA, and the utilization of genetic identification techniques like DNA barcoding combined with morphological studies in modern biodiversity studies.

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Appendix I

Table A1: Overview of all specimens collected for this study. Specimens that were successfully sequenced for this study are marked yellow while unsuccessful sequences are marked green. Missing data are marked with "-". Samples missing a museum number have been given a station number or Sample ID from BOLD.

Museum number	Project	Date	Species	Authority	Identifier	Location	Lat (N°)	Long (E°)	Depth (m)
NTNU_VM_ 79778	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14312	7.9917	0-1
NTNU_VM_ 79783	PolyPort	11.09.2018	*Jaera* sp.	Leach, 1814	August R. Nymoen	Bergen	60.39852	5.312	5
NTNU_VM_ 79784	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.15064	8.03433	0-1
NTNU_VM_ 79785	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14423	8.00899	0-1
NTNU_VM_ 79786	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14423	8.00899	0-1
NTNU_VM_ 79754	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43924	10.39861	1-7
NTNU_VM_ 79755	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43924	10.39861	1-7
NTNU_VM_ 79756	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43924	10.39861	1-7
NTNU_VM_ 79757	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43924	10.39861	1-7
NTNU_VM_ 79758	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43924	10.39861	1-7
NTNU_VM_ 79759	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43924	10.39861	1-7
NTNU_VM_ 79760	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43924	10.39861	1-7
NTNU_VM_ 79761	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14308	8.003317	0-1
NTNU_VM_ 79762	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14308	8.003317	0-1
NTNU_VM_ 79753	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43234	10.37914	1-4

NTNU_VM_79763	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43234	10.37914	1-4
NTNU_VM_79764	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43234	10.37914	1-4
NTNU_VM_79765	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43234	10.37914	1-4
NTNU_VM_79766	PolyPort	26.06.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Trondehim	63.43234	10.37914	1-4
NTNU_VM_79747	PolyPort	23.08.2019	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Kristiansand	58.14232	8.00309	0-1
NTNU_VM_79752	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14232	8.00309	0-1
KRIFAS-B-S2 (2)	PolyPort	23.08.2019	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Kristiansand	58.14232	8.00309	0-1
NTNU_VM_79767	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14232	8.00309	0-1
NTNU_VM_79768	PolyPort	23.08.2019	*Jaera* sp.	Leach. 1814	August R. Nymoen	Kristiansand	58.14232	8.00309	0-1
NTNU_VM_79769	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79770	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.15024	8.033097	0
NTNU_VM_79775	PolyPort	23.08.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79777	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79780	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79771	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79774	PolyPort	23.08.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79781	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79782	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14928	8.03718	0-1
NTNU_VM_79776	PolyPort	23.08.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Kristiansand	58.14259	7.99152	0-1

NTNU_VM_ 79779	PolyPort	23.08.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kristiansand	58.14259	7.99152	0-1
NTNU_VM_ 80073	PolyPort	28.08.2019	*Idotea granulosa*	Rathke,1834	August R. Nymoen	Risør	58.72174	9.23818	0-1
NTNU_VM_ 80071	PolyPort	27.08.2019	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Homborsund	58.26484	8.51268	0-1
NTNU_VM_ 80076	PolyPort	27.08.2019	*Idotea pelagica*	Leach, 1815	August R. Nymoen	Homborsund	58.26484	8.51268	0-1
NTNU_VM_ 80072	PolyPort	11.09.2018	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Bergen	60.39245	5.28696	4
NTNU_VM_ 80074	PolyPort	25.08.2019	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Grimstad	58.34061	8.59692	0-1
NTNU_VM_ 80048	PolyPort	20.08.2019	*Jaera* cf. *syei*	*Bocquet, 1950*	August R. Nymoen	Frierfjorden	59.06459	9.63139	0-1
NTNU_VM_ 80049	PolyPort	20.08.2019	*Jaera*	Leach, 1814	August R. Nymoen	Frierfjorden	59.06459	9.63139	0-1
NTNU_VM_ 80050	PolyPort	20.08.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Frierfjorden	59.06459	9.63139	0-1
NTNU_VM_ 81654	PolyPort	26.08.2019	*Limnoria lignorum*	(Rathke, 1799)	August R. Nymoen	Brevik	59.05386	9.68324	9
NTNU_VM_ 80060	PolyPort	26.08.2019	*Limnoria* cf. *lignorum*	(Rathke, 1799)	August R. Nymoen	Brevik	59.05386	9.68324	9
NTNU_VM_ 81648	PolyPort	26.08.2019	*Gyge branchialis*	Cornalia & Panceri, 1861	August R. Nymoen	Brevik	59.06332	9.69956	11
NTNU_VM_ 80067	PolyPort	19.09.2018	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Oslo	59.89887	10.75376	0.5
NTNU_VM_ 80079	PolyPort	19.09.2018	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Oslo	59.89887	10.75376	0.5
NTNU_VM_ 80070	PolyPort	22.08.2019	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Grimstad	58.32335	8.580955	0.5
NTNU_VM_ 80078	PolyPort	22.08.2019	*Idotea pelagica*	Leach, 1815	August R. Nymoen	Grimstad	58.32335	8.580955	0.5
NTNU_VM_ 80077	PolyPort	07.09.2018	*Idotea pelagica*	Leach, 1815	August R. Nymoen	trondheim	63.44202	10.4233	1
NTNU_VM_ 79750	HABFA	07.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_ 79751	HABFA	07.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1

NTNU_VM_79772	HABFA	07.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79773	HABFA	07.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79787	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79788	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79789	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79790	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79791	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79792	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79793	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79794	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79795	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79796	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79797	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79798	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79799	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79800	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79801	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79802	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1
NTNU_VM_79803	HABFA	07.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Snekkestad, Holmestrand	59.46009	10.359764	0-1

