

# The Biodiversity of Mud Dragons (Kinorhyncha) in the Fjords of Møre og Romsdal, Norway

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## **Abstract**

The poorly studied phylum Kinorhyncha (mud dragons) consists of small, benthic invertebrates inhabiting marine environments at depths ranging from the intertidal- to abyssal zones worldwide. Kinorhyncha are members of the meiofauna, inhabiting the upper layers of oxygenated sediment on the ocean floor. This study aimed at assessing the biodiversity of Kinorhyncha in five selected fjords on the Norwegian Northwest coast in the Møre og Romsdal county; Ålvundfjord, Sunndalsøra, Øksendal, Eidsvåg and Eresfjord. In total, 166 Kinorhyncha specimens were identified to species/genus levels through sequencing parts of the nuclear 18S gene. The identified Kinorhyncha belong to the six genera *Pycnophyes*, *Paracentrophyes*, *Kinorhynchus*, *Echinoderes*, *Semnoderes* and *Condyloderes*. A significant differentiation between number of specimens per species in each fjord was detected. There was also discovered trends that different kinorhynch species prefer different microenvironments (depths). High boat traffic and affiliated port activity, as taking place in Sunndalsøra, likely reduces the diversity and abundance of kinorhynch communities.

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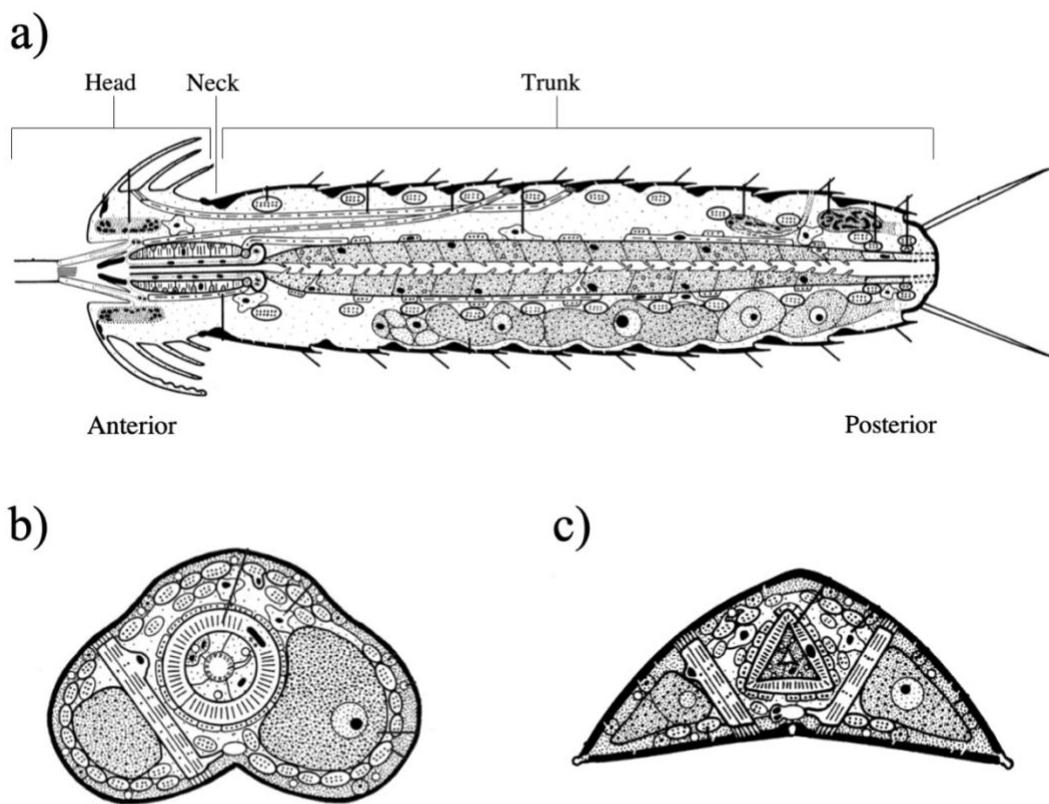
# 1. Introduction

## 1.1 Mud dragons (Kinorhyncha)

The Ecdysozoan phylum Kinorhyncha includes species that are part of the marine meiofauna with a global distribution (Neuhaus and Higgins, 2002). The kinorhynch species prefer the upper oxygenated layers (Vidaković, 1984) of mud or sand in marine sediments from shallow waters down to depths reaching up to 7800m in the Atacama Trench (Danovaro et al., 2002). They can endure high fluctuations in salinities (Horn, 1978), pH and temperatures (Neuhaus and Higgins, 2002), indicating their capacity to adapt to various environments.

In 1841, the French naturalist Felix Dujardin was the first to discover Kinorhyncha on the north coast of the Bretagne, France (Huys and Coomans, 1989). Almost 180 years later, the phylum is still poorly studied. But with new technologies and an increased fascination for life too small to be seen with the naked eye, new discoveries are being made at an increasing pace. This is documented by the growing number of scientific publications in recent years. A quick search on google scholar (30.04.2020) revealed that since the first recognition of Kinorhyncha in 1841 until the end of the 20<sup>th</sup> century, 948 articles were published. During the last 20 years the number of articles concerning Kinorhyncha has increased by 730%, to a total of 7860 publications.

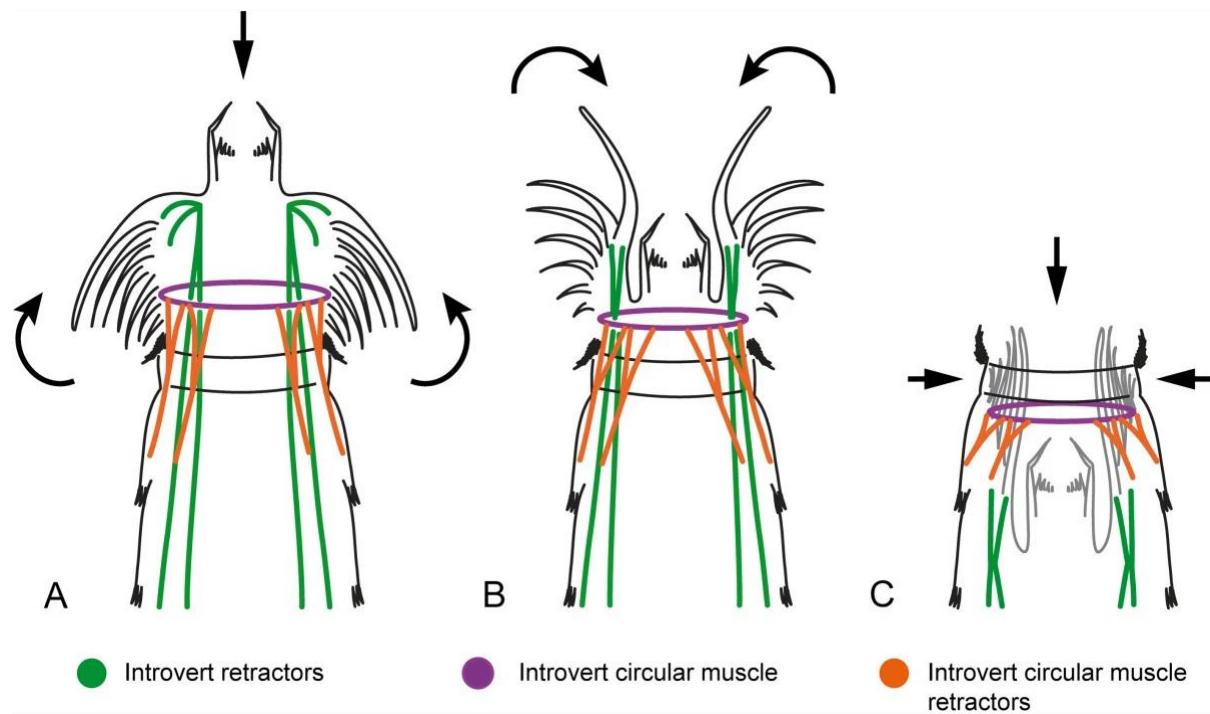
The phylum Kinorhyncha is divided into two main orders, the Homalorhagida and the Cyclorhagida, which constitutes of two and five families, respectively. Morphologically, Homalorhagida and Cyclorhagida can be distinguished easily based on the overall body shape. The cross-section body plan of homalorhagid species appears triangular, while the cross-section of a cyclorhagid constitute a more rounded shape (Figure 1b and c). The Cyclorhagida normally have several trunk spines together with a mid-terminal spine that is not present in the species of the Homalorhagida order, which contrarily have two distinct lateral terminal spines (Brusca et al., 2016). The World Register of Marine Species currently documents a diversity of 298 species, with 24 genera within the order of Cyclorhagida and 18 genera within the order of Homalorhagida (WoRMS, 2020). However, the biodiversity of Kinorhyncha is far from being comprehensively assessed, and the number of species in the phylum is expected to rise considerably within the years to come.



**Figure 1:** Overall body plan of Kinorhyncha and cross sections illustrating the conspicuous first glance of morphological difference between orders. a) typical ventral kinorhynch body plan constituting 13 segments divided into head, neck and trunk (Homalorhagida), the cross section of b) the Cyclorhagida and c) the Homalorhagida (Neuhaus and Higgins, 2002).

The typical kinorhynch body plan as described by Neuhaus and Higgins (2002) consists of 13 segments, divided into head, neck and trunk (Figure 1a). Movement is achieved by extending and retracting the introvert (Figure 2), a segmented mouth cone comprised with scalids, creating a forward movement (Shirley, 2009). The kinorhynch diet is discussed usually under the *a priori* assumption that Kinorhyncha are decomposers of organic material and diatoms (Neuhaus and Higgins, 2002). Based on the muscular structures in the head and mouth cone Hirose and Yamasaki (2015) found that some Kinorhynch species may feed on cellular material, bacteria and other small particles. Brusca et al. (2016) provide a list of major characteristics that separates Kinorhyncha from the other segmented ecdysozoan clades. According to the list, the key features include that Kinorhyncha are triploblastic with a bilateral segmentation, the species are either blastocoelomate or acelomate, absence of locomotory cilia, a complete gut-system and that Kinorhyncha are gonochoristic with directly developed juveniles from embryo. As is typical for gonochoristic organisms, there is no obvious differentiation between male and female, except the gonads and in some species

posterior segments. When morphologically distinguishing species, the number and placement of spines and placids (constituting the neck) along with oral styles in the mouth cone are the key diagnostic features.



**Figure 2:** Schematic overview of introvert extension and retraction, creating a forward movement with colour coded muscular systems involved in the process (Herranz et. al., 2014).

Kinorhyncha belongs together with Priapulida and Loricifera to the Scalidophora, which constitutes a monophyletic clade within the Ecdysozoa in sister group relationship to Nematoida and Panarthropoda (Giribet and Edgecombe, 2017). There is currently only limited molecular data, and in particular genomic data, available for Loricifera, Priapulida and Kinorhyncha. Accordingly, the Scalidophora is only a weakly supported clade in recent phylogenetic and phylogenomic studies (Borner et al., 2014). The lack of molecular support for the relationship within Scalidophora has led to a taxonomic subclade that is still largely based on morphological characters (Giribet and Edgecombe, 2017).

Studies on taxonomy and phylogenetic relationships that are based on morphological characters frequently have to cope with significant challenges that certainly also apply to the Scalidophora in general and to the Kinorhyncha in particular. Three issues will briefly be assessed. First, morphological features that discriminate species may be minute and difficult

to assess. Further they may challenge or even break during sampling and/or fixation. Additionally, the morphological features may differ between developmental stages. For Kinorhyncha, Sørensen and Pardos (2008) provided a fairly good key for morphological identification of kinorhynch species, but most of the species are still not easily distinguishable and/or the determination of the morphological character stages may require sophisticated equipment such as e.g. access to electron microscopes. Second, morphologically based phylogenies are generally considered less reliable than molecular based ones, often in cases where convergent evolution is present as discussed by Zou and Zhang (2016) or when phenotypically similar species are impossible to discriminate based on morphological traits (Correa et al., 2011). The latter certainly is a challenge with Kinorhyncha. Importantly, molecular data are static, where scientists have a framework consisting of the nucleotide arrangement for analysis. The morphological assessment can differ depending of authors and/or time of evaluation. In that respect, molecular phylogenies are interpretations of universal codes, in contrast to more subjective interpretations of morphological characters used for phylogeny. Third, the lack of kinorhynch fossils poses a particular difficulty for the morphological based assumption of the clade Scalidophora (Zhang et al., 2015) and accordingly, the divergence time of Kinorhyncha, Priapulida and Loricifera within Scalidophora remains unresolved. However, recently Zhang et al. (2015) described a fossilized kinorhynch ancestor *Eokinorhynchus rarus* from the early Cambrian. A careful morphological analysis of the specimen might shed new light on the phylogenetic relationships within the subclade Scalidophora.

Molecular species identification of Kinorhyncha is by now possible to some extent, and largely relies on nucleotide sequence data for two molecular markers, i.e. the nuclear ribosomal 18S gene and the mitochondrial cytochrome oxidase subunit 1 (CO1) gene (Yamasaki, 2017; Herranz et al., 2018; Randsø et al., 2019). Kinorhyncha phylogenies have been reconstructed by comparing molecular data with morphological data to interpret interrelationships within the kinorhynch taxon (Sørensen et al., 2015) and molecular data have also been used in attempts to the discovery of new species (Varney et al., 2019; Yamasaki and Fujimoto, 2014). Nevertheless, the use of 18S and CO1 sequences as molecular markers for species as tiny as Kinorhyncha is not necessarily straightforward. The 18S and CO1 target genes are found in all species, and usually highly conserved regions are most suitable for designing universal primers. Accordingly, PCR based amplification and

sequencing approaches are highly susceptible for cross-contamination of DNA from other sources.

In a recent study Schratzberger and Somerfield (2020) reviewed the impacts of human activity that endangers the meiofauna community. They found that anthropogenic activities such as bottom-fishing, introduction of invasive species and climate change reshape the ocean floor, creating both abiotic (sediment texture, bed forms, oxygenation) and biotic (biofilm, organic matter, community interactions) alterations. The Kinorhyncha are distinctive due to the fact that they inhabit both the coastal zones and the deep seas. Consequently, disturbances that happens in both coastal areas such as tourism, settlement, industry, transport, agriculture, fishing and trade, and perturbations in the deep seas such as bottom trawling, deep-sea mining and dumped waste (IPBES, 2019) mainly due to population and economic growth, all affect the ecosystems the Kinorhyncha inhabit. The life history of meiofauna generally constitutes short generation times and multiple offspring, which is believed to make them less vulnerable to timing of disturbance and the rate of recolonization can be rapid (Schratzberger and Somerfield, 2020). Nevertheless, lowered survival rate and fitness due to habitat changes might exceed the tolerance limit threshold making ecosystem recovery unfeasible. As mentioned above, Kinorhyncha prefer the oxygenated layers of the sediments but with increasing temperatures of the water due to global warming, the ability to hold oxygen decreases (Helm et al., 2011), this may directly affect the kinorhynch ability to thrive and consequently decreases the potential for resistance. Climate change and other anthropogenic activities disrupt ecosystems, fragments or eliminate habitats through increased water temperatures, creates oxygen deficiency, acidification, eutrophication, upwelling and intensification of storm activities (IPBES, 2019), which in turn affect both the life histories of species and the fundamental structure of their habitat. These changes to the meiofaunal community may lead to a turnover of species composition from a meio- and macrofauna dominated habitat, to a homogenic habitat largely consisting of microbes able to survive in anaerobic environments (Franco et al., 2008). The listed factors of human disturbances on the marine environment, represent major menaces to the ecosystem services the meiofauna community serves.

## 1.2 Aim of the thesis

There is until today no comprehensive assessment of kinorhynch biodiversity in Norway, and reports of kinorhynch occurrence along the Norwegian coastline have only been circumstantial. The most comprehensive survey has been performed in the artsdatabanken.no founded artsprosjekt “*Kinorhyncha – a poorly known and neglected animal phylum*” in 2013-14 (project number knr. 56-12, pnr. 70184227, assigned to Prof. Lutz Bachmann, Natural History Museum Oslo). The project delivered a first rough overview on Kinorhyncha diversity and identified, although not exhaustively assessed, the inner fjords of Møre og Romsdal, Norway, as conspicuously species rich (personal information).

This thesis aimed at an in-depth assessment of the kinorhynch biodiversity in five selected fjords, i.e. Sunndalsøra, Øksendal, Ålvundfjorden, Eidsvåg and Eresfjorden in Møre og Romsdal, Norway. Particular emphasis was on seasonal variation and depth zonation of the kinorhynch meiofauna community. The selected fjords differ strikingly in the extent of human activities that may impact local ecological parameters, and thus, also kinorhynch diversity and abundance.

## 2. Materials and methods

### 2.1 Sampling locations

Fieldwork to collect Kinorhyncha specimens was conducted in May, July and September 2019 at five fjord localities on the Norwegian northwest coast of Møre og Romsdal, in order to monitor seasonal variation in species abundance and diversity. In total, 81 environmental samples were taken from the five selected fjords (Figure 3 and 4); Tingvollfjorden at Sunndalsøra and Øksendal, Trongfjorden at Ålvundfjord, Langfjorden at Eidsvåg and Eresfjord. Sampling depths ranged from ca. 5m to ca. 160m (Table 1). Ålvundfjorden, Eidsvåg and Øksendal were sampled at all three points in time, whereas Sunndalsøra and Eresfjorden were only sampled in July and September.

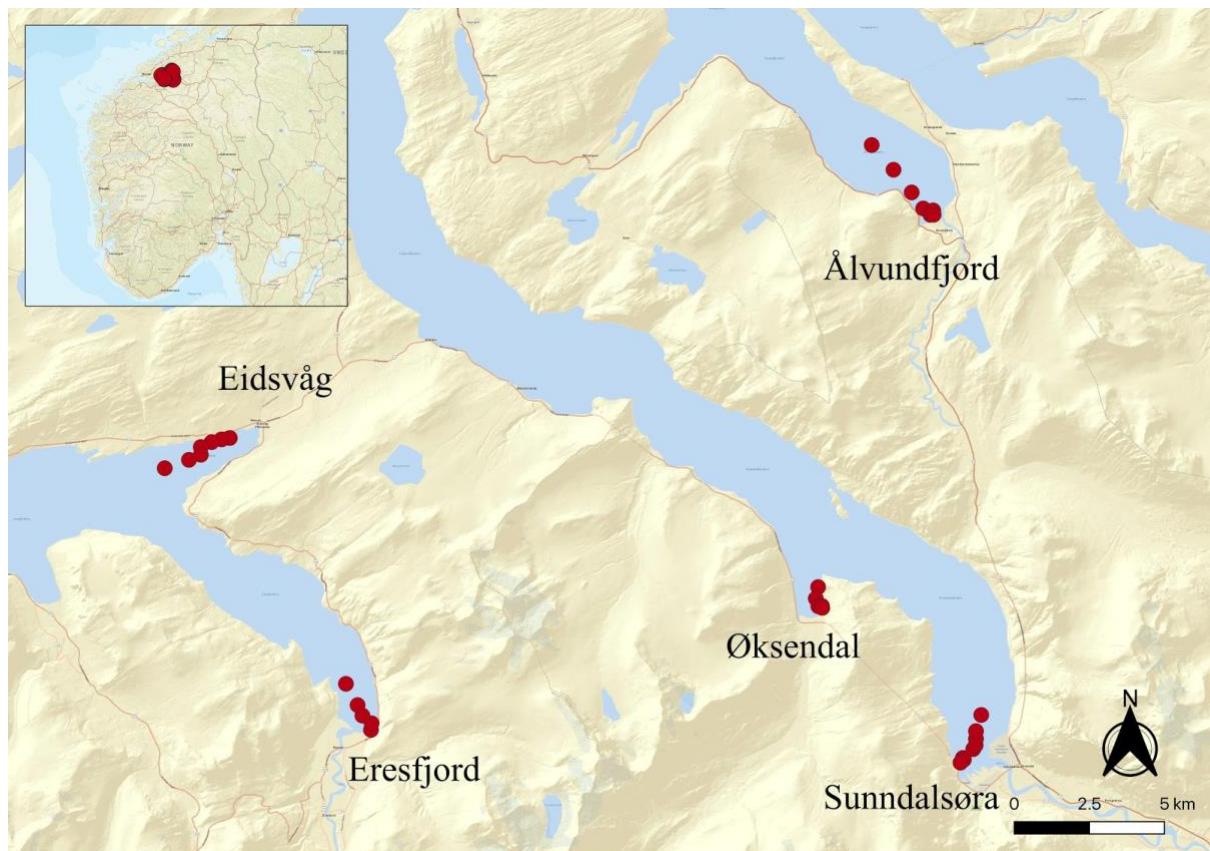
Knowledge from a previous monitoring of Kinorhyncha biodiversity (personal communication) led to the decision of which fjords to sample. For the localities Ålvundfjorden, Øksendal and Eidsvåg the previous survey had shown that Kinorhyncha species could be commonly found at these localities. Although the five fjords are located within short geographical distances, they are affected by different kinds and extent of human activities; ranging from the almost non-impacted Eresfjorden with mainly agriculture and mostly local transit, to the highly impacted Sunndalsøra, a regional center with the largest aluminium factory in Europe and associated port facilities (Table 2).