DJUP-A-A3	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79804	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79805	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79806	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79807	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79808	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79809	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79810	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79811	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79812	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79813	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79814	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79815	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79816	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79817	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79818	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79819	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79820	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79821	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1

NTNU_VM_ 79822	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79823	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79824	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79825	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79826	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79827	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79828	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79829	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79830	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79831	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79832	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79833	HABFA	05.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79740	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79730	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79731	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79732	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79733	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79734	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_ 79735	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1

NTNU_VM_79736	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_79737	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_79738	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45793	10.450455	0-1
NTNU_VM_79748	HABFA	05.04.2020	*Jaera* cf. *forsmani*	Bocquet, 1953	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_79749	HABFA	05.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
NTNU_VM_80075	HABFA	05.04.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Djupvika, Trondheim	63.45703	10.450455	0-1
MØL-A-A7	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79834	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79835	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79836	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79837	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79838	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79839	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79840	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79841	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79842	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79843	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79844	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_79845	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1

NTNU_VM_ 79846	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79847	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79848	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79849	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79850	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79851	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79852	HABFA	09.04.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79739	HABFA	09.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79741	HABFA	09.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79742	HABFA	09.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79743	HABFA	09.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79744	HABFA	09.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79745	HABFA	09.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79746	HABFA	09.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 80069	HABFA	09.04.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Mølen, Larvik	58.96744	9.842206	0-1
NTNU_VM_ 79853	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_ 79854	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_ 79855	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_ 79856	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5

NTNU_VM_79857	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79858	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79859	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79860	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79861	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79862	HABFA	30.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79863	HABFA	30.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79864	HABFA	30.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79865	HABFA	30.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79866	HABFA	30.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
RING002 (14)	HABFA	30.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_80068	HABFA	30.07.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79879	HABFA	30.07.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79880	HABFA	30.07.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79881	HABFA	30.07.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79882	HABFA	30.07.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79883	HABFA	30.07.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79884	HABFA	30.07.2020	*Idotea neglecta*	Sars, 1897	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79885	HABFA	30.07.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5

NTNU_VM_79886	HABFA	30.07.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79887	HABFA	30.07.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79888	HABFA	30.07.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
NTNU_VM_79889	HABFA	30.07.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mølen, Larvik	58.97687	9.824524	0-1.5
HVAL003	HABFA	25.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79867	HABFA	25.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79868	HABFA	25.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79869	HABFA	25.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79870	HABFA	25.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79871	HABFA	25.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79872	HABFA	25.07.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79873	HABFA	25.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79874	HABFA	25.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79875	HABFA	25.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79876	HABFA	25.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79877	HABFA	25.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79878	HABFA	25.07.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sjursholmen, Hvaler	59.02253	11.015339	0-1
NTNU_VM_79911	HABFA	17.10.2019	*Ianiropsis breviremis*	(G. O. Sars, 1883)	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1
NTNU_VM_79912	HABFA	17.10.2019	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1

NTNU_VM_79913	HABFA	17.10.2019	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1
NTNU_VM_79914	HABFA	17.10.2019	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1
NTNU_VM_79915	HABFA	17.10.2019	*Janira* cf. *maculosa*	Leach, 1814	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1
NTNU_VM_79916	HABFA	17.10.2019	*Janira* cf. *maculosa*	Leach, 1814	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1
NTNU_VM_79917	HABFA	17.10.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1
NTNU_VM_79932	HABFA	17.10.2019	Janiridae	G. O. Sars, 1897	August R. Nymoen	Hopavågen, Straumen	63.59338	9.533963	0-1
NTNU_VM_79918	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79919	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79920	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79921	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79922	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79923	HABFA	17.10.2019	*Jaera* cf. *forsmani*	Bocquet, 1953	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79924	HABFA	17.10.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79925	HABFA	17.10.2019	*Jaera forsmani*	Bocquet, 1953	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79926	HABFA	17.10.2019	*Jaera forsmani*	Bocquet, 1953	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79927	HABFA	17.10.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79928	HABFA	17.10.2019	*Jaera forsmani*	Bocquet, 1953	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79929	HABFA	17.10.2019	*Jaera forsmani*	Bocquet, 1953	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_79930	HABFA	17.10.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1

NTNU_VM_ 79931	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79933	HABFA	06.09.2019	*Janiropsis breviremis*	(G. O. Sars, 1899)	August R. Nymoen	Lastevikodden, Svefjorden	67.22501	14.704676	33
NTNU_VM_ 79934	HABFA	06.09.2019	*Janiropsis breviremis*	(G. O. Sars, 1899)	August R. Nymoen	Lastevikodden, Svefjorden	67.22501	14.704676	33
NTNU_VM_ 79935	HABFA	06.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Lastevikodden, Svefjorden	67.22501	14.704676	33
NTNU_VM_ 79936	HABFA	06.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Lastevikodden, Svefjorden	67.22501	14.704676	33
NTNU_VM_ 79937	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Sundstraumen, Straumøya	67.20987	14.523297	24
NTNU_VM_ 79938	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79939	HABFA	05.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79940	HABFA	05.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79941	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79942	HABFA	05.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79943	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79944	HABFA	05.09.2019	*Munna* cf. *limicola*	G. O. Sars, 1866	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79945	HABFA	05.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79946	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79947	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79948	HABFA	05.09.2019	*Munna* cf. *limicola*	G. O. Sars, 1866	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79949	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32
NTNU_VM_ 79950	HABFA	05.09.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Straumvik, Saltstraumen	67.23498	14.60419	32