The number of people connected to the fjords and associated settlements/towns was expected to represent an important factor on how the fjords' ecology is affected. In the sampling area of this thesis, the amount of sewage and other waste certainly increases with large populations as in the Sunndalsøra and Eidsvåg communities, but also the agricultural landscape in Ålvundfjord, Øksendal and Eresfjord cause runoff that might affect the physicochemical balance in the fjords. Other activities such as transportation of large cargo and boats in the fjords cause upwelling of sediments that might also disturb the meiofauna including Kinorhyncha. The fjords in Sunndalsøra and Eidsvåg are in this thesis considered fjords with substantial human impact due to population numbers, the town's status as commercial centers in the area and the corresponding association to ports and utilization of the fjords. The Øksendal settlement has the smallest population number of the targeted fjords

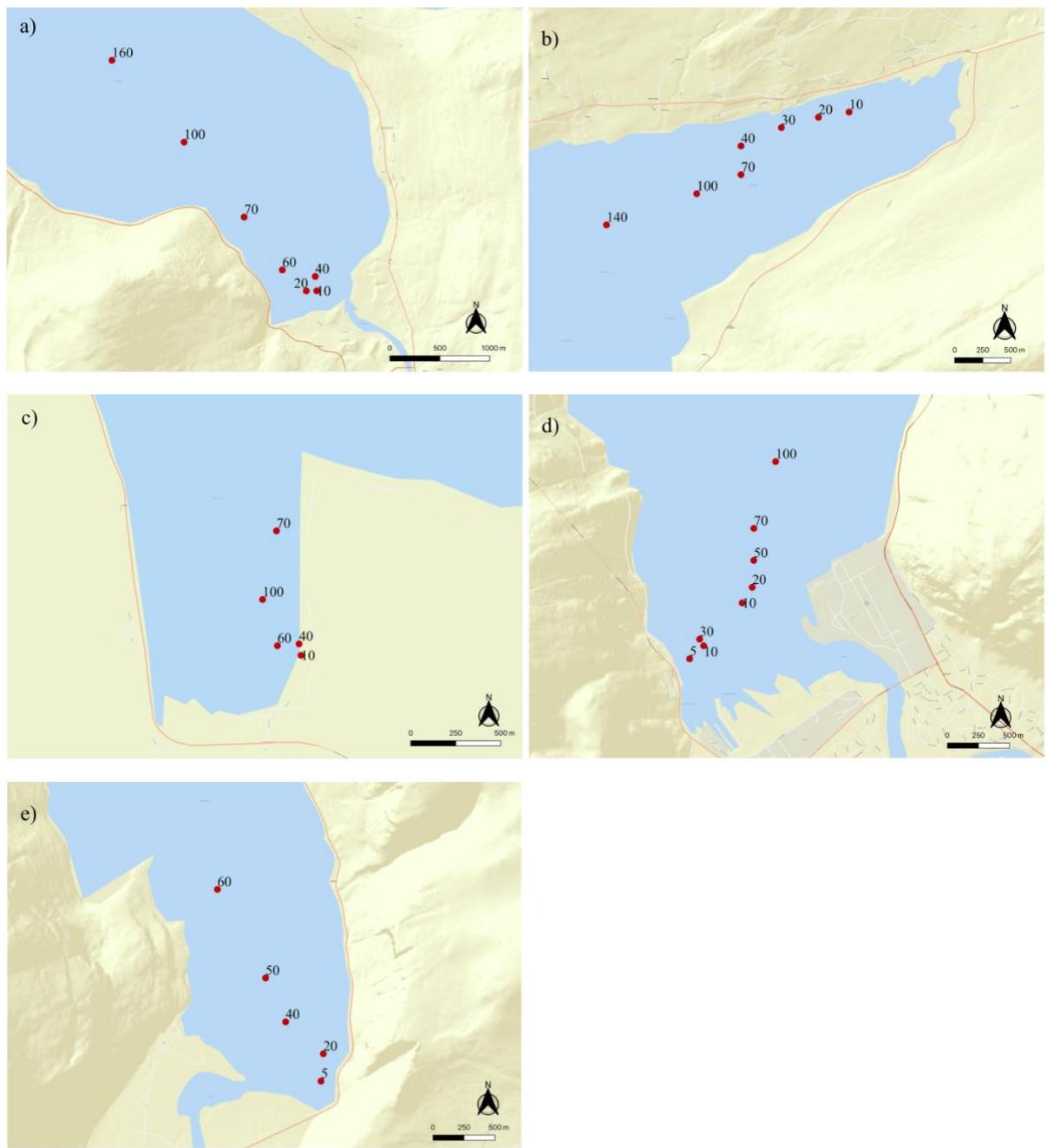
but was first of all selected due to its location in respect to Sunndalsøra. The side fjord of Tingvollfjorden at Øksendal might also be affected by heavy traffic of large cargo ships due to the factory located in Sunndalsøra, although the valley at Øksendal itself is rural.

Ålvundfjord was selected as a fjord only moderately impacted by human activities. Eresfjord is regarded as the least impacted fjord from human activities with only a small local harbour and low population numbers.

The fjords were targeted to address if the extent of local human impact in the fjords affects the abundance and species diversity of Kinorhyncha.



**Figure 3:** Overview map of the sampled fjords Eidsvåg, Eresfjorden, Øksendal, Sunndalsøra and Ålvundfjord in the Møre og Romsdal county, Norway, in 2019.



**Figure 4:** Detailed map of the sampling locations with sampling depth (meters) plotted for each fjord, a) Ålvundfjord, b) Eidsvåg, c) Øksendal, d) Sunndalsøra and e) Eresfjorden.

**Table 1:** Sampling locations, sample ID, geo coordinates, depth and date for each sampling site on the northwest coast of Møre og Romsdal, Norway 2019.

Sampling site	Sample ID	Latitude	Longitude	Depth (m)	Date
Ålvundfjord	500	62.83957	08.50640	40	14.05.19
	501	62.84041	08.50010	60	14.05.19
	502	62.84512	08.49270	70	14.05.19
	503	62.85209	08.48115	100	14.05.19
	504	62.85922	08.46732	160	14.05.19
	505	62.83861	08.50675	10	14.05.19
Eidsvåg	506	62.77223	08.05484	NA	14.05.19
	507	62.77226	08.04996	10	14.05.19
	508	62.77189	08.04495	20	14.05.19
	509	62.77110	08.03842	30	14.05.19
	510	62.76949	08.03181	40	14.05.19
	511	62.76741	08.03133	70	14.05.19
	512	62.76571	08.02402	100	14.05.19
Øksendal	513	62.72167	08.43465	10	15.05.19
	514	62.72167	08.43465	10	15.05.19
	515	62.72215	08.43208	60	15.05.19
	516	62.72435	08.43039	100	15.05.19
	517	62.72787	08.43184	70	15.05.19
	518	62.73174	08.42332	NA	15.05.19
Eidsvåg	519	62.77222	08.05005	10	09.07.19
	520	62.77180	08.04473	20	09.07.19
	521	62.77097	08.03827	30	09.07.19
	522	62.76951	08.03124	40	09.07.19
	523	62.76723	08.03123	70	09.07.19
	524	62.76571	08.02352	100	09.07.19
	525	62.76322	08.00780	140	09.07.19
Sunndalsøra	526	62.67696	08.52595	30	09.07.19
	527	62.67648	08.52659	10	09.07.19
	528	62.67957	08.53263	10	09.07.19

	529	62.68070	08.53420	20	09.07.19
	530	62.68264	08.53444	50	09.07.19
	531	62.68495	08.53446	70	09.07.19
	532	62.68976	08.53787	100	09.07.19
	533	62.67554	08.52438	5	09.07.19
Øksendal	534	62.72786	08.43198	70	09.07.19
	535	62.72445	08.43048	100	09.07.19
	536	62.72215	08.43208	60	09.07.19
	537	62.72224	08.43443	40	09.07.19
	538	62.72167	08.43465	10	09.07.19
Ålvundfjord	539	62.85918	08.46674	160	10.07.19
	540	62.85185	08.48090	100	10.07.19
	541	62.84512	08.49270	70	10.07.19
	542	62.84037	08.50019	60	10.07.19
	543	62.83978	08.50667	40	10.07.19
	544	62.83848	08.50490	20	10.07.19
	545	62.83849	08.50695	10	10.07.19
Eresfjord	546	62.68532	08.14172	5	10.07.19
	547	62.68728	08.14209	20	10.07.19
	548	62.68956	08.13616	40	10.07.19
	549	62.69270	08.13301	50	10.07.19
	550	62.69904	08.12543	60	10.07.19
Ålvundfjord	551	62.85916	08.46663	160	25.09.19
	552	62.85198	08.48106	100	25.09.19
	553	62.84505	08.49264	70	25.09.19
	554	62.84035	08.50018	60	25.09.19
	555	62.83979	08.50671	40	25.09.19
	556	62.83850	08.50490	20	25.09.19
	557	62.83853	08.50696	10	25.09.19
Sunndalsøra	558	62.68875	08.53786	100	25.09.19
	559	62.68491	08.53447	70	25.09.19
	560	62.68268	08.53453	50	25.09.19

	561	62.68067	08.53422	20	25.09.19
	562	62.67955	08.53265	10	25.09.19
	563	62.67648	08.52665	10	25.09.19
	564	62.67696	08.52579	30	25.09.19
Øksendal	565	62.72784	08.43202	70	25.09.19
	566	62.72444	08.43053	100	25.09.19
	567	62.72215	08.43202	60	25.09.19
	568	62.72224	08.43443	40	25.09.19
	569	62.72167	08.43465	10	25.09.19
Eresfjord	570	62.69903	08.12543	60	26.09.19
	571	62.69269	08.13296	50	26.09.19
	572	62.68958	08.13619	40	26.09.19
	573	62.68729	08.14207	20	26.09.19
	574	62.68533	08.14175	5	26.09.19
Eidsvåg	575	62.77218	08.04998	140	26.09.19
	576	62.77180	08.04480	100	26.09.19
	577	62.77096	08.03834	70	26.09.19
	578	62.76954	08.03128	40	26.09.19
	579	62.76724	08.03123	30	26.09.19
	580	62.76544	08.02304	20	26.09.19
	581	62.76325	08.00780	10	26.09.19

**Table 2:** Population numbers and local economy in the settlements connected to the targeted fjords. Population numbers collected from Statistisk Sentralbyrå (Statistisk sentralbyrå, 2020).

Settlement	Population	Municipality	Economy*
Sunndalsøra	4140	Sunndal	Industry and regional commercial center
Øksendal	370	Sunndal	Agriculture
Ålvundfjord	470	Sunndal	Agriculture and small industry
Eidsvåg	950	Molde	Small industry and local commercial center
Eresfjord	360	Molde	Agriculture

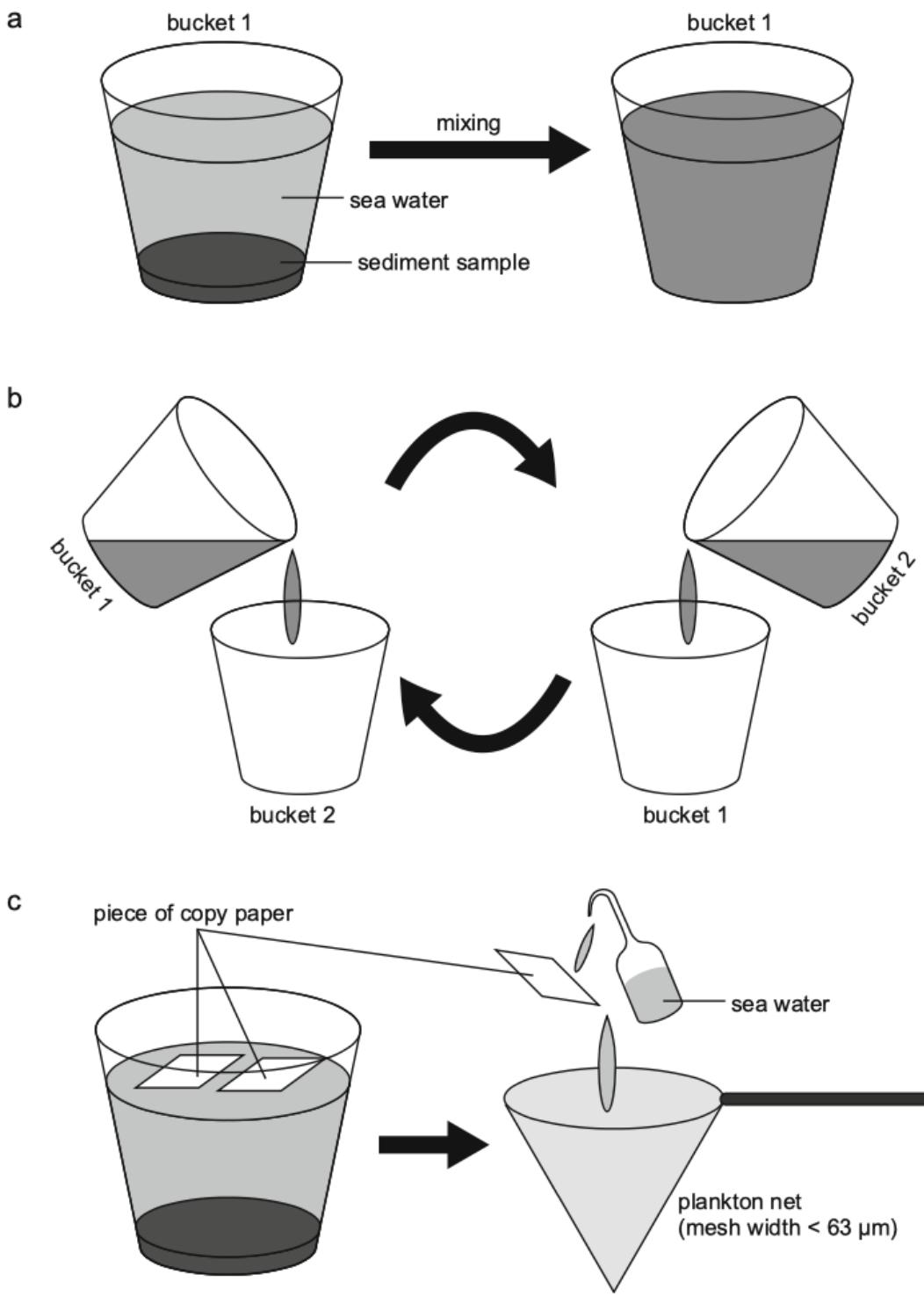
\* the assessment is based on a rough overall impression by the author

## 2.2 Sampling methods

Sampling was conducted from a small boat. A van Veen grab was used to collect approximately 1-2 kg sediment per haul (Figure 5). Meiofauna was extracted from the sediments by means of the bubble-and-blot method (Giere, 2009), and stored in 96% ethanol in plastic test tubes for downstream processing and storage. In brief, the bubble-and-blot method makes first a homogenous blend of seawater and mud by pouring the sample from one bucket into another until a homogeneous mixture are obtained (Figure 6). At the same time air bubbles are produced that drive meiofauna to the surface, where they can readily be collected with a sheet of paper. The meiofauna specimens were washed from the paper into the test tube with 96% ethanol. The test tubes were marked with sampling number associated with coordinates and depth of the sample site.



**Figure 5:** Van Veen grab used to collect seafloor sediment samples, by manually hauling the grab into boat.



**Figure 6:** Schematic overview of bubble-and-blot method as described by Yamasaki (2017).  
 a) seawater and sediment are mixed by pouring substance from one bucket into another, b) creating a homogenous blend by multiple repetitions of pouring, c) collecting specimens from sheet of paper.

The environmental samples were thoroughly examined in lab at the Natural History Museum in Oslo with a stereo microscope at 10x magnification. Kinorhyncha specimens were identified based on overall morphology, and individually hand-picked from the meiofauna samples and stored in 1.5ml reaction tubes containing 30 µl 96% ethanol for downstream DNA analysis. The specimens were also sorted as either Homalorhagida or Cyclorhagida during the morphological identification process. However, some of the very small specimens, suspected of being juvenile stages, could not be unambiguously identified as homalorhagids or cyclorhagids. The number of segments was then counted, and overall body structure was examined in order to determine if the specimens belonged to the phylum of Kinorhyncha. In case of uncertainty, the respective specimens were nevertheless picked for downstream molecular analyses as ‘suspected’ Kinorhyncha. In addition, the presence of microplastics in the environmental samples was noted.

### 2.3 Molecular analysis

For DNA extraction of individual kinorhynch specimen the protocol of the QIAamp DNA Micro Kit (Qiagen) for “Isolation of genomic DNA from tissues” was used, resulting in 30µL of isolated total genomic DNA. Subsequently, two molecular markers were targeted for by Polymerase Chain Reaction (PCR) employing the thermostable AmpliTaq Gold™ DNA Polymerase (ThermoFisher Scientific). The experimental conditions are presented in Table 3. For the nuclear ribosomal 18S, the primer pairs S30/5FB, 4FB/1806R and 18S-323dir/18S-823rev were used, and for the mitochondrial Cytochrome Oxidase Subunit 1 (CO1) the primer pair LCO1490/HCO2198 were used (Table 4).

**Table 3:** Cycling conditions during PCR amplification of 18S and CO1 markers of individual Kinorhyncha specimens.

	34 cycles				
	Initial denaturation	Denaturation	Annealing	Extension	Final extension
Temp (°C)	94	94	56/55	72	72
Duration	5,00	0,30	0,45	1,00	7,00

During PCR amplification of DNA, the denaturation, annealing temperature and extension are important factors. If annealing temperature is set too low the primers are susceptible for cross amplification by non-specific annealing to other locations than the targeted ones on the DNA strand. In contrast, a too high annealing temperature will lead to a reduced reaction efficiency as the possibility of the primer to anneal is significantly reduced (Rychlik et al., 1990). An optimization test of annealing temperature for primer pair 18S-323dir/18S-823rev was conducted and optimal  $T_a$  was found to be 55°C. Following amplification, PCR products were visualized using standard agarose gel electrophoresis.