NTNU_VM_ 79951	HABFA	05.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Sundstraumen, Straumøya	67.20987	14.523297	24
NTNU_VM_ 79952	HABFA	05.09.2019	*Munna minuta*	Hansen, 1916	August R. Nymoen	Sundstraumen, Straumøya	67.20987	14.523297	24
NTNU_VM_ 79953	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Sundstraumen, Straumøya	67.20987	14.523297	24
NTNU_VM_ 79954	HABFA	05.09.2019	*Munna kroyeri*	Goodsir, 1842	August R. Nymoen	Sundstraumen, Straumøya	67.20987	14.523297	24
NTNU_VM_ 79955	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79956	HABFA	17.10.2019	*Munna* sp.	kroyer, 1839	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79957	HABFA	17.10.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79958	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79959	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79960	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79961	HABFA	17.10.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Slettvika, Rishaugen	63.59354	9.527335	0-1
NTNU_VM_ 79984	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79985	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79986	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79987	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79988	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79989	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79990	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79991	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0

NTNU_VM_ 79992	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79993	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
TRD004	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79994	HABFA	26.08.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 80021	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hågån, Trondheimsfjorden	63.58221	10.418215	0
NTNU_VM_ 79962	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79963	HABFA	26.08.2020	*Jaera* cf. *forsmani*	Bocquet, 1953	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79964	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79965	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79966	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79967	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79968	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79969	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79970	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79971	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79972	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79973	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79974	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_ 79975	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0

NTNU_VM_79976	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79977	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79978	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_80026	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_80027	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_80028	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_80029	HABFA	26.08.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79979	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79980	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79981	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79982	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79983	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.59934	10.458855	0
NTNU_VM_79995	HABFA	26.08.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_79996	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_79997	HABFA	26.08.2020	*Jaera forsmani*	Rathke, 1834	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_79998	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_79999	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
TRD005	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_80000	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0

NTNU_VM_80001	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_80002	HABFA	26.08.2020	*Jaera*	Leach, 1814	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_80003	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_80004	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_80005	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_80006	HABFA	26.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Hestdalsbukta, Trondheimsfjorden	63.6003	10.461173	0
NTNU_VM_80007	HABFA	26.08.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
TRD006	HABFA	26.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
NTNU_VM_80008	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
NTNU_VM_80035	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
NTNU_VM_80009	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
NTNU_VM_80066	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
NTNU_VM_80036	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
NTNU_VM_80037	HABFA	26.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Litlleiret, Trondheimsfjorden	63.63938	10.587044	0
NTNU_VM_80010	HABFA	27.08.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
NTNU_VM_80011	HABFA	27.08.2020	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
NTNU_VM_80012	HABFA	27.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
TRD007	HABFA	27.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
NTNU_VM_80013	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0

NTNU_VM_80014	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
NTNU_VM_80015	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
NTNU_VM_80016	HABFA	27.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
NTNU_VM_80038	HABFA	27.08.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Mosholmen, Bjugn	63.87258	9.748456	0
TRD008	HABFA	27.08.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Valsøya, Bjugn	63.87163	9.739144	0
NTNU_VM_80017	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsøya, Bjugn	63.87163	9.739144	0
NTNU_VM_80018	HABFA	27.08.2020	*Jaera* cf. *forsmani*	Bocquet, 1953	August R. Nymoen	Valsøya, Bjugn	63.87163	9.739144	0
NTNU_VM_80019	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsøya, Bjugn	63.87163	9.739144	0
NTNU_VM_80030	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsøya, Bjugn	63.87163	9.739144	0
NTNU_VM_80031	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsøya, Bjugn	63.87163	9.739144	0
NTNU_VM_80020	HABFA	27.08.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Valsøya, Bjugn	63.87163	9.739144	0
TRD009	HABFA	27.08.2020	*Jaera*	Leach, 1814	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_VM_80022	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_VM_80032	HABFA	27.08.2020	*Jaera* cf. *praehirsuta*	Forsman, 1949	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_VM_80033	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_VM_80023	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_VM_80034	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_VM_80024	HABFA	27.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_VM_80025	HABFA	27.08.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Valsneset, Bjugn	63.81928	9.621953	0
NTNU_78107	HABFA	05.05.2019	*Jaera* sp.	Leach, 1814	Jon A. Kongsrud	Kamøyfjorden, Kamøyvær	71.0497	25.91252	-

ZMBN_132563	HABFA	11.05.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Kvaløya, Vennesund	65.21091	11.98873	0.5
ZMBN_130375	HABFA	04.05.2019	*Jaera sp.*	Leach, 1814	Jon A. Kongsrud	Vestvågen, Eggum	68.31	13.677	0
ZMBN_132571	HABFA	23.09.2019	*Munna* cf. *krøyeri*	Goodsir, 1842	Jon A. Kongsrud	Golten, Sotra	60.21682	5.00117	5
ZMBN_132516	HABFA	07.05.2019	*Jaera* sp.	Leach, 1814	Jon A. Kongsrud	Skånland, Tendringsvika	68.60871	16.5648	0
ZMBN_132523	HABFA	07.05.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Vestvågøy, Eggum	68.31	13.679	0.5
ZMBN_132550	HABFA	03.09.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Godøy rasteplass	67.24016	14.71251	1
ZMBN_132522	HABFA	30.04.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Rødøy, Hilstad	66.51236	13.21741	1
ZMBN_132518	HABFA	07.05.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Skånland, Tendringsvika	68.60871	16.5648	1
ZMBN_130573	HABFA	08.08.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Dvergsøya, Kristiansand	58.11011	8.06114	3
NTNU_78121	Sneglebuss	01.05.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Berlevåg, Storsteinbukta	70.82169	29.26187	0
NTNU_78112	Sneglebuss	01.05.2019	*Jaera* sp.	Leach, 1814	August R. Nymoen	Sandfjorden	70.80313	29.2626	0
ZMBN_132515	HABFA	29.04.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Tjøtta, Offersøy camping	65.87471	12.46214	3
ZMBN_132517	HABFA	07.05.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Skånland, Tendringsvika	68.60871	16.5648	1
Sommarøy 2020 stn 2	HABFA	26.07.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Sommarøy	69.62237	18.05806	Littoral
ZMBN_136797	HABFA	26.07.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Sommarøy	69.62237	18.05806	Littoral
ZMBN_136798	HABFA	26.07.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Sommarøy	69.62237	18.05806	Littoral
ZMBN_136799	HABFA	26.07.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Sommarøy	69.62237	18.05806	Littoral
ZMBN_136800	HABFA	26.07.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Sommarøy	69.62237	18.05806	Littoral
	HABFA	29.06.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Naustflot, Hardanger	60.44686	6.64063	Littoral

ZMBN_136697	HABFA	29.06.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Naustflot, Hardanger	60.44686	6.64063	Littoral
ZMBN_136698	HABFA	29.06.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Naustflot, Hardanger	60.44686	6.64063	Littoral
ZMBN_139048	HABFA	03.08.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Henningsvær, Hellandsøya	68.14744	14.19802	Tidal pool
ZMBN_139045	Sneglebuss	05.05.2019	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Kamøyfjorden, Kamøyvær	71.0497	25.91252	0-25
-	HABFA	29.06.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Naustflot, Hardanger	60.44686	6.64063	Littoral
ZMBN_136699	HABFA	29.06.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Naustflot, Hardanger	60.44686	6.64063	Littoral
ZMBN_136700	HABFA	29.06.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Naustflot, Hardanger	60.44686	6.64063	Littoral
-	HABFA	29.06.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Naustflot, Hardanger	60.44686	6.64063	Littoral
ZMBN_132549	HABFA	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	Jon A. Kongsrud	Rekstra	61.55798	4.81818	88-55
ZMBN_132546	HABFA	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Vestvågøy, Eggum	68.29787	13.7179	2
ZMBN_132548	HABFA	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Rekstra	61.55798	4.81818	88-55
ZMBN_132570	HABFA	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	T. Alvestad	Kinn	61.547	4.74517	52-36
ZMBN_132540	HABFA	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Vestvågøy, Eggum	68.29787	13.7179	2
ZMBN_139044	HABFA	04.05.2019	*Idotea* cf. *metallica*	Bosc, 1802	August R. Nymoen	Sjåholmen, Kinn	61.55798	4.80942	55-87.5
ZMBN_139044	HABFA	04.05.2019	*Idotea emarginata*	Fabricius, 1793	August R. Nymoen	Sjåholmen, Kinn	61.55798	4.80942	55-87.5
NTNU_VM_80040	HABFA	19.10.2019	*Idotea pelagica*	Leach, 1815	August R. Nymoen	Breivikbukta	63.62655	9.741837	0-1
NTNU_VM_80041	HABFA	19.10.2019	*Idotea pelagica*	Leach, 1815	August R. Nymoen	Selva	63.61604	9.719692	0-1
NTNU_VM_80042	HABFA	16.10.2019	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Åkervika, Vernes	63.58121	9.508716	0-1
NTNU_VM_80043	HABFA	16.10.2019	*Idotea pelagica*	Leach, 1815	August R. Nymoen	Åkervika, Vernes	63.58121	9.508716	0-1

NTNU_VM_ 80044	HABFA	20.10.2019	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Risthaugen	63.59599	9.523007	Littoral
NTNU_VM_ 80045	HABFA	19.10.2019	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Breivikbukta	63.62655	9.741837	0-1
NTNU_VM_ 80046	HABFA	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	August R. Nymoen	Magerøysundet, Sarnesfjorden	70.9714	25.80019	Littoral
NTNU_VM_ 80047	HABFA	19.10.2019	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Selva	63.61604	9.719692	0-1
NTNU_VM_ 80051	HABFA	14.10.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Straumen, Sletvik	63.59321	9.533559	Littoral
NTNU_VM_ 80052	HABFA	13.10.2020	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Langskjæret	63.57425	9.507274	0-9
NTNU_VM_ 80053	HABFA	13.10.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Langskjæret	63.57425	9.507274	0-9
NTNU_VM_ 80054	HABFA	13.10.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Langskjæret	63.57425	9.507274	0-9
NTNU_VM_ 80055	HABFA	15.10.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Pollen, sletvik	63.59106	9.5443089	0-1.5
NTNU_VM_ 80056	HABFA	16.10.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Verrafjorden, Malen	63.56902	9.550541	0-10
NTNU_VM_ 80057	HABFA	16.10.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Verrafjorden, Vernesholmen	63.57686	9.520919	0-12
NTNU_VM_ 80081	HABFA	16.10.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Verrafjorden, Vernesholmen	63.57686	9.520919	0-12
NTNU_VM_ 80058	HABFA	16.10.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Verrafjorden, Vernesholmen	63.57686	9.520919	0-12
NTNU_VM_ 80059	HABFA	16.10.2020	*Janira maculosa*	Leach, 1814	August R. Nymoen	Verrafjorden, Vernesholmen	63.57686	9.520919	0-12
NTNU_VM_ 80082	HABFA	16.10.2020	*Janira maculosa*	Leach, 1814	August R. Nymoen	Verrafjorden, Vernesholmen	63.57686	9.520919	0-12
NTNU_VM_ 80065	HABFA	16.10.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Verrafjorden, Vernesholmen	63.57686	9.520919	0-12
-	HABFA	29.07.2020	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Andøya	69.29699	16.02838	-
-	HABFA	31.05.2020	*Jaera* sp.	Leach, 1814	August R. Nymoen	Flatnes, Sveio	59.54	5.4628	0.50
-	HABFA	26.07.2020	*Idotea pelagica*	Leach, 1815	August R. Nymoen	Renna, Sommarøy Kvaløya	69.63704	18.00219	0-2
-	-	29.07.2020	*Jaera* sp.	Leach, 1814	Jon A. Kongsrud	Andøya	69.29699	16.02838	-
-	-	21.03.2020	*Idotea pelagica*	Leach, 1815	Jon A. Kongsrud	Stemsviken	-	-	-