**Table 4:** Primers used in PCR for amplification of 18S and CO1 targeted regions.

<b>18S</b>	S30	Forward	GCTTGTCTCAAAGATTAAGCC
	5FK	Reverse	TTCTTGGCAAATGCTTCGC
	4FB	Forward	CCAGCAGCCGCCGTAATTCCAG
	1806R	Reverse	CCTTGTACGACTTTACTTCCTC
	18S-323dir	Forward	ATAACGGGTAACGGYGAATCAGGG
	18S-823rev	Reverse	TTATTCCATGCACCACTATWCAGGC
<b>CO1</b>	LCO1490	Forward	GGTCAACAAATCATAAAGATATTGG
	HCO2198	Reverse	TAAACTTCAGGGTGACCAAAAAATCA

The obtained PCR products were purified and subsequently Sanger sequenced. The actual DNA-sequencing was outsourced to StarSEQ Mainz, Germany. The sequencing results were received digitally both as text-files including the sequences after base-calling and as ab1 formatted trace files containing the DNA sequence electropherogram as well as raw data along with some other ‘run’ information.

The electropherograms were viewed using the MEGAX software (Kumar et al., 2018), and ambiguous positions were either trimmed or edited manually. The edited sequences were screened against GenBank using BLAST (Basic Local Alignment Search Tool) function

(Johnson et al., 2008) of the National Center for Biotechnology Information (NCBI). The highest scoring database entries were used to determine the Kinorhyncha specimens to species or at least to genus level.

The specimens that were molecularly identified to species/genus were then registered to the Corema (Collection and Research management) database of the Natural History Museum in Oslo to ensure that the information will be available with open access to scientists and enthusiasts interested in the meiofauna.

## 2.4 Statistics

The Kruskal Wallis test with a following Bonferroni post hoc test, was run to assess the statistical support for possible variation in the three key questions of this thesis. Firstly, if the distribution of specimens per species is the same across each fjord. Secondly, if the distribution of number of specimens is the same across depth zonation. And thirdly, if there is statistical support for seasonal variation in number of specimens at each sampling site. The statistical analysis was conducted in SPSS Statistics (available from <https://programvare.uio.no/produkt/6861.html>).

A relative abundance curve (RAD) was generated using Microsoft Excel to detect variation in species richness and species evenness of both the whole dataset and for the distribution between Homalorhagida and Cyclorhagida. The species richness is defined as the number of species found in a habitat or ecosystem and the species evenness is defined as the mathematical independent variable drawn from the species richness (Gosselin, 2006). The species evenness shows the distribution of species based on the species richness across the ecosystem of interest.

### 3. Results

In total, 394 Kinorhyncha individuals were morphologically identified in the meiofauna samples collected in the five selected fjords in Møre og Romsdal, Norway, by screening with stereo microscope. Additionally, plastic particles were noticed in all environmental samples collected. A breakdown of the identified specimens according to sampling period, sampling depth and geographic origin is provided in Figure 7. Overall, the highest number of specimens were identified from Eidsvåg, and the least in Sunndalsøra.

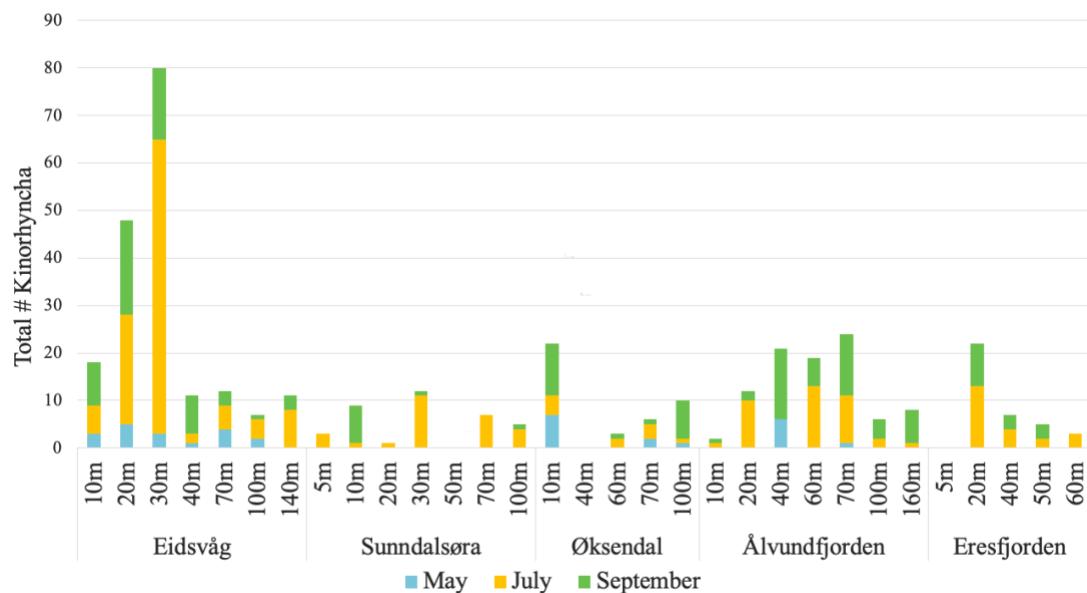
All individual specimens were subject to molecular species identification using either parts of nuclear 18S ribosomal gene and/or the mitochondrial cytochrome oxidase I gene. Of the 394 Kinorhynch specimens, 166 (42%) individuals were successfully determined to either species (96 specimens) or genus level (70 specimens) using molecular markers. The compiled sequence data are provided as supplementary information S1. The identified Kinorhyncha species belonged to six genera; three genera belonging to the order Homalorhagida and three to the order Cyclorhagida. A list of species is presented in Table 5.

**Table 5:** Kinorhyncha species found in selected fjords in Møre og Romsdal, Norway (2019).

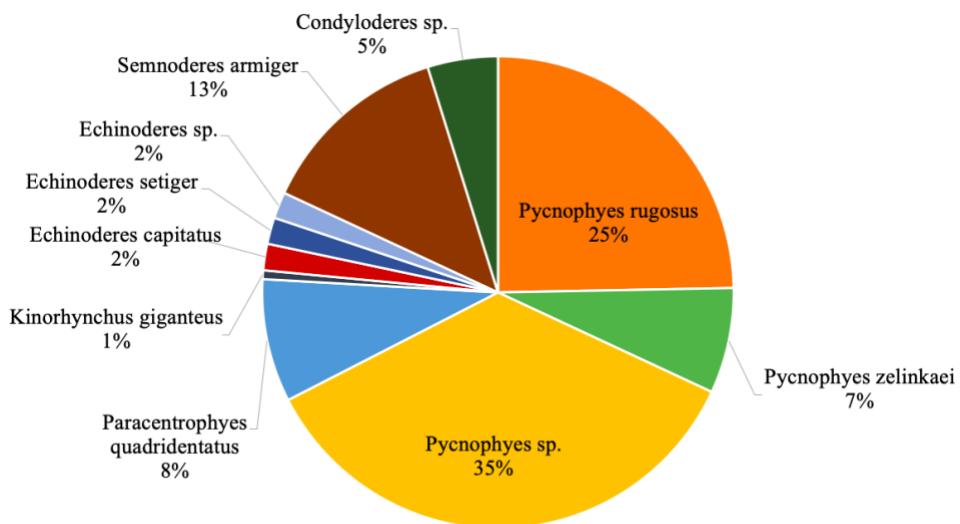
Order	Genera	Species
Homalorhagida	<i>Pycnophyes</i>	<i>rugosus</i> <i>zelinkaei</i> sp.
	<i>Paracentrophyes</i>	<i>quadridentatus</i>
	<i>Kinorhynchus</i>	<i>giganteus</i>
Cyclorhagida	<i>Echinoderes</i>	<i>capitatus</i> <i>setiger</i> sp.
	<i>Semnoderes</i>	<i>armiger</i>
	<i>Condyloderes</i>	sp.

The relative species frequency of each molecularly identified Kinorhyncha species compiled for the whole sampling period and area was calculated (Figure 8). *Pycnophyes rugosus* was found to be most common (25%) relative to the other species. Specimens only identified to

the genus *Pycnophyes* made up for 35%. The least abundant species was *Kinorhynchus giganteus*, represented with only one specimen collected in Eidsvåg.

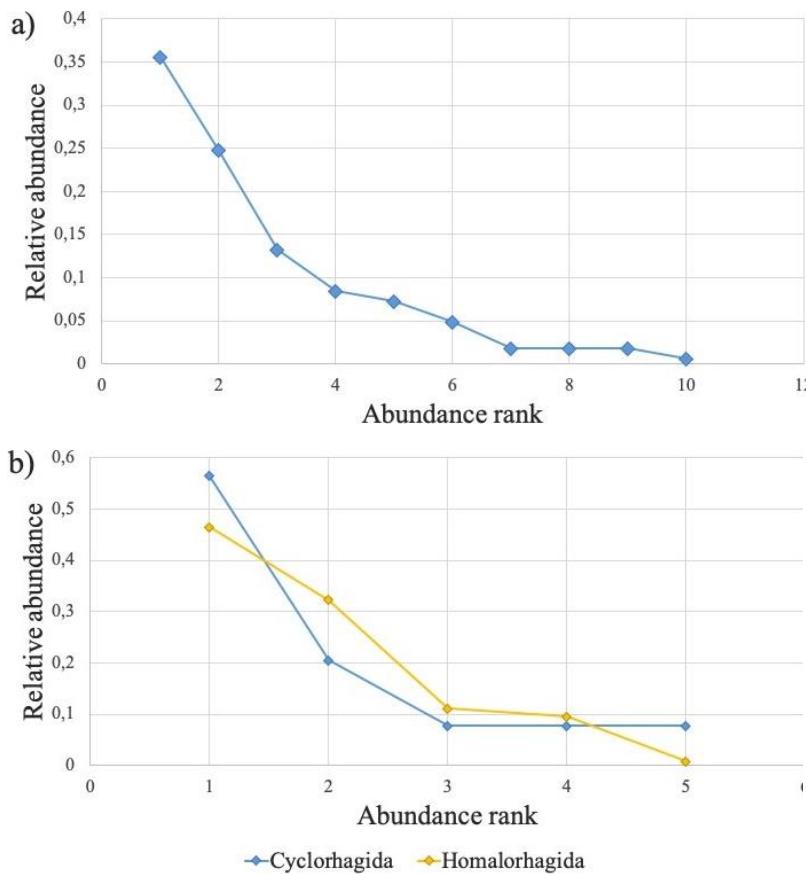


**Figure 7:** Total numbers of morphologically identified Kinorhyncha specimens collected in 2019 from five selected fjords in Møre og Romsdal, Norway. The sampling depth and season is indicated.



**Figure 8:** Relative frequency of molecularly determined Kinorhyncha species collected in five selected fjords in Møre og Romsdal, Norway 2019.

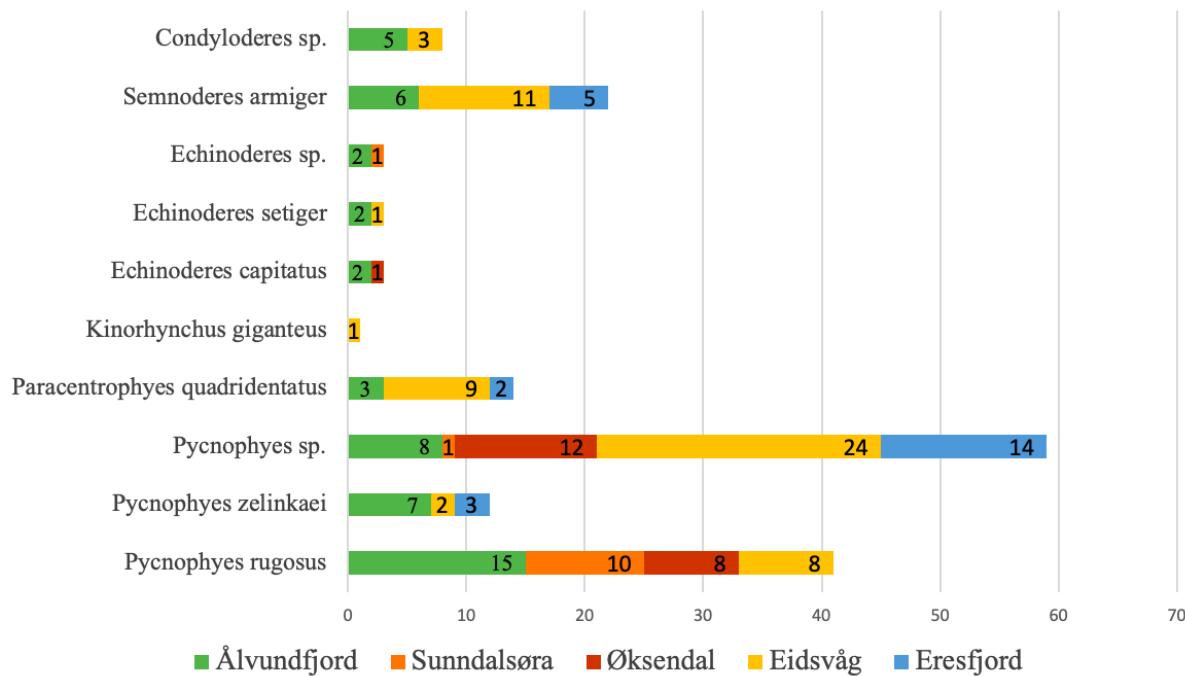
A relative abundance curve analysis was performed to interpret the species richness and species evenness (Figure 9, Table 6). The species richness in Møre og Romsdal proved to be 10. Based on the steep slopes observed, the species evenness proved to be low for both the whole sampling set as well as for the classes Homalorhagida and Cyclorhagida separately.



**Figure 9:** Rank abundance curves for the Kinorhyncha specimens collected in Møre of Romsdal, Norway 2019, a) the whole Kinorhyncha dataset and b) for Cyclorhagida and Homalorhagida separately.

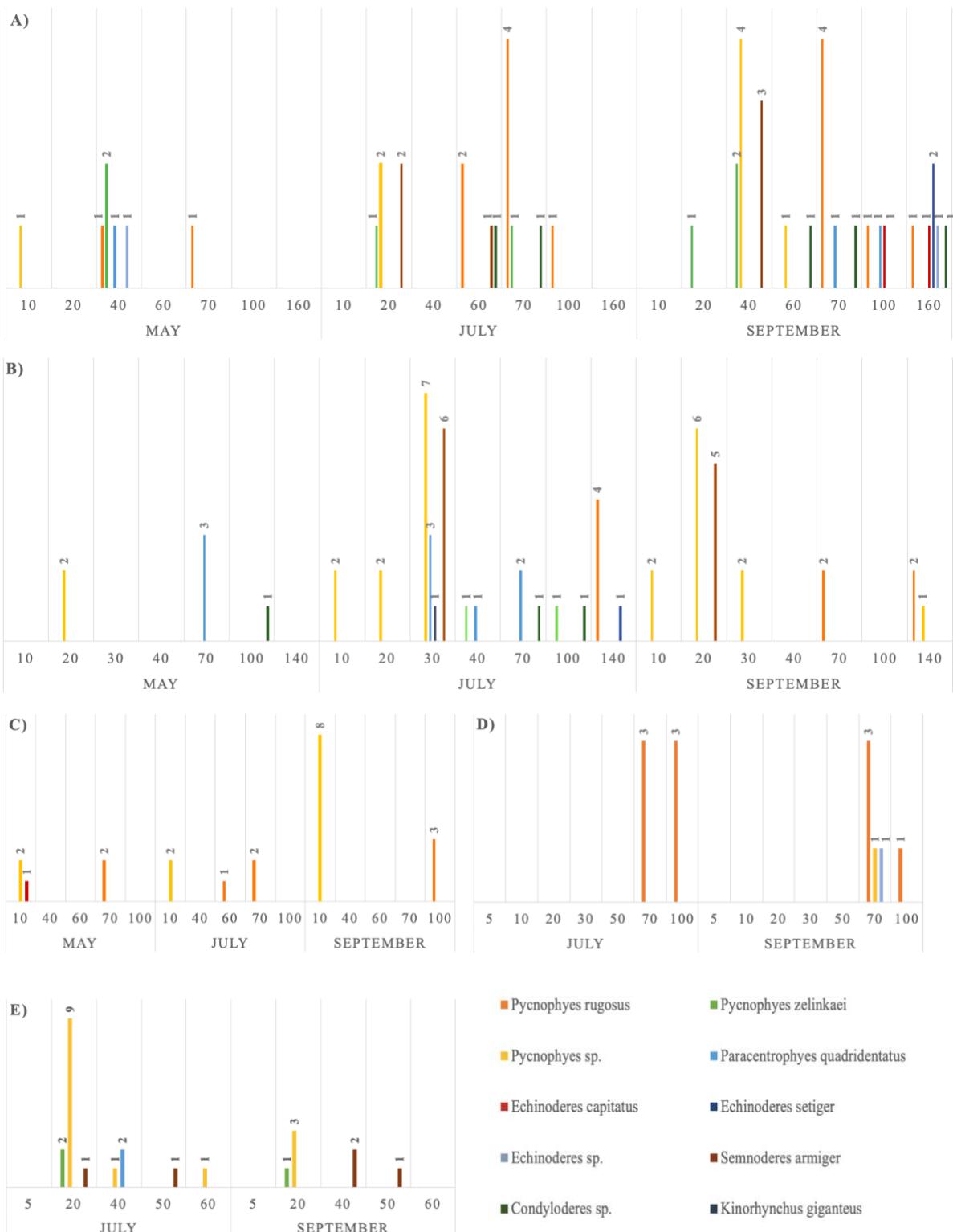
**Table 6:** Rank abundance values of Kinorhyncha species identified in Møre og Romsdal, 2019.

Rank	Species	Order	# individuals	Proportion
1	<i>Pycnophyes</i> sp.	Homalorhagida	59	0.35
2	<i>Pycnophyes rugosus</i>	Homalorhagida	41	0.25
3	<i>Semnoderes armiger</i>	Cyclorhagida	22	0.13
4	<i>Paracentrophyes quadridentatus</i>	Homalorhagida	14	0.08
5	<i>Pycnophyes zelinkaei</i>	Homalorhagida	12	0.07
6	<i>Condyloderes</i> sp.	Cyclorhagida	8	0.05
7	<i>Echinoderes capitatus</i>	Cyclorhagida	3	0.02
8	<i>Echinoderes setiger</i>	Cyclorhagida	3	0.02
9	<i>Echinoderes</i> sp.	Cyclorhagida	3	0.02
10	<i>Kinorhynchus giganteus</i>	Homalorhagida	1	0.01



**Figure 10:** Number of molecularly identified Kinorhyncha species in each of the five targeted fjords Ålvundfjord, Sunndalsøra, Øksendal, Eidsvåg and Eresfjord in Møre og Romsdal, Norway.