-	-	03.06.2019	*Idotea pelagica*	Leach, 1815	Jon A. Kongsrud	Espegrend	-	-	-
-	-	26.07.2020	*Idotea granulosa*	Rathke, 1834	August R. Nymoen	Renna, Sommarøy, Kvaløya	69.63704	18.00219	0-2
-	-	20.08.2017	*Synidotea nodulosa*	Krøyer, 1846	August R. Nymoen	-	-	-	42.00
ZMBN_136579	-	-	*Ligia oceanica*	Linnaeus, 1767	August R. Nymoen	-	-	-	-
-	-	19.04.2020	*Jaera ischiosetosa*	Forsman, 1949	August R. Nymoen	Espegrend	-	-	0-2
NTNU_VM_80061	POLYPORT	07.09.2018	*Jaera praehirsuta*	Forsman, 1949	August R. Nymoen	Trondheim	63.43519	10.39321	1.00
NTNU_VM_80064	POLYPORT	07.09.2018	*Jaera albifrons*	Leach,1814	August R. Nymoen	Trondheim	63.43519	10.39321	1.00
NTNU_VM_80062	POLYPORT	07.09.2018	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Trondheim	63.44133	10.4182	1.00
NTNU_VM_80063	POLYPORT	07.09.2018	*Jaera albifrons*	Leach, 1814	August R. Nymoen	Trondheim	63.43311	10.38724	1.00
NTNU_VM_81056	-	25.09.1974	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	-	-	-	-
NTNU_VM_81055	-	25.09.1974	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	-	-	-	-
NTNU_VM_81051	-	02.10.2018	*Idotea balthica*	(Pallas, 1772)	August R. Nymoen	Skjærstadfjorden	-	-	0-10
ZMBN_132528	-	05.09.2019	*Janira*	Leach, 1814	J.A. Kongsrud	Sundstraumen, Straumøya	67.20987	14.5233	24
ZMBN_132569	-	03.05.2019	*Janira maculosa*	Leach, 1814	T. Alvestad	Askrova	61.50377	4.97972	29-22
NTNU_78117	-	07.05.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Altafjorden, Bossekopberget	69.96999	23.2338	35-5
ZMBN_132567	-	20.07.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Ramfjorden	69.53123	19.05703	20-10
ZMBN_132525	-	03.09.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Buberget, Sveet	67.22153	14.64929	30
ZMBN_132524	-	04.09.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Tuvhaugen, Saltstraumen	67.22263	14.62916	38
ZMBN_132527	-	05.09.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Sundstraumen, Straumøya	67.20987	14.5233	24

ZMBN_139035	MAREA NO	13.12.2017	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hjeltefjorden	60.62703	4.87555	211
ZMBN_139043	MAREA NO	13.12.2017	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hjeltefjorden	60.62703	4.87555	211
ZMBN_139039	MAREA NO	21.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Sula	64.28047	8.40965	357
ZMBN_139031	MAREA NO	21.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Sula	64.28047	8.40965	357
ZMBN_139038	HABFA	13.11.2017	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hjeltefjorden	60.6232	4.87738	209
ZMBN_139034	HABFA	13.11.2017	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hjeltefjorden	60.6232	4.87738	209
ZMBN_139024	HABFA	13.11.2017	*Janira maculosa*	Leach, 1814	August R. Nymoen	Hjeltefjorden	60.6232	4.87738	209
ZMBN_139042	MAREA NO	26.10.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Kongsfjorden	79.09072	11.09095	67-83
ZMBN_139028	MAREA NO	22.04.2020	*Janira maculosa*	Leach, 1814	August R. Nymoen	Haltenbanken	64.43058	8.82566	201
ZMBN_139027	MAREA NO	18.04.2020	*Janira maculosa*	Leach, 1814	August R. Nymoen	Frøyabanken	64.19543	7.349645	332
ZMBN_139026	MAREA NO	25.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Haltenbanken	64.71312	8.218613	235
ZMBN_139022	MAREA NO	25.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Haltenbanken	64.71312	8.218613	235
ZMBN_139025	MAREA NO	25.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Haltenbanken	64.71312	8.218613	235
ZMBN_139030	MAREA NO	25.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Haltenbanken	64.71312	8.218613	235
ZMBN_139033	MAREA NO	25.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Haltenbanken	64.71312	8.218613	235
ZMBN_139023	MAREA NO	23.04.2020	*Janira maculosa*	Leach, 1814	August R. Nymoen	Haltenbanken	64.5999	8.934225	118
ZMBN_139036	MAREA NO	27.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Haltenbanken	64.43217	8.821572	196
ZMBN_139041	MAREA NO	27.04.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Haltenbanken	64.43217	8.821572	196
ZMBN_139020	HABFA	26-Mar-2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Turøy, Balsvågen	60.46	4.941	8

ZMBN_139029	HABFA	26-Mar-2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Turoy, Balsvågen	60.46	4.941	8
ZMBN_139040	HABFA	26-Mar-2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Turoy, Balsvågen	60.46	4.941	8
ZMBN_139021	HABFA	17.06.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	lindåsslusene	60.72281	5.09939	0.5
ZMBN_136701	HABFA	21.06.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Kilstraumen	60.79663	4.944105	8 -20
-	-	20.06.2020	*Ianiropsis breviremis*	(G. O. Sars, 1883)	August R. Nymoen	Sævrøysundet	-	-	0-4
ZMBN_139032	HABFA	20.06.2020	*Ianiropsis breviremis*	(G. O. Sars, 1883)	August R. Nymoen	Sævrøysundet	60.80389	4.808083	0-4
ZMBN_139047	HABFA	20.06.2020	*Ianiropsis breviremis*	(G. O. Sars, 1883)	August R. Nymoen	Sævrøysundet	60.80389	4.808083	0-4
ZMBN_136703	HABFA	20.06.2020	*Ianiropsis breviremis*	(G. O. Sars, 1883)	J.A. Kongsrud	Sævrøysundet	60.80389	4.808083	0-4
ZMBN_136702	HABFA	20.06.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Sævrøysundet	60.80389	4.808083	0-4
ZMBN_139037	HABFA	06.06.2017	*Janira maculosa*	Leach, 1814	August R. Nymoen	Vatlestraumen	60.33865	5.18607	20-31
ZMBN_136704	HABFA	02.03.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Osundet	60.54872	4.85655	20-15
ZMBN_136705	HABFA	21.06.2020	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Kilstraumen	60.79663	4.944105	8-25
ZMBN_130359	HABFA	04.05.2019	*Idotea* sp.	Fabricius, 1798	J.A. Kongsrud	Vestvågøy, Eggum	68.29787	13.71790	2
ZMBN_132555	HABFA	07.05.2019	*Idotea* sp.	Fabricius, 1798	J.A. Kongsrud	Vestvågøy, Eggum	68.31000	13.67900	1
ZMBN_130425	HABFA	07.05.2019	*Idotea emarginata*	(Fabricius, 1798)	J.A. Kongsrud	Vestvågøy, Eggum	68.31000	13.67900	1
ZMBN_132541	HABFA	05.09.2019	*Idotea granulosa*	Rathke, 1843	J.A. Kongsrud	Sundstraumen, Straumøya	67.20987	14.52330	24
NTNU_78108	Sneglebuss	03.05.2019	*Idotea balthica*	(Pallas, 1772)	J.A. Kongsrud	Porsangerfjorden, Smørfjorden	70.53226	25.10109	1
ZMBN_132557	UM/BIO stations	07.05.2019	*Idotea balthica*	(Pallas, 1772)	J.A. Kongsrud	Vestvågøy, Eggum at low tide	68.31000	13.67900	1

ZMBN_132539	UM/BIO stations	08.05.2019	*Idotea balthica*	(Pallas, 1772)	J.A. Kongsrud	Vestvågøy, Kvalnes	68.34600	13.94700	0.5
ZMBN_132543	UM/BIO stations	09.05.2019	*Idotea balthica*	(Pallas, 1772)	J.A. Kongsrud	Henningsvær	68.14710	14.19755	0.5-4
ZMBN_132545	UM/BIO stations	04.05.2019	*Idotea emarginata*	(Fabricius, 1793)	J.A. Kongsrud	Rekstra	61.55798	4.81818	88-55
NTNU_78113	Sneglebuss	30.04.2019	*Idotea granulosa*	Rathke, 1843	J.A. Kongsrud	Berlevåg, Vargvika	70.85009	29.15429	Littoral
ZMBN_130349	UM/BIO stations	04.05.2019	*1 Idotea granulosa and 1 I. neglecta*	Rathke, 1843	J.A. Kongsrud	Vestvågøy, Eggum	68.29787	13.71790	2
ZMBN_132556	UM/BIO stations	07.05.2019	*Idotea granulosa*	Rathke, 1843	J.A. Kongsrud	Vestvågøy, Eggum	68.31000	13.67900	1
ZMBN_132538	UM/BIO stations	08.05.2019	*Idotea granulosa*	Rathke, 1843	J.A. Kongsrud	Vestvågøy, Kvalnes	68.34600	13.94700	0.5
NTNU_78114	Sneglebuss	08.05.2019	*Idotea granulosa*	Rathke, 1843	J.A. Kongsrud	Altafjorden, Årøysundet, Rasmusgambukta	70.15666	23.28533	Littoral
ZMBN_130588	UM/BIO stations	08.08.2019	*Idotea granulosa*	Rathke, 1843	J.A. Kongsrud	Dvergsøya, Kristiansand	58.11011	8.06114	4
ZMBN_132549	UM/BIO stations	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Rekstra	61.55798	4.81818	-
ZMBN_132540	UM/BIO stations	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Vestvågøy, Eggum	68.29787	13.71790	2
ZMBN_132540	UM/BIO stations	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Vestvågøy, Eggum	68.29787	13.71790	2
ZMBN_132546	UM/BIO stations	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Vestvågøy, Eggum	68.29787	13.71790	2
ZMBN_132548	UM/BIO stations	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	J.A. Kongsrud	Rekstra	61.55798	4.81818	-
ZMBN_132570	UM/BIO stations	04.05.2019	*Idotea neglecta*	G. O. Sars, 1897	T. Alvestad	Kinn	61.54700	4.74517	-
ZMBN_132544	UM/BIO stations	30.04.2019	*Idotea pelagica*	Leach, 1816	J.A. Kongsrud	Rødøy, Hilstad	66.51019	13.21803	1
ZMBN_132537	UM/BIO stations	08.05.2019	*Idotea pelagica*	Leach, 1816	J.A. Kongsrud	Vestvågøy, Kvalnes	68.34600	13.94700	0.5
ZMBN_130587	UM/BIO stations	08.08.2019	*Idotea pelagica*	Leach, 1816	J.A. Kongsrud	Dvergsøya, Kristiansand	58.11011	8.06114	4