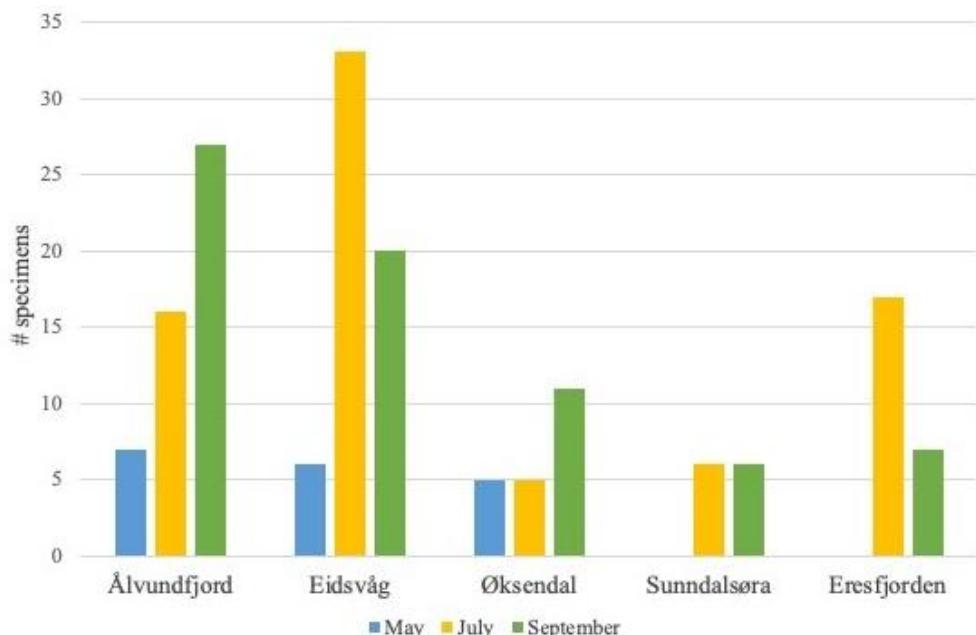
A seasonal increase of the number of sampled and molecularly determined specimens (Figure 10) is observed in Ålvundfjord with seven specimens in May, 16 specimens in July and 27 specimens molecularly identified in September (Figure 11 a). The depth with the highest number of individuals in Ålvundfjorden were found to be at 70 meters in July and at 40 meters in May and September. For Eidsvåg the highest species richness of all sampled fjords was found, where 59 specimens could be molecularly determined (Figure 11 b). The highest abundance of kinorhynch individuals in Eidsvåg was found at 30 meters depth in July. In total, there were 6 specimens in May, 33 in July and 20 in September. Øksendal revealed a lower species richness, with a total of 21 specimens molecularly identified (Figure 11 c). The highest number of specimens was found in September with 11 specimens. Most specimens were found at a depth of 10 meters in both May and September. Sunndalsøra proved to be the fjord with least number of kinorhynch specimens with 12 individuals molecularly determined (Figure 11 d). All specimens were sampled at only two locations, at 70 meters and 100 meters. Eresfjorden revealed a relatively high number of specimens with 17 in July and 7 specimens in September. The highest number of specimens were found at a depth of 20 meters in both July and September (Figure 11 e).



**Figure 11:** Number of Kinorhyncha species and genus identified broken down according to sampling depth, season and sampling location; a) Ålvundfjord b) Eidsvåg c) Øksendal d) Sunndalsøra and e) Eresfjord.

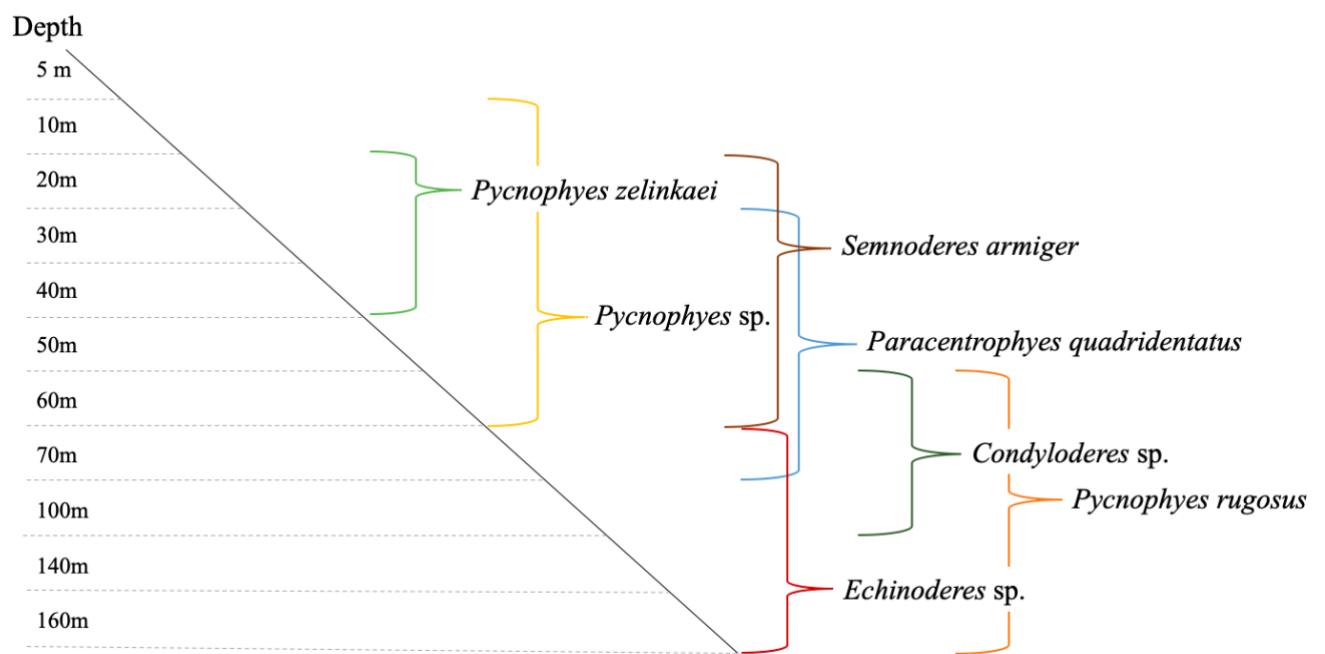
A Kruskal Wallis test revealed statistical differentiation in the distribution of specimens per species across each targeted fjord ( $\chi^2(4) = 11.979$ ,  $p = 0.018$ ). The Bonferroni post hoc test revealed differentiations between *Pycnophyes* sp. and *Kinorhynchus giganteus*, *Condyloderes* sp., *Echinoderes* sp., *Echinoderes setiger* and *Echinoderes capitatus*. A distinction was also found between *Pycnophyes rugosus* and *Kinorhynchus giganteus*, *Condyloderes* sp., *Echinoderes* sp., *Echinoderes setiger* and *Echinoderes capitatus*. The significant differentiation between the targeted fjords were found to be Eidsvåg relative to Sunndalsøra and Øksendal, and Ålvundfjord relative to Sunndalsøra, Øksendal and Eresfjord.

A significant seasonal differentiation of Kinorhyncha abundance could not be supported by a Kruskal Wallis test ( $\chi^2(2) = 5.565$ ,  $p = 0.062$ ), and a subsequent post hoc test was therefore not conducted. There was no obvious seasonal peak in species abundance, but a clear population growth was noticed between May and July sampling. In Eidsvåg and Eresfjord the highest abundance of Kinorhyncha was found in July with 33 and 17 specimens respectively. Ålvundfjorden and Øksendal showed the highest abundance in September with 27 and 11 specimens molecularly determined. No seasonal variation was observed in Sunndalsøra based on the molecularly identified specimens (Figure 12).



**Figure 12:** Variation in seasonal abundance of Kinorhyncha in each sampled fjord based on molecularly determined specimens observed in May, July and September on the northwest coast of Norway, Møre og Romsdal 2019.

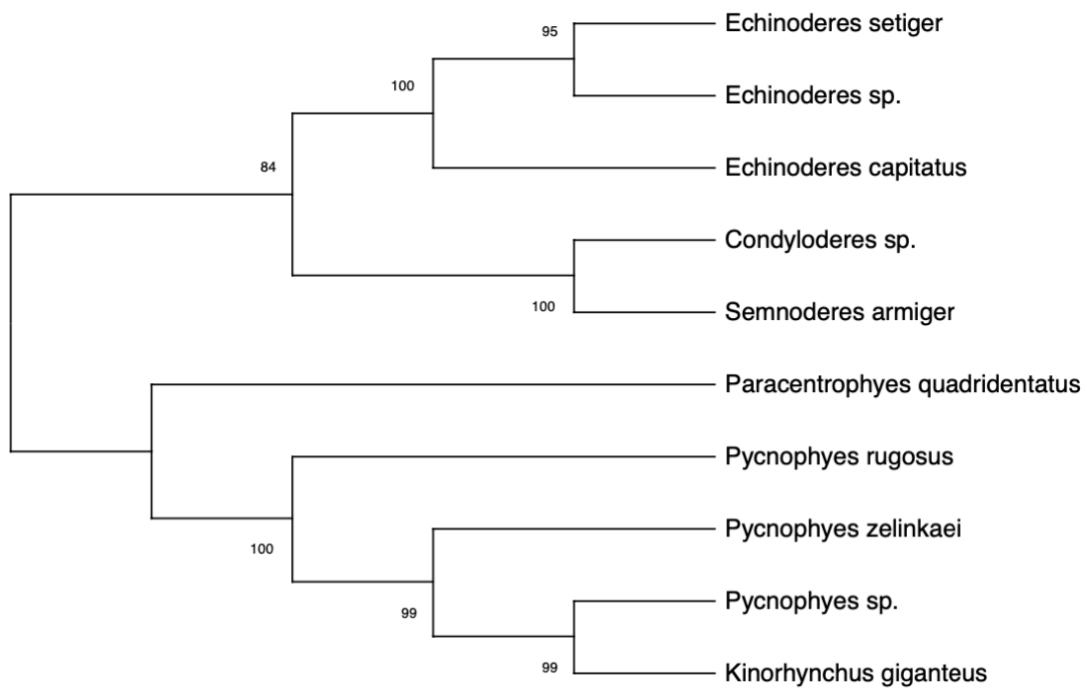
There was no statistical support for another key hypothesis of this thesis, i.e. the of number of specimens across depth zonation did not differ significantly ( $\chi^2(10) = 14.371$ ,  $p = 0.157$ ). The Bonferroni post hoc test was subsequently not conducted as no significant results were found in the Kruskal Wallis test. Nevertheless, trends can be seen in the dataset (Figure 13). Species of the genus *Echinoderes* tend to prefer depths deeper than 70 meters. As a consequence of a small dataset, all the *Echinoderes* specimens were clustered together. *Semnoderes armiger* and *Paracentrophyes quadridentatus* seem to inhabit almost the same depths, at 20-60 meters and 30-70 meters respectively. The genus of *Condyloderes* were only found between depths of 60 and 100 meters, whereas the genus of *Pycnophyes* were found at almost all sampled depths. *Pycnophyes zelinkaei* were found at depths between 20 and 40 meters, *Pycnophyes* sp. at depths of 10 to 60 meters and *Pycnophyes rugosus* between depths of 60 and 160 meters. For *Kinorhynchus giganteus* nothing can be stated in this report as only one specimen could be detected.



**Figure 13:** Trends in depth zonation of Kinorhyncha species in Møre og Romsdal, Norway 2019.

In order to assess the quality of the molecular species identification, a quick heuristic maximum likelihood (ML) analyses with nearest-neighbour-interchange (NNI) was generated with MEGAX, for the 18S sequences obtained for the sampled kinorhynch sequences (Figure 14). The resulting dendrogram makes phylogenetic sense and illustrates the

phylogenetic relationships between the Kinorhyncha species collected in the five sampled fjords Ålvundfjorden, Eidsvåg, Øksendal, Sunndalsøra and Eresfjord.



**Figure 14:** ML phylogenetic tree of 18S sequence data representing the molecularly identified Kinorhynch species collected in 2019 in selected fjords of Møre og Romsdal, Norway. Bootstrap support values based on 1000 replicates are indicated.

## 4. Discussion

The current study assessed the kinorhynch biodiversity in five targeted fjords in the Møre og Romsdal county, Norway. The selected fjords ranged from the almost non-impacted fjord Eresfjorden only experiencing local transit to Sunndalsøra, where the largest aluminium factory in Europe is based. This exploitation of the fjords as well as local environmental factors certainly affect the population structures of Kinorhyncha.

In total, 394 kinorhynch specimens were morphologically identified, but only 166 individuals could be confirmed as Kinorhyncha by molecular species identification. There are several reasons that might explain the discrepancy in the morphological and molecular approaches for kinorhynch identification. The morphological procedures applied in this study were a somewhat superficial ‘quick and dirty’ approach to rapidly screen the meiofauna samples for downstream analyses. There is very few obvious morphological characteristics in Kinorhyncha and juvenile stages of other meiofauna organisms can easily be misinterpreted. In addition, misinterpretation of morphological features of Kinorhyncha may have occurred more frequently in the initial phase of the thesis before extended experience with this phylum had been obtained. Indeed, the discrepancy of morphological and molecular identification was more frequent in the May and July samplings than in September. However, morphological misidentification did not affect this thesis other than leading to an increased workload for the molecular species identification. Other reasons for the observed discrepancy between morphological and molecular species identification may be due to the process of manually transferring the Kinorhyncha specimens from the environmental samples to small reaction tubes, and it cannot be excluded that some specimens got lost underway.

In the course of the molecular species identification it turned out that the less specific and universal primer pairs S30/5FK, 4FB/1806R and LCO1490/HCO2198 proved to be highly susceptible to cross-contamination. The targeted genes are present in all animals, and 18S in particular is highly conserved. While this on the one hand allows for designing universal primer pairs it also opens for amplification of contaminating DNA, a risk that is of even greater concern when using low annealing temperatures. The obtained sequence data confirmed to some extent the morphological misidentification issue and identified other meiofauna species such as e.g., nematodes, polychaetes and annelids. Nevertheless, these

primers allowed identification to species level, whereas the alternative and more specific primer pair of 18S-323dir/18S-823rev in some cases did not provide enough information to determine specimens to species level. During the molecular species identification, none of the sequences obtained with the CO1 primer pair LCO1490/HCO2198 provided good enough sequences to be implemented in the species determination. Most of the CO1 generated sequences came at best from contaminating material. Accordingly, only the 18S gene were used in the identification. It is also noteworthy that the DNA lab at the Natural History Museum in Oslo is a multi-user facility, which implies an increased risk of contamination between projects.

#### 4.1 Biodiversity of Kinorhyncha in the targeted fjords

In the targeted fjords in Møre og Romsdal a relatively low Kinorhyncha species richness was observed with only seven species within six genera identified. The species evenness also proved to be relatively low, with a high abundance of *Pycnophyes* species. Even with a more specific look at the distribution of species/genera identified within the classes of Homalorhagida and Cyclorhagida, the species evenness was still low. The steeper slope of the cyclorhagids compared to the homalorhagids visualized in the RAD curve (Figure 9 b) indicates a slightly skewed distribution of more homalorhagid specimens present than cyclorhagids. The list of identified Kinorhyncha species in the course of this study includes *Pycnophyes rugosus*, *Pycnophyes zelinkaei*, *Paracentrophyes quadridentatus*, *Echinoderes capitatus*, *Echinoderes setiger*, *Semnoderes armiger* and *Kinorhynchus giganteus*. Some of the specimens could not be determined to species level, but were identified to genus level, i.e. *Pycnophyes*, *Condyloderes* and *Echinoderes*. Overall, a significant differentiation in number of specimens of each species was observed between sampled fjords.

In the targeted fjords Kinorhyncha were detected with a significant differentiation in both diversity and abundance. As suspected due to the high level of human activities particularly when regarding the port facilities, Sunndalsøra showed the lowest abundance and diversity of Kinorhyncha. All specimens molecularly identified to species level were unpredictably found at depths of 70 and 100 meters. The low abundance of Kinorhyncha found in Sunndalsøra compared to the other sampling fjords might indicate limited habitat and ecological resources for meiofauna in this area due to the heavy traffic and possible pollution associated with the

aluminium factory. The factory port facilities generate soil-, water- and air pollution from the cargo ships (Trozzi and Vaccaro, 2000) transporting aluminium, which all contributes to a less favourable habitat on the ocean floor. In addition, the propeller of large cargo boats can whirl up the sediments, creating abrupt alterations of the meiofauna habitat which is regarded as one of the major factors threatening the meiofauna community (Schratzberger and Somerfield, 2020).

The side fjord of Tingvollfjorden at Øksendal is geographically very close to the Sunndalsøra sampling localities. Initially Øksendal was expected to be an ideal location in Tingvollfjorden where Kinorhyncha prospering could be detected. But only a slightly higher species richness than in Sunndalsøra was observed. Since the fjord of Øksendal locally only is affected by small-boat transit and agriculture, the data collected may indicate that the ship activity at Sunndalsøra also impact the Kinorhyncha diversity at Øksendal.

Ålvundfjord is also geographically close to Tingvollfjorden but the inner parts of the two fjords; Tingvollfjorden and Trongfjorden, are separated from each other by an extended ridge. Here, a seasonal increase in abundance was observed. Ålvundfjord represent the most diverse sampling site with nine of the observed species/genera present. The highest abundance of kinorhynchs was found at water depths of 40 meters, closely followed by 70 meters. Given that there are minor human activity at Ålvundfjord, this fjord may reflect the most natural situation in the larger Tingvollfjord area. In that respect, Ålvundfjord could potentially reflect the kinorhynch diversity in Tingvollfjord without the human alterations observed in Sunndalsøra.

Eidsvåg represented the fjord with the highest abundance of Kinorhyncha of the targeted fjords. Although with a somewhat speculative peak of abundance in July. Eidsvåg is known from previous studies (personal communication) for being a Kinorhyncha diversity hotspot, which was confirmed in this study. Eidsvåg represented the second most impacted fjord in terms of human activities and seem to contradict the initial expectation that human impact affects the abundance of Kinorhyncha, or at least might confirm that Kinorhyncha prospering is not affected by moderate human activities as how the fjord of Eidsvåg is utilized. Whether the high number of specimens could be a result of high amounts of nutrition run-off associated with a larger town and the surrounding agriculture could be an explanation to the abundance observed. However, this seem unlikely as Eresfjord and Øksendal in that case also

would yield a higher abundance of Kinorhyncha. Therefore, the elevated abundance of kinorhynchs due to the excess input of nutrition from agriculture seem unlikely but cannot be ruled out. However, the observed abundance of Kinorhyncha in Eidsvåg suggests that the level of human activity in this fjord at least does not negatively affect the Kinorhyncha diversity. It may indicate that the differentiation between the abundance of Kinorhyncha in Eidsvåg and Sunndalsøra are caused by the port activity in Sunndalsøra. If true, one may conclude that other parameters such as population size of the town/settlement closely associated with the targeted fjord is of less importance for meiofauna diversity. Furthermore, the Eidsvåg fjord has an entirely different geographical direction than all the other fjords. Eidsvåg is located in a north-south direction, and the other targeted fjords are all located in an east-west direction. If ecological parameters are affected by this geographical direction or not would only be speculations, but it is worth noticing.

Among the targeted fjords in this study, Eresfjord is regarded the least impacted fjord of human activity. Nevertheless, species richness was found to be relatively low, with only four identified species/genera. Eresfjord and Eidsvåg should in theory be highly comparable as they are both located in the end of Langfjorden, but this study provides too little information from Eresfjord to comprehensively compare these two fjords. In addition, Eresfjord is much shallower than the other fjords with the highest Kinorhyncha abundance found at a depth of 20 meters. It must also be noted that Eresfjord, together with Sunndalsøra, was only sampled during July and September, which may represent a sampling bias.