ZMBN_132566	UM/BIO stations	23.09.2019	*Idotea pelagica*	Leach, 1816	J.A. Kongsrud	Glesvær, Holmen	60.20320	5.04224	0
ZMBN_132551	UM/BIO stations	03.09.2019	*Ianiropsis breviremis*	(G. O. Sars, 1883)	J.A. Kongsrud	Godøy rasteplass	67.24016	14.71251	1-0
ZMBN_132552	UM/BIO stations	03.09.2019	*Ianiropsis breviremis*	(G. O. Sars, 1883)	J.A. Kongsrud	Godøy rasteplass	67.24016	14.71251	1-0
ZMBN_132515	UM/BIO stations	29.04.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Tjøtta, Offersøy camping	65.87471	12.46214	0.5-4
ZMBN_132522	UM/BIO stations	30.04.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Rødøy, Hilstad	66.51236	13.21741	1
ZMBN_130375	UM/BIO stations	04.05.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Vestvågøy,Eggum	68.31000	13.67700	1
NTNU_78107	Sneglebuss	05.05.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Kamøyfjorden, Kamøyvær	71.04970	25.91252	0-25
ZMBN_132516	UM/BIO stations	07.05.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Skånland, Tendringsvika	68.60871	16.56480	0-1
ZMBN_132518	UM/BIO stations	07.05.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Skånland, Tendringsvika	68.60871	16.56480	0-1
ZMBN_130572	UM/BIO stations	08.08.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Dvergsøya, Kristiansand	58.11011	8.06114	4
ZMBN_130573	UM/BIO stations	08.08.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Dvergsøya, Kristiansand	58.11011	8.06114	4
ZMBN_132550	UM/BIO stations	03.09.2019	*Jaera* sp.	Leach, 1814	J.A. Kongsrud	Godøy rasteplass	67.24016	14.71251	-
NTNU_78121	Sneglebuss	01.05.2019	*Jaera albifrons*	Leach, 1814	J.A. Kongsrud	Berlevåg, Storsteinbukta	70.82169	29.26187	Littoral
NTNU_78112	Sneglebuss	01.05.2019	*Jaera albifrons*	Leach, 1814	J.A. Kongsrud	Sandfjorden	70.80313	29.26260	Littoral
ZMBN_132520	UM/BIO stations	04.05.2019	*Jaera albifrons*	Leach, 1814	J.A. Kongsrud	Vestvågøy,Eggum	68.31000	13.67700	1
ZMBN_132523	UM/BIO stations	07.05.2019	*Jaera albifrons*	Leach, 1814	J.A. Kongsrud	Vestvågøy, Eggum	68.31000	13.67900	0-1
ZMBN_132517	UM/BIO stations	07.05.2019	*Jaera albifrons*	Leach, 1814	J.A. Kongsrud	Skånland, Tendringsvika	68.60871	16.56480	0-1
ZMBN_132563	UM/BIO stations	11.05.2019	*Jaera albifrons*	Leach, 1814	J.A. Kongsrud	Kvaløya Vennesund	65.21091	11.98873	-
ZMBN_132528	UM/BIO stations	05.09.2019	*Janira* sp.	Leach, 1814	J.A. Kongsrud	Sundstraumen, Straumøya	67.20987	14.52330	-

ZMBN_132569	UM/BIO stations	03.05.2019	*Janira maculosa*	Leach, 1814	T. Alvestad	Askrova	61.50377	4.97972	-
NTNU_78117	Sneglebuss	07.05.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Altafjorden, Bossekopberget	69.96999	23.23380	35-5
ZMBN_132567	UM/BIO stations	20.07.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Ramfjorden	69.53123	19.05703	20-10
ZMBN_132525	UM/BIO stations	03.09.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Buberget, Sveet	67.22153	14.64929	30
ZMBN_132524	UM/BIO stations	04.09.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Tuvhaugen, Saltstraumen	67.22263	14.62916	38
ZMBN_132527	UM/BIO stations	05.09.2019	*Janira maculosa*	Leach, 1814	J.A. Kongsrud	Sundstraumen, Straumøya	67.20987	14.52330	24
ZMBN_130581	UM/BIO stations	26.03.2019	Janiridae	G. O. Sars, 1897	J.A. Kongsrud	Turøy	60.45958	4.94108	8
ZMBN_132568	UM/BIO stations	28.03.2019	*Munna* sp.	Krøyer, 1839	T. Alvestad	Kyrkjesundet	60.15300	5.17515	9-20
ZMBN_132532	UM/BIO stations	03.09.2019	*Munna* sp.	Krøyer, 1839	J.A. Kongsrud	Kvitberget, Saltstraumen	67.23726	14.60037	20
ZMBN_132531	UM/BIO stations	03.09.2019	*Munna* sp.	Krøyer, 1839	J.A. Kongsrud	Kvitberget, Saltstraumen	67.23726	14.60037	20
ZMBN_130578	UM/BIO stations	26.03.2019	*Munna kroyeri*	Goodsir, 1842	J.A. Kongsrud	Turøy	60.45958	4.94108	8
ZMBN_130336	UM/BIO stations	02.05.2019	*Munna kroyeri*	Goodsir, 1842	J.A. Kongsrud	Rødøy, Hilstad	66.51248	13.21914	2
ZMBN_132530	UM/BIO stations	09.05.2019	*Munna kroyeri*	Goodsir, 1842	J.A. Kongsrud	Henningsvær fyr	68.14710	14.19755	0.5-4
ZMBN_132533	UM/BIO stations	05.09.2019	*Munna kroyeri*	Goodsir, 1842	J.A. Kongsrud	Sundstraumen, Straumøya	67.20987	14.52330	24
ZMBN_132571	UM/BIO stations	23.09.2019	*Munna kroyeri*	Goodsir, 1842	J.A. Kongsrud	Golten, Sotra	60.21682	5.00117	5-0
ZMBN_132535	UM/BIO stations	04.09.2019	*Munna minuta*	Hansen, 1910	J.A. Kongsrud	Tuvhaugen, Saltstraumen	67.22263	14.62916	38
ZMBN_132534	UM/BIO stations	04.09.2019	*Munna palmata*	Lilljeborg, 1851	J.A. Kongsrud	Tuvhaugen, Saltstraumen	67.22263	14.62916	38
ZMBN_132536	UM/BIO stations	04.09.2019	*Munna palmata*	Lilljeborg, 1851	J.A. Kongsrud	Tuvhaugen, Saltstraumen	67.22263	14.62916	38
ZMBN_126397	DECNB	30.08.2015	*Janira maculosa*	Leach, 1814	M. Daneliya	Norwegian Sea	66.5945	6.941	555

UMBergen_NB_iso04	MAREANO	15.09.2011	Isopoda	Latreille, 1817	J. K. Haugland	Norwegian Sea	67.999	10.514	262
NTNU_VM_44083	-	18.07.1928	*Idotea emarginata*	(Fabricius, 1793)	Per Pethon	Kristiansund	-	-	-
NTNU_VM_46389	-	1983	*Idotea* sp.	Latreille, 1817	Øystein Stokland	Trondheimsfjorden	-	-	-

Table A2: Overview of revised specimens from museum collections at NTNU Vitenskapsmuseet and Universitetsmuseet I Bergen. Some samples contained several species. N= number of individuals. - = missing information.