## 4.2 Seasonal variation

When availability to light and temperatures increase, the primary production is expected to grow (Brown et al., 2004). Based on the *a priori* assumption that Kinorhyncha feed on diatoms and decompose organic material, a direct consequence of the increased availability to resources from approximately March until September, would be an increased frequency of reproductively mature Kinorhyncha (Higgins and Fleeger, 1980). In that respect, this would lead to a kinorhynch population growth during this surveys time of sampling. From sampling period in May to July an increase in abundance was observed, with a roughly fourfold increase in the number of Kinorhynch specimens. With the highest recruitment period of juvenile Kinorhyncha in May to September (Higgins and Fleeger, 1980), the population is

expected to experience a peak in population density to ensure population survival during times of scarce resources. But the seasonal variation in Kinorhyncha abundance observed in the target fjords in Møre og Romsdal, is not consistent with the expected outcome from the increased availability to resources nor population growth. The September sampling revealed a slightly lowered number of molecularly identified specimens, which in turn indicate a somewhat decrease in population abundance. This could be a consequence based on technical issues described above in both sampling and molecular species identification. However, it could also be elucidated by three possible biological explanations; the possible peak in population growth a) occurred in between sampling times, b) occurred after sampling ceased or c) there is no clear peak of population growth in the Kinorhyncha population in Møre og Romsdal. Regardless, there was not detected any statistical significance for a seasonal variation in the kinorhynch community structure in Møre og Romsdal. In addition, there was also an issue with uneven sampling as Sunndalsøra and Eresfjord were sampled only in July and September, which created an inconsistency that surely affected the information obtained to detect seasonal variation. The May sampling had to be dropped for the two localities due to issues with time management of the fieldwork, which was improved in July and September. On the other hand, the relatively small dataset turned out to be a more serious issue for this study. To fully explore the potential of seasonal variation, a more comprehensive sampling period might yield a better dataset to provide information on seasonal variation in the Kinorhyncha community in Møre og Romsdal, Norway.

#### 4.3 Depth zonation

The Kinorhyncha have been recorded thriving at a wide variety of depths, ranging from the intertidal to the abyssal zones (McIntyre, 1962; Danovaro et al., 2002; Neuhaus and Blasche, 2006; Adrianov and Maiorova, 2015). The current study covered only depths until ca 160 meters, and there was no significant differentiation found between number of specimens relative to depth for the five targeted fjords. The minor differentiation in Kinorhyncha abundance depending depth zonation observed in this study can therefore only be seen as trends without sufficient statistical support. In an attempt to obtain some indication of optimal depth zonation in Møre og Romsdal, the depths were clustered together in ranges of 35 meters; 5-40, 45-80, 85-120, 125-160. But neither this clustering revealed any further insight, and a significant differentiation in Kinorhynch abundance was subsequently not

found. Here, a larger sample size is certainly required for a more powerful analysis. *Echinoderes* species as well as *Pycnophyes rugosus* seem to prefer depths below ca 60-70 meters whereas *Semnoderes armiger* and *Paracentrophyes quadridentatus* seem to prefer less deep habitats. Although currently only trends, the various Kinorhyncha species occurring in the fjords on the Norwegian northwest coast seem to have adapted to particular microenvironments.

#### 4.4 Human impact on the kinorhynch community

The assessment of human impact has in this study been focusing on the level of utilization of the fjords in respect to fishing, passage and transport, and size of the associated settlements. Other than the aluminium factory and associated activities in Sunndalsøra, there was not recorded any heavy utilization in the other fjords, where only small-boat passage was observed, and no heavy fishing nor aquaculture occurred. As reported by Schratzberger and Somerfield (2020) heavy bottom-fishing is regarded as one of the main factors threatening the meiofauna community together with invasive species. They further state that the global ocean environment is threatened by climate change. As increased temperatures, acidic waters and aerobic habitats are rapidly created, the metabolic rates change which in turn will affect the life history of the meiofauna (Schratzberger and Somerfield, 2020). The distribution of meiofauna, at least nematodes, has been found to largely depend on temperature of habitat (Wieser and Schiemer, 1977), this would be transferrable to other meiofauna as ectotherms use the external environment to regulate body temperature. As in the case of Kinorhyncha, they have been found to endure various environmental states (Horn, 1978; Neuhaus and Higgins, 2002; Kozloff, 1972) at a large range of depths throughout the world. In other words, kinorhynchs would in that respect be quite resilient to environmental change. But as anoxic environments are created as a consequence of the increased water temperatures, the survival rate of kinorhyncha are expected to decrease as a direct effect of the new anoxic habitats (Dal Zotto et al., 2016). During analysis of the environmental meiofauna samples, plastic particles were found in all samples from all of the targeted fjords. Meiofauna has been found to ingest microfibers (Gusmão et al., 2016). Although studies on this subject are limited, it represents another potential threat to the kinorhynch prospering, not only in Møre og Romsdal but also around the globe. As the ocean temperatures rise at an increasing pace and new threats alter the habitats, it is currently impossible to predict how the kinorhynch

diversity will evolve. A long-term survey of the kinorhynch community in Møre og Romsdal would yield better knowledge and understanding on how and to what degree the kinorhynch community is affected by human activity.

## 5. Conclusion

The current study on Kinorhyncha biodiversity on the northwest coast of Norway has provided information on the kinorhynch community in the fjords of Møre og Romsdal. There was a relatively high abundance and diversity of kinorhynchs in both Eidsvåg and Ålvundfjord, and a kinorhynch richness in Øksendal, Sunndalsøra and Eresfjord. A correlation was observed between human activities and abundance of Kinorhyncha species. The port facilities and possible pollution associated with the aluminium factory in Sunndalsøra, may be a main factor for low abundance of Kinorhyncha in Sunndalsøra and the geographically close side fjord of Øksendal. More extended sampling, both in terms of time and samples, is required to properly assess the community structures of kinorhynchs. The limited dataset of the current study only allows for identifying trends in the Kinorhynch community in Møre og Romsdal, Norway, and to derive hypotheses for more comprehensive future studies.

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## Supplementary Information S1 – Edited nucleotide sequences obtained for the Kinorhyncha specimens collected in Møre og Romsdal, Norway, 2019.

Order Homalorhagida;

*Pycnophyes rugosus*:

500A      S30/5FK:

GGATCTGGCGTACGGCGCGCGGTCCGCCTTCAGGCGGCTACTGCGCTCCGACGTACCTCTGGCTTCCC  
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502A      S30/5FK:

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517A      S30/5FK:

TCTTGTTTTTCAAGATTAAGCCATGCATGCTAACGTACACCGCTCCGGAAAGCAAACCGCAGAAGGCTC  
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517B      S30/5FK:

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GTCA CGC TAGTCAGCGTTA ACTTCTTAGGGAACAGGC GGCGTTAGCCGACGAAATAGATCAATAACAG  
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**525B S30/5FK:**

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**525C 18S-323dir/18S-823rev:**

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**525H 18S-323dir/18S-823rev:**

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**525I S30/5FK:**

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**531A 18S-323dir/18S-823rev:**

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**531C 18S-323dir/18S-823rev:**

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**531G 18S-323dir/18S-823rev:**

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**532B 18S-323dir/18S-823rev:**

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**532C 18S-323dir/18S-823rev:**

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**532D 18S-323dir/18S-823rev:**

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**534B 18S-323dir/18S-823rev:**

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**534C 18S-323dir/18S-823rev:**

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540A S30/5FK:

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541A S30/5FK:

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GAGGTGAAATTCTTGATCGCAGCAAGACGAACAGCGGCTAAACTTTCCAAAAA

541B S30/5FK:

CTTGTGTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTAT  
TTCGGCCAATATTGATCAATGCCTTACATGGATAACTGTGGAATTCTAGAGCTAATACATGGATCCCC  
GCACCGACCTTACGGGACGTGCGCATTTGTCAGACTAAAAACCAATCGGCTTCTCGGGGCCGTTCTGGTGA  
ACCATGATAACCTTACGCTGACCGCACGGTCTCGAACCGGGCCCTATCTTCGAATGTCCGCCCTATCAACT  
TTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGG  
AGCCTGAGAAAACGGTACCCACATCCAAGGAAGGCAGCACGCAAATTACCAACTCCGGCACGGGAGG  
TAGTGACAAGAAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAAC  
ACGAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGCGTAATTCCAGCTCCAATAGCGTATATTATG  
CTGCTGAGTAAAGCTGTAGTTGGATCTGGCTGGGGCTGCGGTCCGCTTCAGGCAGCTACTGCTCG  
GTCCCACGTACCTCTCGGTTCCCTAGTTGCTCTAGCTGAGTACTAGGGTTACCGAACGTTACTTGA  
AAAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
CTATTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTT  
GAGGTGAAATTCTTGATCGCAGCAAGACGAACAGCGGCTAAACTTTCCAAAAA

541F S30/5FK:

TGCTTCAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTATT  
TCGGCCAATATTGATCAATGCCTTACATGGATAACTGTGGAATTCTAGAGCTAATACATGGATCCCC  
CACCGACCTTACGGGACGTGCGCATTTGTCAGACTAAAAACCAATCGGCTTCTCGGGGCCGTTCTGGTGA  
CCATGATAACCTTACGCTGACCGCACGGTCTCGAACCGGGCCCTATCTTCGAATGTCCGCCCTATCAACT  
TCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGG  
GCCGTGAGAAAACGGTACCCACATCCAAGGAAGGCAGCACGCAAATTACCAACTCCGGCACGGGAGG  
AGTGACAAGAAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAAC  
CGAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGCGGTAACTCCAGCTCCAATAGCGTATATTATG  
TGTGAGTAAAGCTGTAGTTGGATCTGGCTGGGGCTGCGGTCCGCTTCAGGCAGCTACTGCTCG  
TCCCGACGTACCTCTCGGTTCCCTAGTTGCTCTAGCTGAGTACTAGGGTTACCGAACGTTACTTGA  
AAAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT

AAAATTAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGTTCT  
ATTITGTTGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTTGATCGCAGCAAGACGAACGGCGCGAAAG

**541J S30/5FK:**

TTAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGCAAAGCAAAACCGCAGAAGGCTCAGTATTCGGC  
CAATATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGACCG  
ACCTTACGGGACGTGCGCATTGTCAGACTAAAAACCAATCGGCTCTCGGGGCCCTGTGGTGAACCAG  
ATAACCTCTACGCTGACCGCACGGCTCGAACCGGGCCCTATCTTCGAATGTCCGCTTATCAACTTCGAT  
GGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCGGAGAGGGAGCCTG  
AGAAACGGCTACCATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCAGCACGGGAGGTAGTGA  
CAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACTCCTTAACGAGG  
ATCTATTGGAGGACAAGTCTGGGCCAGCACCCGCGGTAACTCCAGCTCCAATAGCGTATATTAAATGCTGCTG  
CAGTAAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCTCGGGCTCAGGGCTACTGCTGAGTGA  
ACGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGAGTGA  
TAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTATTT  
GTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGA  
AATTCTTGATCGCAGCAAGACGAACGGCGCGAAGATTGGCAAAAA

**542C 18S-323dir/18S-823rev:**

ATAACGGGTAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGA  
TCGAGGCCCTGAATTGGAATGAGTACACTTTAACTCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGC  
CAGCACCCGCGGTAACTCCAGCTCCAATAGCGTATATTAAATGCTGCTGAGTAAAAAGCTCGTAGTTGGATC  
TGGCGTACGGGCGCGCGTCCGCCCTCAGGCCGCTACTGCGCGTCCCGACGTACCTCTGGCTTCCCTAGTTG  
CTCTAGCTGAGTGA  
TAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTATTT  
GTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGA  
AATTCTTGATCGCAGCAAGACGAACGGCGCGAAGCTTTGCAAAAA

**542K S30/5FK:**

AAAGATTAAGCCATGCATGCTAAGTACACGCTCCGCAAAGCAAAACCGCAGAAGGCTCAGTATTCGGCC  
AAATATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGACCG  
ACCTTACGGGACGTGCGCATTGTCAGACTAAAAACCAATCGGCTCTCGGGGCCCTGTGGTGAACCAG  
ATAACCTCTACGCTGACCGCACGGCTCGAACCGGGCCCTATCTTCGAATGTCCGCTTATCAACTTCGAT  
GGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCGGAGAGGGAGCCTG  
AGAAACGGCTACCATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCAGCACGGGAGGTAGTGA  
CAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACTCCTTAACGAGG  
ATCTATTGGAGGACAAGTCTGGGCCAGCACCCGCGGTAACTCCAGCTCCAATAGCGTATATTAAATGCTGCTG  
CAGTAAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCTCGGGCTCAGGGGGCTACTGCTCGTCCCG  
ACGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGAGTGA  
TAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTATTT  
GTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGA  
AATTCTTGATCGCAGCAAGACGAACGGCGCGAAGCTTTGCAAAAA

**551B 4FB/1806R:**

ATGCTGCTGAGTAAAAAGCTCGTAGTTGGATCTGGCGTGGGGCGTGGCTCCGCCCTCAGGGCGCTACTG  
CTCGTCCCACGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGAGTGA  
TAGGGTTACCGGAACGTTACT  
TGAAAAAAATTAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCG  
GTCTAATTGTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGT  
TAGAGGTGAAATTCTGGATCGCAGCAAGACGAACGGCGCGAAGGCATTGCCAAAAATGTTTCTTAGTC  
AAGAGCGATAGTCGGAGGTTCGAAGGGCAGTCAGATACCGCCCTAGTTCCGACCATAAACGATGCCGACTGAC  
AATCCGCAGGAGTTATTACAATGACTCTGGGGCAGCTCCGGGAAACCTTAAGTGGACAGGTTCCGGGGGG  
AGTATGGTTGCAAAGCTCAAACCTAAAGGAATTGACGGAAGGGCACCATGGAGTGGAGGCTGCCCTA  
ATTGACTCAACACGGGGAACCTCACCGCGTCCGGACAATGTTAGGATTGACAGATTGAGAGCTTCTTAGTC  
TTCATTGGTGGTGGCATGGCGTCTTAGTTGGAGTGA  
ACTCTGGCCTACTAAATAGTCGCCGATCACCGCTTGTGCGGCCAACCTTAAGTGGGAACAGGGCGCTACACTGA  
GCCGCACGAAATAGATCAATAACAGGTCTGTGATGCCCTTAGATGTCCGGGGGCCACCCGCGCTACACTGA  
AGGAGACAGCGTGTGCTGCCCTCCGGAAGGAATGGCAACCCGATGA  
GAATTGCAATTATTCCCATGAACGAGGAATTCCAGTAAGCGCAGTCA  
GCTGGCAACAGTCGCCCGTGCCTGGGAAGATGACCAAACTGATTAGTGA  
GAGGTGTTGGACTGGCCCCTGCGAG  
CAAG

**552C S30/5FK:**

AAAGATTCAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTATTCGGCC  
AATATTCAATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGACCG  
ACCTTACGGGACGTGCGCATTTGTCAGACTAAAAACCAATCGGCTCTCAGGGCCCTATCTTCGAATGTCCCCTTATCAACTTGCAT  
GGTAGATTAAGTGCCTACCAGGTGATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTG  
AGAAACGGTACCATCAAGGAAGGCAGCAGGACGCAAATTACCCACTCCCGCACGGGAGGTAGTGA  
CAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAACGAGG  
ATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGGTAACTCAGCTCCAATAGCGTATATTATGCTGCTG  
CAGTAAAAAGCTCGTAGTTGGATCTGGCGTGCAGGCGTCCGCCTCAGGGCTACTGCTCGTCCG  
ACGTACCTCTGGCTTCCCTAGTTGCTTAGCTGAGTGAATAGGGTACCGGAACGTTACTTGAAAAAA  
TAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTATT  
GTTGGTTCCGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCAGTAGAGGTGA  
AATTCTGGATCGCAGCAAGACGAACAGCTGCGAAAGCTTTGCCAAGAAA

**553A 18S-323dir/18S-823rev:**

GAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCAACATCCAAGGAAGGCAGCAGGCACGCA  
AATTACCCACTCCGGCACGGGAGGTAGTACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATT  
GGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGGTAA  
TCCAGCTCCAATAGCGTATATTAAATGCTGCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGCGCG  
GGTCCGCCTCAGGGCTACTGCGCGTCCGACGTACCTCTGGCTTCCCTAGTTGCTCTAGTGTGAGTGAC  
TAGGGTACCGGAACGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGCCCTGCGCTGAATAGTGGT  
ATGGAATAAA

**553D S30/5FK:**

TTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTATT  
TCGGCCAATATTCAATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCG  
CACCGACCTTACGGGACGTGCGCATTTGTCAGACTAAAAACCAATCGGCTCTCAGGGCCCTGTGGTGA  
CCATGATAACCTCTACGCTGACCGCACGGCTCGAACCGGCGCCTATCTTCGAATGTCCGCCTTATCAACTT  
TCGATGGTAGATTAAGTGCCTACCAGGTGATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGA  
GCCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGACGCAAATTACCCACTCCCGCACGGGAGGT  
AGTACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAA  
CGAGGATCTATTGGAGGACAAGTCTGGGCCAGCACCCGCGGTAACTCAGCTCCAATAGCGTATATTATG  
TGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTGCAGGCGTCCGCCTCAGGGCTACTGCTCG  
TCCCACGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGTGAGTGAATAGGGTACCGGAACGTTACTTGAA  
AAAATTAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
ATTITGTTGGTTCCGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCAGTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACAG

**553E 4FB/1806R:**

CAGATCGAGTGAGACCGCGCGTGAUTGCTTGAGCAGCAGCCTCGTGCAGTCTCCAATCAGCTATGCTATATG  
CATGCTGCAGTTAATAGGCTCGTAGGTTGACTCCGGTACGGGCTTGCAGGCTTCAAGGGCTACTG  
CTCGTCCGACGTACCTCTCGGCTTCCCTAGTGGCTCTAGTGTGAGTGAUTAGGGTACCGGAACGTTACTT  
TGAAAAAAATTAGAGTGTCAAAGCAGGTGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCG  
GTTCTATTGGTTGGTTCCGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTCG  
TAGAGGTGAAATTCTGGATCGCAGCAAGACGAAGGGCGGAAGGCATTGCCAAAATGTTTCTTAGTC  
AAGAGCGATAGTCGGAGGTTGAGGCGATCAGATACGCCCTAGTCCGACCATAAACGATGCCACTGAC  
AATCCGCAGGAGTTATTACAATGACTCTCGGGCAGCTCCGGAAACCTTAAGTGGACAGGTTCCGGGGGG  
AGTATGGTTGCAAAGCTAAACTTAAAGGAATTGACCGAAGGGCACCACCATGGAGTGGAGCCTGCGGCTTA  
ATTGACTCAACACGGGAACCTCACCCGGTCCGGACAACGCTAGGATTGACAGATTGAGAGCTTTCTGA  
TTCATTGGTTGGTGGTGCATGCCCTTCTAGTTGGTAGTGTGATTGTTAATTCCGATAACGAACGAG  
ACTCTGGCTACTAAATAGTCCCGATCACGCGTTGTCGGCGCCAACCTCTAGGGGAACAGCGCGCTTA  
GCCGCACGAAATAGATCAATAACAGGTCTGTGATGCCCTAGATGTCCGGGGCGCACGCGCTACACTGA  
AGGAGACAGCGTGTGCTGCCGTTCCGGAAGGAATGGCAACCCGATGAATCCCTTCTGCTAGGGATTGG  
GAATTGCAATTATTCCCATGAAACGAGGAATTCCCAAGTAAGCCGAGTCATCAGCTCGTGTGATTACGTCCT  
GCCCTTGTACACACCGCCCGTGCCTACTACAGATTGAATGATTAGTGAAGGTGTTGGACTGCCCTGCGAG  
GCTGGCAACAGTCGCCGGTGCCTGGGAA

**553M S30/5FK:**

CTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTAT  
TCGGCCAATATTCAATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCC  
GCACCGACCTTACGGGACGTGCGCATTTGTCAGACTAAAAACCAATCGGCTCTCAGGGCCCTGTGGTGA  
ACCATGATAACCTCTACGCTGACCGCACGGTCTCGAACCGGCGCCTATCTTCGAATGTCCGCCTTATCAACT  
TTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGAATCAGGGTTGATTCCGGAGAGGG

AGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCACGCCAAATTACCCACTCCGGCACGGGAGG  
TAGTGACAAGAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAA  
ACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCCGCGTAATTCCAGCTCAATAGCGTATATTAAATG  
CTGCTGCAGTAAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCGTGCAGGTCCGCCTCAGGCGGCTACTGCTC  
GTCGGACGTACCTCTCGGTTCCCTAGTTGCTCTTAGCTGAGTGAAGTGGACTAGGGTTACCGGAACGTTACTTGA  
AAAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
CTATTGTTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCCTTA  
GAGGTGAAATTCTGGATCGCAGCAAGACGAACAGCGAGCGAAAGCTTTGCCAAA

**558A 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGAGGACAAGTCTGGTGC  
CAGCACCCCGCGTAATTCCAGCTCAATAGCGTATATTAAATGCTGCTGCAGTAAAAAGCTGTAGTTGGATC  
TGGCGTGCAGGGCGTGCAGGTCCCGCTCAGGCGGCTACTGCGCTCCGACGTACCTCTCGGTTCCCTAGTTG  
CTCTAGCTGAGTGAAGTGGTACCGGAACGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCCCTCAT  
GCCTGAATAGTGGTGCATGGAATAA

**559C 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGAGGACAAGTCTGGTGC  
CAGCACCCCGCGTAATTCCAGCTCAATAGCGTATATTAAATGCTGCTGCAGTAAAAAGCTGTAGTTGGATC  
TGGCGTACGGGCGCGCGTCCCGCTCAGGCGGCTACTGCGCTCCGACGTACCTCTCGGTTCCCTAGTTG  
CTCTAGCTGAGTGAAGTGGTACCGGAACGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCCCTCGT  
GCCTGAATAGTGGTGCATGGAATAA

**559D S30/5FK:**

CTTGTCTAAAGATTAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAACCGCAGAAGGCTAGTAT  
TTCGGCCAATATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCC  
GCACCGACCTTACGGGACGTGCGCATTGTCAGACTAAAAACCAATCGGCTTCTCGGGGCCCTGTGGTGA  
ACCATGATAACCTCTACGCTGACCGCACGGTCTCGAACCGGGCGCCTATCTTCAATGTCCGCCCTATCAACT  
TTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGG  
AGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCACGGCACGCAAATTACCCACTCCGGCACGGGGAGG  
TAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAA  
ACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCAATAGCGTATATTAAATG  
CTGCTGCAGTAAAAAGCTGTAGTTGGATCTGGCGTGCAGGTCCCGCTCAGGCGGCTACTGCTC  
GTCCCGACGTACCTCTCGGTTCCCTAGTTGCTCTAGCTGAGTGAAGTGGACTAGGGTTACCGGAACGTTACTTG  
AAAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
CTATTGTTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCCTTA  
GAGGTGAAATTCTGGATCGCAGCAAGACGAACAGCTGCGAAAGCTTTGCCAAAAA

**559E 18S-323dir/18S-823rev:**

AACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCAGG  
CACGCAAATTACCCACTCCGGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCC  
TGTAAATTGGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGAGGACAAGTCTGGTGCAGCACCCG  
CGGTAACTCAGCTCAATAGCGTATATTAAATGCTGCTGCAGTAAAAAGCTCGTAGTTGGATCTGGCGTACG  
GGCGCGCGTCCGCTCAGGCGGCTACTGCGCTCCGACGTACCTCTCGGCTTCCCTAGTTGCTCTAGCT  
GAGTGACTAGGGTACCGGAACGTTACTTGAAAAAATTAGAGTGTCAAAGCAGG

**566E S30/5FK:**

TCTTCAAAGATTAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAACCGCAGAAGGCTAGTATTTC  
GGCCAATATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCCG  
ACCGACCTTACGGGACGTGCGCATTGTCAGACTAAAAACCAATCGGCTTCTCGGGGCCCTGTGGTGAAC  
CATGATAACCTCTACGCTGACCGCACGGTCTCGAACCGGGCGCCTATCTTCAATGTCCGCCCTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGTACCATCCAAGGAAGGCAGCACGGCACGCAAATTACCCACTCCGGCACGGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAA  
GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCAATAGCGTATATTAAATGCT  
GCTGCAGTAAAAAGCTGTAGTTGGATCTGGCGTGCAGGTCCCGCTCAGGCGGCTACTGCTCGT  
CCCGACGTACCTCTCGGTTCCCTAGTTGCTCTAGCTGAGTGAAGTGGACTAGGGTAACCGGAACGTTACTTGAAA  
AAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATACTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTA  
TTTGTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCCTAGAG  
GTGAAATTCTGGATCGCAGCAAGACGAACAGCTGCGAAAGCATTGCAA

**566G S30/5FK:**

TTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTATTCGGCCAATATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGACCCGACCTTACGGGACGTGCGCATTTGTCAGACTAAAACCAATCGCTCTCAGGGCCCTATCTTCGAATGTCCCCTTATCAACTTTGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAGGAGCAGCACGCCAAATTACCCACTCCGGCACGGGGAGGTAGTGAAGAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGGCCAGCACCCGCGGTAACTCAGCTCCAATAGCGTATATTAAATGCTGCTCAGTAAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCGTCCGCTCAGGGCTACTGCTCGTCCGACGTACCTCTCGGCTTCCCTAGTTGATGGTACCTCCAGGAAACGTTACTTGAAAAAAATAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGAATTCTGGATCGCAGCAAGACGAACAGCTGCGAAAGCTTT

**566H 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGCTACCACATCCAAGGAAAGCAGGACCGCAAAATTACCCACTCCGGCACGGGGAGGTAGTGAACAAGAAATAACAATACAGGACTCTTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGAGGACAAGTCTGGTGCAGCTAAAAGCTCGTAGTTGGATCTGGCGTCCGCTCAGGGCGCTACTGCTCGTCCGACGTACCTCTCGGCTTCCCTAGTTGCTTAGCTGAGTGAATAGGGTTACCGGAACGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTCTGAATAGTGGTCATGGAATAA

**575A S30/5FK:**

CTTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTATTTTCGGCCAATATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGCACCCGACCTTACGGGACGTGCGCATTTGTCAGACTAAAACCAATCGCTCTCAGGGCCCTATCTTCGAATGTCCGCTTATCAACTTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAAGGAGCAGCACGCCAAATTACCCACTCCGGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAACACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCTCTGCTGAGTAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCGTCCGCTTCAGGCGGCTACTGCTCGTCCCGACGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGAGTGAATAGGGTTACCGGAACGTTACTTGAAAGAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGAGGTGAAATTCTGGATCGCAGCAAGACGAAC

**575C S30/5FK:**

TGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTATTTGGCCAATATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGCACCGACCTTACGGGACGTGCGCATTGTCAGACTAAAACCAATCGCTCTCAGGGCCCTATCTTCGAATGTCCGCTTATCAACTTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAAGGAGCAGCACGCCAAATTACCCACTCCGGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCTGCTCAGTAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCGTCCGCTTCAGGCGGCTACTGCTCGTCCCGACGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGAGTGAATAGGGTTACCGGAACGTTACTTTGAAAGAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACAGCAGCGAAAGCTTTGCCAAGAAA

**577A S30/5FK:**

CTTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGCAAAACCGCAGAAGGCTCAGTATTTTCGGCCAATATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGCACCCGACCTTACGGGACGTGCGCATTGTCAGACTAAAACCAATCGCTCTCAGGGCCCTATCTTCGAATGTCCGCTTATCAACTTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAAGGAGCAGCACGCCAAATTACCCACTCCGGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCTGCTCAGTAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCGTCCGCTTCAGGCGGCTACTGCTCGTCCCGACGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGAGTGAATAGGGTTACCGGAACGTTACTTTGAAAGAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGCTGCTGAGTAAAAGCTCGTAGTTGGATCTGGCGTGCAGGGCGTCCGCTTCAGGCGGCTACTGCTC

GTCCCCACGTACCTCGGTTCCCTAGTTGCTCTAGCTGAGTGACTAGGGTTACCGGAACGTTACTTGA  
AAAAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGCATGGAATAATGGAACAAGACCTCGTT  
CTATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTA  
GAGGTGAAATTCTGGATCGCAGCAAGACGAACGAGCGCGAAAGCTTT

**577B S30/5FK:**

TGCTTAAAGATTAAGCCATGCATGTCTAACGTACACGCTCCGGCAAAGCAAACCGCAGAAGGCTCAGTATT  
CGGCCAATATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATCCCCGC  
ACCGACCTTACGGGACGTGCGCATTGTCAGACTAAAACCAATCGGCTTCTCGGGGCCATTCTGTTGAAC  
CATGATAACCTTACGCTGACCCACGGCTCGAACCGGCCATTCTGCAATGTCCGCTTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGACCGCAAATTACCCACTCCCGCACGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGATTGGAATGAGTACACTTAAATCCTTAA  
GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCT  
GCTGCAGTAAAGCTCGTAGTTGGATCTGGCGTGCAGCGCTTCAAGGCGCTACTGCTCGT  
CCCGACGTACCTCTGGCTTCCCTAGTTGCTCTAGCTGAGTCACTAGGGTTACCGAACGTTACTTGA  
AAATTAGAGTGTCAAAGCAGGTGATCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTA  
TTTGTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAG  
GTGAAATTCTGGATCGCAGCAAGACGAACGGCGCAAAGCTTTG

*Pycnophyes zelinkaei:*

**500E 4FB/1806R**

AAAAACACTCGTAGTCGGATTGAGGGACACGGCCTTGCAGCTGAAGTCTGGGGATGGCAACGT  
CTCGGACCGAACTGCCTGGCTCTCTTCTAGGGTCTGTTATCTGAGTCTAGGGTACCGGGAAATGTTACT  
TTGAAAAAAATTAGAGTGTCAAAGCAGGCATCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCT  
GGTCTATTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCCGGGATCCGTATTGCTGC  
GTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACTACTCGCAAAGCATTGCAAGAATGTTTCTATTAG  
CCAAGAACGAAAGTCGGAGGTTCGAAGGCATCAGATACGCCCTAGTCCGACCATAACGATGCCACTG  
ACAATCCGAGGAGTTTACAATGACTCTCGGGCAGCTCCGGAAACCAAAGTGTGGGGGGGG  
GAGTATGGTCAAAGCTGAAACTTAAAGGAATTGACGGAAGGGCACCACCAAGGAGTGGAGGCTCGGCTTA  
ATTGACTCAACACGGAAACCTCACCGGGTCCGGACACTGTAAGGATTGACAGATTGAGAGCTTTCTGA  
TTCAGTGGTGGTGGTGCATGGCGTTCTTAGTTGGTGGAGTATTGTCGGTTAATTCCGATAACGAACGAG  
ACTCTGGCTACTAAATAGTCGCCGATCACACGTTGCGCGCTACTCTCTAGGGGAAACAAGCAGCTTATA  
GCTGCACGAAATAGAGCAATAACAGGTCTGTGATGCCCTAGATGTCCCCGGCGCACGCGCGCTACACTGA  
AGGAGGCAGCGTGTGATTACCCCTTCCGGAAGGAATGGTAACCCATGAATCCTTGTGCTAGGGACTG  
GCGCTTGCAATTGTTGCCATGAACGAGGAATCCAGTAAGCGCGAGTCATAAGCTCGTGTGAATACGTCC  
GTGCCCTTGTACACACCACCCCGTGCCTACTACAGAGTGAGTGAATAACAGAGGCCCTGGACTGGCCCCTGCG  
AGGCTGGCAACAGTACGCCGGTGCAG

**500G 4FB/1806R:**

GCACGTCCCGACGTACCTCTCGGTTCCCTAGTTGCTCTAAATGAGTGACTAGGGTTACCGGAATGTTACT  
TTGAAAAAAATTAGAGTGTCAAAGCAGGCATCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCT  
GGTCTATTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCCGGGGATCCGTATTGCTGC  
GTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACTACTCGCAAAGCATTGCAAGAATGTTTCTATTAG  
CCAAGAACGAAAGTCGGAGGTTCGAAGGCATCAGATACGCCCTAGTCCGACCATAACGATGCCACTG  
ACAATCCGAGGAGTTTACAATGACTCTCGGGCAGCTCCGGAAACCAAAGTGTATGGTGGGGGG  
GAGTATGGTCAAAGCTGAAACTTAAAGGAATTGACGGAAGGGCACCACCAAGGAGTGGAGGCTCGGCTTA  
ATTGACTCAACACGGAAACCTCACCGGGTCCGGACACTGTAAGGATTGACAGATTGAGAGCTTTCTGA  
TTCAGTGGTGGTGGTGCATGGCGTTCTTAGTTGGTGGAGTATTGTCGGTTAATTCCGATAACGAACGAG  
ACTCTGGCTACTAAATAGTCGCCGATCACACGTTGCGCGCTACTCTCTAGGGGAAACAAGCAGCTTATA  
GCTGCACGAAATAGAGCAATAACAGGTCTGTGATGCCCTAGATGTCCCCGGCGCACGCGCGCTACACTGA  
AGGAGGCAGCGTGTGCTTACCCCTTCCGGAAGGAATGGTAACCCATGAATCCTTGTGCTAGGGACTG  
GCGCTTGCAATTGTTGCCATGAACGAGGAATCCAGTAAGCGCGAGTCATAAGCTCGTGTGAATACGTCC  
CTGCCCTTGTACACACCACCCCGTGCCTACTACAGATTGAATGATTAGTGAGGTCTTGGACTGGCCCCTGCG  
AGGCTGGCAACAGTACGCCGGTGCAG

**522B S30/5FK:**

TTGTTTAAAGATTAAGCCATGCATGTCTAACGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAA  
TCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCG  
CCCTGACCTCGCGGAAGGGCGCATTTGTCAGACTAAAACCAATCGGCTTCCGGGGCTCAGTGGTGAACC  
ATGATAACCTACGCTGACCGCACGGTCACGCACCGGGCCATCTTCGAATGTCCTATCAACTTIC

GATGGTAGGTTAATGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCCAAATTACCCACTCCCGCACGGGAGGTAG  
TGACAAGAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCCTTAACG  
AGGATCTATTGGAGGACAAGTCTGGTGCCAGCACCCCGCGTAATTCCAGCTCAATAGCGTATTTAATGCTG  
CTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCCTCACCTCAGGTGGCGACTGCACGTC  
CCGACGTACCTCTCGCTTCCCTAGITGCTCTAAGTGAGTACTAGGGTACCGGAATGTTACTTGAAAAA  
AATTAGAGTGTCAAAGCAGGGATGCCATGAAATAGTGGCATGAAATAATGAAACAAGACCTCGGTCTAT  
TTTGGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCGTTAGAGG  
TGAAATTCTGGATCCAGCAAGACGAACACTGCGAA

**524C S30/5FK:**

CTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAATCAG  
TTAGTATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCCGCCCT  
GACCTCGGGAAAGGGCGATTGTCAGACTAAAACCAATCGGCTCCGGCGTCAGTGGTAACCATG  
ATAACCTCTACGCTGACCGCACGGTCACGCACCCGGCGCTATCTTCGAATGTCCTTATCAACTTCGAT  
GGTAGGTTAAATGCCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGGCTG  
AGAAACGGTACACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGAGGTAGTGA  
CAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTAACGAGG  
ATCTATTGGAGGACAAGTCTGGGCCAGCACCCGGTAATTCCAGCTCAATAGCGTATTTAATGCTGCTG  
CAGTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCCTCACCTCAGGTGGCGACTGCACGTC  
ACGTACCTCTCGGCTTCCCTAGTTGCTCTAAGTGACTAGGGTACCGGAATGTTACTTGAAAAAA  
TAGAGTGTCAAAGCAGGCATGCCATGAAATAGTGGCATGAAATAATGAAACAAGACCTCGGTCTATT  
GTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCGTTAGAGGTGA  
AATTCTGGATCGCAGCAAGACGAACACTGCGA

**541I S30/5FK:**

AGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAATCAGTTAGTATT  
TTGATCAATTGCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCCGCCCTGACCTCGGG  
AAAGGGCGATTGTCAGACTAAAACCAATCGGCTCCGGCGCTATCTTCGAATGTCCTTATCAACTTCGATGGTAGGTTAAA  
TGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGCTA  
CCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGAGGTAGTGAAGAAATAAC  
AATACAGGACTCTTCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAG  
GACAAGTCTGGGCCAGCACCCGGTAATTCCAGCTCAATAGCGTATTTAATGCTGCTGCAGTTAAAAG  
CTCGTAGTTGGATCTGGCGTACGGGCTTGCCTCACCTCAGGTGGCGACTGCACGCTCCGACGTACCTCTC  
GGCTTCCCTAGTTGCTCTAAGTGACTAGGGTACCGGAATGTTACTTGAAAAAAATTAGAGTGTCA  
AAGCAGGGATGCCATGAAATAGTGGCATGAAATAATGAAACAAGACCTCGGTCTATTGTTGGTTCCG  
GAACACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCGTTAGAGGTGAATTCTGGAT  
CGCAGCAAGACGAACACTGCGAA

**544B 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGAGGTAGTGAACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGGTAACTCCAGCTCAATAGCGTATTTAATGCTGCTGCAGTTAAAAGCTCGTAGTTGGATC  
TGGCGTACGGGCTTGCCTCACCTCAGGTGGCGACTGCACGCTCCGACGTACCTCTCGGCTTCCCTAGTTG  
CTCTTAAGTGACTAGGGTACCGGAATGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTGCATGGAATAA

**547E 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGAGGTAGTGAACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGGTAACTCCAGCTCAATAGCGTATTTAATGCTGCTGCAGTTAAAAGCTCGTAGTTGGATC  
TGGCGTACGGGCTTGCCTCACCTCAGGTGGCGACTGCACGCTCCGACGTACCTCTCGGCTTCCCTAGTTG  
CTCTTAAGTGACTAGGGTACCGGAATGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTGCATGGAATAA

**547F S30/5FK:**

AGTAAAACCGCACAAGGCTCATTAATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCA  
ATTCTAGAGCTAATACATGGATACCCGCCCTGACCTCGCGAAAGGGCGATTGTCAGACTAAAACCAATC  
GGCTTCCGGGCCGTTAGTGGTAACCATGATAACCTCCACGCTGACCGCACGGTCACGACCCGGCGCCSTAT  
CTTCGAATGTCCTTATCAACTTCGATGGTAGGTTAAATGCCATGGTATAACGGGAACGGGAGC  
ATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCAGGCACGCAAA

TTACCCACTCCCAGGACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGG  
AATGAGTACACTTTAACGAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCCGCGGTAAATTG  
CAGCTCCAATAGCGTATATTATGCTCTGCAGTTAAAAGCTGTAGTTGGATCTGGGTACGGGCTTGC  
TCCAGCTTCAGCTGGCAGTCACGTCGGACGTCACCTCTCGGTTCCCTAGTTGCTTTAACTGAGTGACTA  
GGGTTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGCGATGCCCTGAATAGTGGTGCATGG  
AATAATGGAACAAGACCTCGGTCTATTGTTGGTTCCCGAACAGGAGGTAATGATTAAGAGGGACTGCC  
GGGGCATCCGTATTGCTGCGTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAACATTG  
CCAAGAATGTTTCATTAGCCAAGAACGAAAGTCGGAGGTCGAAGGGCATCAGATACCCCTAGTCGAC  
CATAAACGATGCCAACTGACAATCCGAGGAGTTATTACAATGACTCTCGGGCAGCTCCGGAAACCAAA  
GTGTTGGGTTCCGGGGGGAGTATGGTGCAAAGCTAAAGGAATTGACGGAAAGGGCACCACCCAGG  
AGTGGAGCCTGCGGCTTAATTGACTCAACACGGAAACCTCACCGGGTCCGGACACTGTAAGGATTGACAG  
ATTGAGAGCTCTTCTTGATTCACTGGTGGTGGCATGCCGTTCTAGTTGGTGGAGTGATTGCTGGTT  
AATTCCGATAACGAACGAGACTCTGGCTACTAAATAGTCGCCGATCACACGGTGTGGCGTAACCTCTTA  
GGGAAACAAGCAGCTTATAGCTGCAGGAAATAGAGCAATAACAGGGTGTGATGCCCTAGATGTCCGGC  
CGCACGGCGCTACACTGAAGGAGGCAGCGTGTGATTACCCCTTCCGGAAAGGAATGGTAACCCCATGAATC  
CTTTCTGTGCTAGGGACTGGCCTTGCAATTGTCGCCATGAACGAGGAATTCCAGTAAGCGCGAGTCATAA  
GCTCGTGTGATTACGTCCTGCC

555H S30/5FK:

CTTGTCTTAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGGAAAGTAAAACCGCACAAGGCTCATTTAA  
ATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGGAAAGGGCGATTGTCAAGACTAAAAACCAATCGGCTTCGGGCCGTTAGTGGTGAAC  
CATGATAACCTGTACGCTGACCGCACGGTCACGCACCGGGGCCATCTTCGAATGTCTGCCATTCAACTTT  
CGATGGTAGGTTAAATGCCCTACCATGGTGATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGTACCCACATCCAAGAACACAGCAGGCACGCAAATTACCCACTCCGGCACGGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAAC  
GAGGATCTATTGGAGGACAAGTCTGGGCCAGCACCGGGTAATTCCAGCTCCAATAGCGTATATTAATGCT  
GCTGCAGTTAAAAGCTGAGTGGATCTGGCGTACGGGCTTGCCTACCGTCCACCTCAGCTGGCAGTCACGT  
CCCGACGTACCTCTCGGCTTCCCTAGTTGCTCTTAAGTGGACTAGGGTACCGGAATGTTACTTGAAA  
AAATTAGAGTGGTCAAAGCAGGGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT  
ATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCCATTGAGA  
GGTGAATTCTTGGATCGCAGCAAGCGAACTACTCGCAAAGCATTTGCCAA

555M 4FB/1806R:

ATGCTGCTGCAGTAAAAAGCTCGTAGTGGATCTGGCGTACGGGCTGCGGTCCAGCTTCAGCTGGCGACTG  
CACGTCCCACGTACCTCTCGGCTTCCCTAGTTGCTCTTAAGTGACTAGGGTTACCGGAATGTTACTT  
TGAAAAAAATTAGAGTGTCAAAGCAGGCATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCG  
GTTCTATTTGTTGGTTCCCGAACACGGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCG  
TTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGAAGCATTGCAAGAAATGTTTCTTATTAGC  
CAAGAACGAAAGTCGGAGGTTCGAAGGCATCAGATACGCCCTAGTTCCGACCATAACGATGCCAACTGA  
CAATCCGAGGAGTTATTACAATGACTCTCGGGCAGCTCCCGGAAACCAAAAGTGTGGGTTCCCCGGGG  
AGTATGGTTGCAAAGCTGAAACTAAAGGAATTGACGGAAGGGCACACCAGGAGTGGAGCCTGCGCTTAA  
TTGACTCAACACGGGAAACCTCACGGGTCGGACACTGTAAGGATTGACAGATTGAGAGCTTTCTTGAT  
TCAGTGGTGGTGGTGCATGGCGTTCTAGTTGGTGGAGTGATTGCTGGTTATTCCGATAACGAACGAGA  
CTCTGGCCTACTAAATAGTCGCCGATCACACGGTGTGATGCCCTAGATGTCGGCCGACGCGCTACACTGAA  
CTGCACGAAATAGAGCAATAACAGGCTGTGATGCCCTAGATGTCGGCCGACGCGCTACACTGAA  
GGAGGCAGCGTGTGATTACCTTTCCCGAAGGAATGGTAACCCCATGAATCCTTCTGTCTAGGGACTGG  
CGCTTGCATTGTCGCATGAACGAGGAATCCAGTAAGCGCGACTCATAGCTCGTGTGATTACGTCCC  
TGCCCTTGACACACCGCCCGTGCCTACTACAGATTGAATGATTAGTGGAGGTCTTGGACTGGCCCTGCGA  
GGCTGGCAACAGTCGCGCCGGTGCATGGGAAGATGACCAAACTTGATTATTAGAGGAAGTAAAGTCAA  
CTTGATTATTAGAGGAAGTAAAGTC

556B S30/5FK:

CTTGTCTTAAAGATTAAGCCATGCATGCTAAGTACACGCCGGAAAGTAAAACCGCACAAGGCTCATTAATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAACATGGATACCCGCCCTGACCTCGCGGAAAGGGCGCATTGTCAGACTAAAAACCAATCGGCTTCCGGGCCGTTAGTGGTGAACCATGATAACCTCACGCTGACCGCACGGTCACGCCACCGGGGCCATCTTCGAATGTCTGCCATTACAACCTTCCGATGGTAGGTTAAATGCCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGGAGGTA GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAAACGAGGATCTATTGGAGGACAAGTCTGGGCCAGCACCCGGTAATTCCAGCTCCAATAGCGTATATTAATGCTGCTGCAGTTAAAAGCTGTTGGATCTGGCGTACGGGCTTGCGCTCAGCTCAGCTGGCAGTCACGTCCCGACGTACCTCTCGGCTTCCCTAGTTGCTCTAACATGAGTGAATAGGGTACCGGAATGTTACTTGAAGAATTAGAGTGTCAAAAGCAGCGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT

ATTTTGTGTTCCCGAACACGGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACAACTACTGCGAAAGCATTGCCAAGAA

573A S30/5FK:

CTTGTGTTAAAGATTAAGCCATGCATGTCTAAGTACCGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAA  
ATCAGTTAGTATTGATCAATGCCCTACATGGATACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCGCATTTGTCAGACTAAAACCAATCGGCTCCGGCCGTTCACTGGTGAAC  
CATGATAACCTCCACGCTGACCCGACGGTCACGCACCGGCGCCTATCTTCGAATGTCTGCCCTATCAACTTT  
CGATGGTAGGTTAAATGCCCTACCATGGTGATAACGGGTAACGGGGAACTAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGACGCAAATTACCCACTCCGGCACGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTAA  
GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCT  
GCTGAGTAAAGCTGTTGGATCTGGTGCAGCAGGCCCTGAGCTGGTCCAGCTCAGCTGGGACTGACG  
CCCGACGTACCTCTGGCTTCCCTAGTTGCTCTAACTGAGTACTAGGGTTACCGGAATGTTACTTTGAAA  
AAATTAGAGTGTCAAAGCAGGCGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCT  
ATTTGTTGGTTCCCGAACACGGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACAAACTACTGCGAAAGCATTGCCA

*Pycnophyes* sp.:

500 A 4FB/1806R:

GGATCTGGCGTACGGCGCGCGTCCGCCCTCAGGCGGCTACTGCGCGTCCCACGTACCTCTCGGCTTCCC  
TAGTTGCTCTAGCTGAGTACTAGGGTTACCGGAACGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGC  
GCTCGCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGC  
GAGGTAATGATTAAGAGGGACTGCCGGGCGTCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGC  
AAAGCAGCAGCGGCCACAGCGTTGACATGAATGTTCTCACTAGTCAAGAGCGATAGTCGGAGGTTGAA  
GCGATCAGATACCGCCCTAGTCGACCATAACGATGCCACTGACAATCCGAGGAGTTATTACAATGACT  
CTGCGGGCAGCTCCGGAAACCTTAAGTGATGGGTTCCGGGGAGATGGTTGCAAAGCTCAAACCTAA  
AGGAATTGACGGAAGGGCACCACCATGGAGTGGAGCCTGCGGTTAATTGACTCAACACGGGGAACCTCAC  
CAGGTCCGGACAACGTTAGGATTGACAGATTGAGAGCTCTTCTTGATTGTTGGTGGTGCATGCCGTT  
CTAGTTGGGAGTGATTGCTGGTTAATTGATAACGAACGAGACTCTGGCTACTAAATAGTCGCTGA  
TCCTCAACCGCGTCCCTCGTGGCGTCAGCGCTAGTCAGCGTTAACTTCTAGGGGAACAGCGCGCTTAG  
CCGCACGAAATAGATCAATAACAGGTCTGTGATGCCCTAGATGCTCTGGCGCAGCGCGCTACACTGAAG  
GAGACAGCGTGTGCTGCTGCTGAGGAAACGGCAACCCGCTGAATCCCTTCTGCTAGGGATTGGA  
ATTGCAATTGTTCCCATGAACGAGGAATTCCAGTAAGCGCGAGTCATCAGCTCGTGTGATTACGTCCCTG  
CCCTTGTACACACCGCCCGTCACTACAGATTGATTAAGGTTAGTGGACTGGCACCCCTCGAG  
GCTGGCAAC

508B 4FB/1806R:

CGGTAAATCCAGCTCAATAAGCCGTATATTAAATGCTGCTGCAGTTAAAAGCTGTTGGGATCTGGCGTACG  
GGCTTGGGTCCACCTCAGGTGGCGACTGCACGTCCCGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGCT  
GAGTACTAGGGTTACCGGAATGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGCATGCCCTGAATAGT  
GGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGGATCGCAGCAAGACGAACTACTGCGA  
GGACTGCTGGGGGATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACTACTGCGA  
AACGATTGCCAAAATGTTCTAGCCAAGAACGAAAGTCGGAGGTTGCAAGGGCAGTACAGATACCGCCCT  
AGTCCGACCATAACGATGCCACTGACAATCCGAGGAGTTTACAATGACTCTGCGGGCAGCTCCCGG  
GAAACCAAAGTCTATGGGTTCCGGGGAGATGGTTGCAAAGCTGAAACTTAAAGGAATTGACGGAAGGGC  
ACCACCAAGGAGTGGAGCCTGCGGTTAATTGACTCAACACGGGAAACCTCACCGGGTCCGGACACTGTAAG  
GATTGACAGATTGAGAGCTCTTCTTGATTGCTGGTGGTGCATGGCGTTCTAGTTGGGAGTGATT  
TGTCTGGTTAATTGATAACGAACGAGACTCTGGCTACTAAATAGTCGTCGATCACACGTTGTCGGCGCTA  
ACTTCTTAGGGGAACAAGCAGCTTATAGCTGCACGAAATAGAGCAATAACAGGTCTGTGATGCCCTAGATGT  
CCCGGGCCGACGCGCTACACTGAAGGAGGCAGCGTGTGCTTACCTTTCCGGAAGGAATTGGTAACCCCC  
ATGAATCCTTTCTGCTAGGGACTGGCGCTGCAATTGTCGCCATGAACGAGGAATTCCAGTAAGCGCGA  
GTCATAAGCTCGTGTGATTACGTCCCTGCCCTTGTACACACCGCCCGTCACTACAGATTGATTA  
GTGAGGTCTTGGACTGGCCCTCGAGGGCTGGCAACAGTCGCGCCGGTGTGATGGGAAGATGACCAAAAC  
CTTGATATTAAAGAGGAAGTTAAAAGGTGCTGTAACA

508E 4FB/1806R:

GGTTGGATCTGGCGTACGGGCTTGGTCCACCTCAGGTGGCGACTGCACGTCCGGCGTACCTCTCGGCTT  
CCCTAGTTGCTCTAGCTGAGTACTAGGGTTACCGGAATGTTACTTGAAAAAAATTAGAGTGTCAAAGCA  
GGCGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGTTCCGGAACA  
CGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAG

CAAGACGAACTACTCGCAAAGCATTGCCAAAATTTTCACTAGCCAAGAACGAAAGTCGGAGGTTCGAA  
GGCGATCAGATACCGCCCTAGTCCGACCATAAACGATGCCGACTGACAATCCGCAGGAGTTATTACAATGAC  
TCTGCGGGCAGCTCCGGAAACCAAAGTCTATGGGTTCCGGGGAGTATGGTTGCAAAGCTGAAACCTAA  
AGGAATTGACGGAAGGGCACCACCAAGGAGTGGAGGCTGCGGCTTAATTGACTCAACACGGAAACCTCAC  
GGGTCCGGACACTGTAAGGATTGACAGATGAGAGCTTTCTGATTCACTGGTTGGTGGCATGGCCGTT  
CTTAGITGGTGGAGTGATTGCTGGTAATTCCGATAACGAACAAGACTCTGGCCTACTAAATAGITCGITCGA  
TCACACGTTGTCGGCCTAACTCTTAGGGAAACAAGCAGCTTATAGCTGCACGAAATAGAGCAATAACAGGT  
CTGTTATGCCCTAGATGTCGGCCGACCGCCTACACTGAAGGAGGCAGCGTGTGCTTACCCCTTTCC  
GGAAGGAATGGGTAACCCCATGAATCCTTCTGCTAGGGACTGGCGCTTGAATTGTCGCCATGAACGAG  
GAATTCCCAGTAAGCGCAGTCATAAGCTGTGATTACGTCCTGCCCTTGACACACCGCCCGTCGCTA  
CTACAGATTGAATGATTAGTGGAGGCTTGACTGGCCCTGCGAGGCTGGCAACAGTCGCCGGT

**514B 4FB/1806R:**

AAGCTCGTAGTGGATATGTGACCGGGCTGAGGTGCCAGCGTTCCAGGGGGACTGCACCGTTCCCTGC  
CGTACCTCTCGCTTCCCTCAGCTGCTTAGTGAAGTACTTAGGCTTACCGGAATGTTACTTGTAAAA  
AATTAGAGTGTCAAAAGCAGGCGATCGCTGAATAGTGGTGCATGGAATAATGAAACAAGACCTCGGTTCTAT  
TTTGTGTTGGATCCGGAAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTTATTGCTGCGTTAGAGG  
TGAAATTCTGGATCCAGCAAGACGAACACTGCGAAAGCATTGCAAAATGTTTCAATTAGCCAAGAAC  
GAAAGTAGGAGGTTCGAAGGGCAGTACAGATACCGCCCTAGTCCGACCATAACGATGCCGACTGACAATCCG  
CAGGAGTTATTACAATGACTCTGGGAGCTTCCGGAAACCAAAGTCTATGGGTTCCGGGGAGTATGG  
TTGCAAAGCTGAAACTAAAGGAATTGACCGAAGGGCACCACCAAGGAGTGGAGCCTGCGCTTAATTGACT  
CAACACGGAAACCTCACCGGTCGGACACTGTAAGGATTGACAGATTGAGAGCTTCTGATTCACTGG  
TTGGTGGTGCATGGCGTTCTAGTGGAGTGATTGCTGGTTAATCCGATAACGAGACTCTGGC  
CTACTAAATAGITCGTCGATCACCGTGTGGCCTAACTCTAGGGAAACAAGCAGCTTATAGCTGCACG  
AAATAGAGCAATAACAGGTCTGTGATGCCCTAGATGTCGGCCGACCGCCTACACTGAAGGAGGA  
GCGTGTGCTTACCCCTTCCGGAAAGGAATGGTAACCCATGAATCCTTCTGCTAGGGACTGGCGCTTGCA  
ATTGTTGCCATGAACGAGGAATTCCAGTAAGCGCAGTCATAAGCTGTGATTACGTCCTGCCCTTG  
TACACACCGCCCGTGCCTACTACAGATTGAATGATTAGTGGAGGCTTGACTGGCCCTGCGAGGCTGGCA  
ACAGTCGCCGGTGTGCATG

**514D S30/5FK:**

CTTGTCTAAAAGATAAGCCATGCATGCTAAGTACACGCTCCGGAAAGTAAAACCGCACAAGGCTCATTA  
AATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACC  
CGCCCTGACCTCGCGAAAGGGCGCTTGTCACTGAGACTAAAACCAATCGCTTCCGGCGTACAGTGGTGA  
CCATGATAACCTCTACGCTGACGGCACGGCACCGGCGCTATCTTCAATGTCTGCCTTATCAACTT  
TCGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGA  
GCCGAGAAACGGTACACATCCAAGGAAGGCAGCAGGACCGCAAATTACCCACTCCGGCACGGGGAGGT  
AGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGAAATGAGTACACTTTAAATCCTTAA  
CGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCCAATAGCGTATATTAGC  
TGCAGTTAAAAGCTGTAGTGGATCTGGTACGGCTTGCCTCACCTCAGGTGGCAGTCACG  
TCCCGCGTACCTCTCGCTTCCCTAGTGTCTTAGTGTAGTACTAGGGTTACCGGAATGTTACTTTGAA  
AAAATTAGAGTGTCAAAGCAGCGATGCCCTGAATAGTGGCATGGAATAATGAAACAAGACCTCGGTT  
TATTGTTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCGTATTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGGCAAGAAT

**519A 4FB/1806R:**

GCTGCTATGTTAATAAAGCTATTAGTCGAGTTGGGGTACGGCTTGCAGGCTTCCACCTCAGGGTGGCGGCTT  
GCAACGTCCCAGCGTTACCTCGGGCTTCTATGTTGCTTTAGTGTGAGTTGGATCTAGGGTGCACGC  
GAGATAGTCTACTTGAaaaaaaATTAGGAGTGATTCAAAGCAGGCAGATGCCCTGGAATAGTGA  
GGAATAATGGAACAAGACCTCGGTTCTATTGTTGTTCCGAAACACGAGGTAAATGATTAAGAGGGACTGC  
TGGGGCATCCGTATTGCTGCTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATT  
TGCCAAAAATGTTTCACTAGCCAAGAACGAAAGTAGGAGGTTGCAAGGGCAGTACCGCCCTAGTCCG  
ACCATAACGATGCCACTGACAATCCGCAAGGAGTTTACAATGACTCTGCCAGCTCCGGAAAC  
AAAGTCTATGGGTTCCGGGGAGTATGGTGAAAGCTAAAGGAATTGACGGAAAGGGCACCACC  
AGGAGTGGAGCCTCGGGCTTAATTGACTCAACACGGAAACCTCACCGGTCCGACACTGTAAGGATTGA  
CAGATTGAGAGCTTTCTGATTCACTGGTGGTGCATGCCGTTCTAGTGTGAGTGATTGCT  
GTTAATTCCGATAACGAACGAGACTCTGGCTACTAAATAGTGTGATCACAGCTGCGCTAATTCT  
TAGGGGAACAAGCAGCTTATAGCTGCACGAAATAGAGCAATAACAGGTCTGTGATGCCCTAGATGTC  
GCCGACGCGCGTACACTGAAGGAGGCAGCGTGTGCTTACCCCTTCCGGAAAGGAATGGTAACCCATGA  
ATCCCTTCTGCTAGGGACTGGCCTGCAATTGTCGCCATGAACGAGGAATTCCAGTAAGCGCAGTC  
TAAGCTCGTGTGATTACGTCCTGCCCTTGACACACCGCCCGTGCATTCCAGATCGGTATTAGTGA  
GTACTGGACTGGCCCTGCGAGGCT