Museum number	**Date**	**Original identification**	**Revised identification**	**Identifier**	**Location**	**Lat (°N)**	**Long (°E)**	**N**	**Depth**
NTNU_VM_46524	08.08.1930	*Jaera albifrons*	-	Anon	Ålesund, Borgundfjorden	-	-	1	-
NTNU_VM_79890	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79891	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79892	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79893	06.07.1969	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79894	06.07.1969	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79895	06.07.1969	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79896	06.07.1969	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79897	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79898	06.07.1969	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79899	06.07.1969	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79900	06.07.1969	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79901	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79902	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79903	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79904	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79905	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-

NTNU_VM_79906	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79907	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79908	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79909	06.07.1969	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Vikestadvågen, Bindalfjorden	65.116667	12.25	1	-
NTNU_VM_79910	28.04.1977	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Trondheimsfjorden, Strindfjorden	63.440833	10.348889	1	-
ZMBN_42393	23.09.1948	*Jaera albifrons*	*Jaera ischiosetosa*	August R. Nymoen	-	-	-	-	-
ZMBN_52142	18.10.1958	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Hardangerfjorden, Ulvikpollen	-	-	-	26-12
ZMBN_52159	01.12.1961	*Jaera albifrons*	*Jaera praehirsuta*	August R. Nymoen	Husnesfjorden , Kvinnherad, Herøy	-	-	4	Littoral
ZMBN_52148	22.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Kvinnherad, Løfallstrand	-	-	-	Littoral
ZMBN_52141	26.09.1958	*Jaera albifrons*	*Jaera albifrons*	August R. Nymoen	Hardangerfjorden, Ullensvang, Troneset	-	-	1	Littoral
			Jaera ischiosetosa	August R. Nymoen	Hardangerfjorden, Ullensvang, Troneset	-	-	1	Littoral
			Jaera sp.	August R. Nymoen	Hardangerfjorden, Ullensvang, Troneset	-	-	4	Littoral
ZMBN_52151	28.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Hardangerfjorden, Sildafjorden	-	-	3	Littoral
ZMBN_52169	22.02.1963	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Luten, Bømlo	-	-	3	Littoral
ZMBN_52150	27.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Hardangerfjorden, Ytre Samlafjord	-	-	1	Littoral
ZMBN_52136	06.06.1958	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Hardangerfjorden, Eidfjord	-	-	1	7-->8
ZMBN_52166	20.02.1963	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Midgardsvik, Bømlo	-	-	-	Littoral
			Jaera praehirsuta	August R. Nymoen	Midgardsvik, Bømlo	-	-	5	Littoral
ZMBN_52144	21.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Bjellandsøy, Kvinnherad	-	-	3	Littoral

ZMBN_52149	23.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Seltevikneset, Varaldsøy	-	-	1	Littoral
ZMBN_52146	22.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Kvinnherad, Eikholmen	-	-	1	Littoral
ZMBN_52157	30.11.1961	*Jaera albifrons*	*Jaera ischiosetosa*	August R. Nymoen	Åskesholmen, Husnesfjorden	-	-	5	Littoral
			Jaera sp.	August R. Nymoen	Åskesholmen, Husnesfjorden	-	-	1	Littoral
ZMBN_52165	19.02.1963	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Sveio, Bømlafjorden	-	-	3	Littoral
ZMBN_52158	01.12.1961	*Jaera albifrons*	*Jaera ischiosetosa*	August R. Nymoen	Tysnes, Seløytunga	-	-	1	Littoral
			Jaera sp.	August R. Nymoen	Tysnes, Seløytunga	-	-	3	Littoral
ZMBN_52138	04.07.1956	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Kvam, Fyksesund	-	-	6	Littoral
			Jaera praehirsuta	August R. Nymoen	Kvam, Fyksesund	-	-	2	Littoral
			Jaera albifrons	August R. Nymoen	Kvam, Fyksesund	-	-	1	Littoral
ZMBN_52164	01.12.1961	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Dimmelsvik, Kvinnherad	-	-	1	1
			Jaera ischiosetosa	August R. Nymoen	Dimmelsvik, Kvinnherad	-	-	1	1
ZMBN_52170	19.03.1963	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Hardangerfjorden, Indre Samlafjord	-	-	3	Littoral
			Jaera albifrons	August R. Nymoen	Hardangerfjorden, Indre Samlafjord	-	-	2	Littoral
ZNMBN_52199	11.06.1963	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Hardangerfjorden, Børve	-	-	8	Littoral
			Jaera albifrons	August R. Nymoen	Hardangerfjorden, Børve	-	-	1	Littoral
ZMBN_52176	21.03.1963	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Utnefjorden, Troneset	-	-	1	Littoral
ZMBN_52185	22.08.1956	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Granvinsfjorden	-	-	50	Littoral
			Jaera albifrons	August R. Nymoen	Granvinsfjorden	-	-	40	Littoral

			Jaera ischiosetosa	August R. Nymoen	Granvinsfjorden	-	-	20	Littoral
ZMBN_52192	24.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Bjørkebeinneset	-	-	2	Littoral
ZMBN_52190	23.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Varaldsøy, Kvinnherad	-	-	1	Littoral
ZMBN_52182	13.06.1963	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Indre Samlafjorden, Hesthamar	-	-	16	Littoral
ZMBN_52195	25.07.1959	*Jaera albifrons*	*Jaera* sp.	August R. Nymoen	Hardangerfjorden, Utne	-	-	13	Littoral

Appendix II

Figure B1: Pappose and broom setae on the lateral margin of J. ischiosetosa *specimen NTNU_VM_79735.*