**519C 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCCGACGGGGAGGTAGTACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGGTAATTCCAGCTCCAATAGCGTATATTATGCTGCTGCAGTTAAAAGCTGTAGTTGGATC  
TGGCGTACGGGCTTGCCTCACCTCAGTGGCGACTGCACGTCCCACGGTACCTCTCGGCTTCCCTAGTTG  
CTCTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTCATGGAATAA

**520G 4FB/1806R:**

TTGCTCTTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCGAT  
CGCCTGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTCTATTGTTGTTCCGAAACAGCAGGAT  
AATGATTAAGAGGGACTGCTGGGGCATCGTATTGCTCGTTAGAGGTGAAATTCTTGGATCGCAGAACAG  
GAACACTCGAAGAACGATTGCAAAATGTTTCAATTGCAAGAACGAAAGTCGGAGGTTCGAAGGCGAT  
CAGATACCCCTAGTCCGACCATAACGATGCCACTGACAATCCGCAAGGAGTTATTACAATGACTCTGC  
GGCAGCTCCCGGAAACCAAAGTCTATGGGTTCCGGGGAGTATGGTCAAAGCTGAAACTTAAAGGAA  
TTGACGGAAGGGACCACCAAGGAGTGGAGCCTGCCTTAATTGACTCAACACGGGAAACCTCACCGGTC  
CGGACACTGTAAGGATTGACAGATTGAGAGCTCTTGTATTGACTAGTGGTTGGTCATGGCCTTCTAGT  
TGGTGGAGTGATTGCTGGTTAATTCCGATAACGAACGAGACTCTGGCTACTAAATAGTCGATCACA  
CGTTGTCGGCCTAACCTTAAAGGGAAACAAGCAGCTTATAGCTGCACGAAATAGAGCAATAACAGGCTGTG  
ATGCCCTAGATGTCCCGGGCGCACGCCGCTACACTGAAGGAGGCAGCGTGTGCTTACCCCTTCCGGAAG  
GAATGGGTAACCCATGAATCCTTCTGCTGAGGGACTGGCGCTTGCATAATGTTGCCATGAACGAGGAATT  
CCAGTAAGCGCAGTCATAAGCTGTGATTACGTCCTGCCCTTGACACACCGCCGTCGCTACTACA  
GATTGAATGATTAGTGGAGGTCTTGGACTGGCCCTGCAGGGCTGGCAACAGTCGCCGCGTGTGATGGGA  
A

**520Q S30/5FK**

CTGTCTCAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAA  
ATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCCCTTGTCAACTAAAAACCAATCGGTTCCGGCGTACAGTGGTAAC  
CATGATAACCTCTACGCTGACCGCACGGTCACGCACCGCGGCTATCTTGAATGTCTGCCTTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCACGCCAAATTACCAACTCCGGCACGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAAAC  
GAGGATCTATTGGAGGACAAGTCTGGTCCAGCAGCGGTAATTCCAGCTCCAATAGCGTATATTATGCT  
GCTCAGTTAAAAGCTGTAGTTGATCTGGTACGGCTTCCACCTTCAGGTGGCAGTGCACGT  
CCCGCGTACCTCTGGCTTCCAGTGTGCTTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAAA  
AAATTAGAGTGTCAAAGCAGGCATGCCGATAATGTTGAGTGAATAATGGAACAAGACCTCGGTTCT  
ATTGGTGTGTTCGGAACACGAGGTAATGATTAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAG  
GTGAAATTCTGGATCGCAGCAAGACGAACTACTCGGAAAGCATTGCGAA

**521G 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCCGACGGGGAGGTAGTACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGGTAATTCCAGCTCCAATAGCGTATATTATGCTGCTGCAGTTAAAAGCTGTAGTTGGATC  
TGGCGTACGGGCTTGCCTCACCTCAGTGGCGACTGCACGTCCCACGGTACCTCTCGGCTTCCCTAGTTG  
CTCTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCGATCGC  
CTGAATAGTGGTCATGGAATAA

**521HH S30/5FK:**

TTAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAATCAGT  
TAGTATTGATCAATGCCTTACATGGATAACTGTGGAATTCTAGAGCTAATACATGGATACCGCCCTG  
ACCTCGCGAAAGGGCCCTTGTCAACTAAAAACCAATCGGTTCCGGCGTACAGTGGTAACCATGAT  
AACCTCTACGCTGACCGCACGGTCACGCACCGCGGCTATCTTGAATGTCTGCCTTATCAACTTCGATGG  
TAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGGCTGAG  
AAACGGCTACCACATCCAAGGAAGGCAGCACGGCAGGAAATTACCAACTCCGGCACGGGAGGTAGTGACA  
AGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAACGAGGAT  
CTATTGGAGGACAAGTCTGGTCCAGCACCGCGGTAACTCCAGCTCCAATAGCGTATATTATGCTGTC  
GTAAAAAAGCTGTAGTTGATCTGGTACGGGCTTGCCTACCTTCAGGTGGCAGTGCACGTCCCAC  
GTACCTCTGGCTTCCAGTTGCTTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAAAAAATT  
GAGTGTCAAAGCAGGCATGCCGATAATGTTGAGTGAATAATGGAACAAGACCTCGGTTCTATTGTT  
TGTTTCCGGAACACGAGGTAATGATTAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGAAA  
TTCTGGATCGCAGCAAGACGAACTACTCGGAA

**521UU S30/5FK:**

AAAGATTAAGCCATGCATGTCTAAGTACCGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAATCAGTTA  
GTATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCGCCCTGAC  
CTCGCGAAAGGGCGCTTGTCAACTAAAACCAATCGGCTCCGGCCGTACAGTGGTGAACCATGATA  
ACCTCTACGCTGACCCACGGTCACGCACCGCGGCCATCTTCGAATGTCTGCCTATCAACTTTCGATGGT  
AGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGA  
AACGGCTACCACATCCAAGGAAGGCAGCACGAAATTACCCACTCCCGCACGGGGAGGTAGTGACAA  
GAAATAACAATACAGGACTCTTCGAGGCCGTAAATTGGAATGAGTACACTTAAATCCTTAACGAGGATC  
TATTGGAGGACAAGTCTGGTCCAGCACCCCGGTAAATTCAAGCTCCAAATAGCGTATATTATGCTGCTGCAG  
TTAAAAAGCTGTAGTTGGATCTGGTACGGGCTTGCCTCACCTCAGGTGGCAGTCACGTCCCAGCG  
TACCTCTCGGTTTCCCTAGTTGCTTAGTGTAGTGACTAGGGTTACCGGAATGTTACTTGAAGAAATTAG  
AGTGTCAAAGCAGGCATGCCGTAAATGTTGAGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGTT  
GGTTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGAAAT  
TCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAAGAAACTACTTCATT

**521YY S30/5FK:**

TTGTTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAT  
ATCAGTTAGTATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCGC  
GCCCTGACCTCGCGAAAGGGCGCTTGTCAACTAAAACCAATCGGCTCCGGCCGTACAGTGGTGAAC  
CATGATAACCTCTACGCTGACCCACGGTCACGCACCGCGGCCATCTTCGAATGTCTGCCTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCACGGCAAAATTACCCACTCCCGCACGGGGAGGTAA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCGTAAATTGGAATGAGTACACTTAAATCCTTAAC  
GAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCCGGTAAATTCAAGCTCCAAATAGCGTATATTATGCT  
GCTCAGTTAAAAGCTGTAGTTGGATCTGGTACGGGCTTGCCTCACCTCAGGTGGCAGTCACGT  
CCCGCGTACCTCTCGGTTTCCCTAGTTGCTTAGTGTAGTGACTAGGGTTACCGGAATGTTACTTGAAGAA  
AAATTAGAGTGTCAAAGCAGGCATGCCGTAAATGTTGAGTGCATGGAATAATGGAACAAGACCTCGGTTCT  
ATTITGTTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
GGTGAATTCTGGATCGCAGCAAGACGAACACTGCGAA

**521ZZ S30/5FK:**

TGCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAT  
CAGTTAGTATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCGC  
CCTGACCTCGCGAAAGGGCGCTTGTCAACTAAAACCAATCGGCTCCGGCCGTACAGTGGTGAACCA  
TGATAACCTCTACGCTGACCGCACGGTCACGCACCGCGGCCATCTTCGAATGTCTGCCTATCAACTT  
ATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCC  
TGAGAAACGGTACCCACATCCAAGGAAGGCAGCACGGCAAAATTACCCACTCCCGCACGGGGAGGTAGT  
GACAAGAAATAACAATACAGGACTCTTCGAGGCCGTAAATTGGAATGAGTACACTTAAATCCTTAACGA  
GGATCTATTGGAGGACAAGTCTGGTCCAGCACCCCGGTAAATTCAAGCTCCAAATAGCGTATATTATGCTC  
TGCAGTTAAAAGCTGTAGTTGGATCTGGTACGGGCTTGCCTCACCTCAGGTGGCAGTCACGT  
CCGGCGTACCTCTCGGTTTCCCTAGTTGCTTAGTGTAGTGACTAGGGTTACCGGAATGTTACTTGAAGAA  
ATTAGAGTGTCAAAGCAGGCATGCCGTAAATGTTGAGTGCATGGAATAATGGAACAAGACCTCGGTTCTATT  
TTGTTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
GAAATTCTGGATCGCAGCAAGACGAACACTGCGAA

**521Å S30/5FK:**

TTGTTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAT  
TCAGTTAGTATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCGC  
CCTGACCTCGCGAAAGGGCGCTTGTCAACTAAAACCAATCGGCTCCGGCCGTACAGTGGTGAAC  
ATGATAACCTCTACGCTGACCGCACGGTCACGCACCGCGGCCATCTTCGAATGTCTGCCTATCAACTT  
GATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAAACGGTACCCACATCCAAGGAAGGCAGCACGGCAAAATTACCCACTCCCGCACGGGGAGGTAG  
TGACAAGAAATAACAATACAGGACTCTTCGAGGCCGTAAATTGGAATGAGTACACTTAAATCCTTAACG  
AGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCCGGTAAATTCAAGCTCCAAATAGCGTATATTATGCTG  
CTGCAGTTAAAAGCTGTAGTTGGATCTGGTACGGGCTTGCCTCACCTCAGGTGGCAGTCACGT  
CCGGCGTACCTCTCGGTTTCCCTAGTTGCTTAGTGTAGTGACTAGGGTTACCGGAATGTTACTTGAAGAA  
ATTAGAGTGTCAAAGCAGGCATGCCGTAAATGTTGAGTGCATGGAATAATGGAACAAGACCTCGGTTCTATT  
TTGTTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
TGAAATTCTGGATCGCAGCAAGACGAACACTGCGAA

**521DDD S30/5FK:**

TTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAATCAGT  
TAGTATTCAATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCGCCCTG  
ACCTCGCGAAAGGGCGCTTGTCAACTAAAACCAATCGGCTCCGGCCGTACAGTGGTGAACCATGAT

AACCTCTACGCTGACCGCACGGCACGCACCGCGGCCATCTTCGAATGTCTGCCTTATCAACTTCGATGG  
TAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAACTAGGGTTGATTCCGGAGAGGGAGCCTGAG  
AAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGAGGTAGTGACA  
AGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATGAGTACACTTTAACCTTAACGAGGAT  
CTATTGGAGGACAAGTCTGGTGCAGCACCGCGGTAAATTGGATGAGTACACTTTAACCTTAACGAGGAT  
GTAAAAAAGCTCGTAGITGGATCTGGCGTACGGGCTGCGGTCCACCTCAGGTGGCGACTGCACGTCCCCGC  
GTACCTCTCGGCTTCCCTAGTTGCTCTAGTGGTACTAGGGTTACCGGAATGTTACTTTGAAAAAAATTA  
GAGTGTCAAAGCAGGCGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTG  
TGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTAGAGGTGAAA  
TTCTGGATCGCAGCAAGACGAACACTGCGAAGATTGCAAAAAA

**538E S30/5FK:**

CTGTCTCAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGCAAAGTAAAACCGCACAGGCTCATTA  
AATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACC  
CGCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGGCTTCCGGGCCGTACAGTGGTGAAC  
CCATGATAACCTCTACGCTGACCGCACGGTACCGCACCCGGCGCTATCTTCGAATGTCTGCCTTATCAACTT  
TCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGG  
GCCTGAGAAACGGTACACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGAGG  
AGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATGAGTACACTTTAACCTTAA  
CGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGGGTAACTCCAGCTCCAATAGCGTATATTATGC  
TGCTGCAGTTAAAAGCTCGTAGTTGATCTGGCGTACGGGCTGCGGTCCACCTCAGGTGGCGACTGCACG  
TCCC CGGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGGTACTAGGGTTACCGGAATGTTACTTTGAA  
AAAATTAGAGTGTCAAAGCAGGCGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
TATTTGTTGGTTCCGGAACAGGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAGCATTGCAAA

**538F 18S-323dir/18S-823rev:**

ATAACGGGTAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCAACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCACTCCCGCACGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGGATGAGTACACTTTAACGAGGATCTATTGAGGACAAGTCTGGTGC  
CAGCACCCCGGGTAATTCCAGCTCCAATAGCGTATATTGCTGCTGAGTTAAAAGCTCGTAGTTGGATC  
TGGCGTACCGGCTTGGTCCACCTCAGGTGGCGACTGCACCTCCGGCGTACCTCTCGGCTTCCCTAGTTG  
CTCTAGTGTGACTAGGGTACCGGAATGTTACTTTGAAAAAAATTAGAGTGTCAAAGCAGGCGATCGC  
CTGAATAGTGGTGCATGGAATAAA

**544A S30/5FK:**

CTGTCTAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGCAAAGTAAAACCGCACAGGCTCATTA  
ATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACC  
GCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGGCTTCCGGGCCGTACAGTGGTGAAC  
CATGATAACCTCTACGCTGACCGCACGGTACCGCACCCGGCGCTATCTTCGAATGTCTGCCTTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGG  
CCTGAGAAACGGTACACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGAGG  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATGAGTACACTTTAACCTTAA  
GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGGGTAACTCCAGCTCCAATAGCGTATATTATGC  
GCTGCAGTTAAAAGCTCGTAGTTGATCTGGCGTACGGGCTTGGTCCACCTCAGGTGGCGACTGCACGT  
CCCGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGGTACTAGGGTACCGGAATGTTACTTTGAAA  
AAATTAGAGTGTCAAAGCAGGCGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
ATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTGCGAAAG

**544I S30/5FK:**

AAACCGCACAAGGCTCATTAAATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCT  
AGAGCTAATACATGGATACCGCCCTGACCTCGCGGAAGGGCGCTTGTCAAGACTAAAACCAATCGGCTT  
CCGGGCCGTACAGTGGTGAACCATGATAACCTCTACGCTGACCGCACGGCACCCGGCGCTATCTTC  
GAATGTCTGCCTTATCAACTTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAG  
GGTTGATTCCGGAGAGGGAGCGTGGAGAAACGGCTACACATCCAAGGAAGGCAGCAGGACCGCAAATTAC  
CACTCCGGCACGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATG  
AGTACACTTTAAATCTTAAAGGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGGGTAACTCCAGC  
TCCAATAGCGTATATTGCTGCTGAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGGCGTCCA  
CCTCAGGTGGCGACTGCACGTCGGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGTGAGTGA  
TACCGGAATGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGCGATGCCCTGAATAGTGGTGCATGGAATA  
ATGGAACAAGACCTCGGTTCTATTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGG  
CATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGAtCGCAGCAAGACGAACACTGCGAAGCATTGCAAA

**547A S30/5FK:**

CTTGTGTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAT  
ATCAAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAAACCAATCGGCTCCGGGCCGTACAGTGGTGAAC  
CATGATAACCTCTACCGCTGACCGCACGGTCACGCACCGCGGCCATCTTCGAATGTCTGCCTTATCAACTTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCACGCAAATTACCACTCCCGCACGGGAGGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAAAC  
GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCAATAGCGTATATTATGCT  
GCTGCAGTTAAAAGCTGTAGTTGGATCTGGTACGGGCTTGCAGGTACCGTGGCAGTCACGT  
CCCGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGACTAGGGTACCGGAATGTTACTTGA  
AAATTAGAGTGTCAAAGCAGGGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCT  
ATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGT  
GGTGAATTCTGGATCGCAGCAAGACGAACACTGCAGAA

**547B S30/5FK:**

TGTTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAT  
CAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCCGC  
CCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAAACCAATCGGCTCCGGGCCGTACAGTGGTGAACCA  
TGATAACCTCTACGCTGACCGCACGGTCACGCACCGCGGCCATCTTCGAATGTCTGCCTTATCAACTTTCG  
ATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGGCC  
TGAGAAACGGCTACCACATCCAAGGAAGGCAGCACGGCACGCAAATTACCACTCCCGCACGGGAGGGTAGT  
GACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAAACGA  
GGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCAATAGCGTATATTATGCTGC  
TGCAGTTAAAAGCTGTAGTTGGATCTGGTACGGGCTTGCAGGTACCGTGGCAGTCACGT  
CCGGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGACTAGGGTACCGGAATGTTACTTGA  
ATTAGAGTGTCAAAGCAGGGATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTATT  
TTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGT  
GAAATTCTGGATCGCAGCAAGACGAACACTGCAGAA

**547D S30/5FK:**

CGGCAAAGTAAAACCGCACAAGGCTCATTAATCAGTTAGTATTGATCAATGCCTTACATGGATAACT  
GTGGCAATTCTAGAGCTAATACATGGATAACCGCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAAA  
CCAATCGGCTTCCGGCGTACAGTGGTGAACCATGATAACCTCTACGCTGACCGCACGGTCACGCACCGCG  
GCCTATCTTCGAATGTCTGCCTTATCAACTTTGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAAC  
GGGGAAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCA  
CGCAAATTACCACTCCGGCACGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTG  
TAATTGGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGGAGGACAAGTCTGGTGCAGTAAAAGCTGTAGTTGGATCTGGTACCGG  
GTAATTCCAGCTCAATAGCGTATATTATGCTGCTGAGTTAAAAGCTGTAGTTGGATCTGGTACCGG  
CTTGCAGTCCACCTCAGGTGGCAGTCACGTCCGGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGA  
GTGACTAGGGTACCGGAATGTTACTTTGAAAAAATTAGAGTGTCAAAGCAGGGCAGTCGCTGAATAGTGG  
TGCATGGAATAATGGAACAAGACCTCGGTTCTATTGGTGGTTCCGGAACACGAGGTAATGATTAAGAGGG  
ACTGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAA  
GCATTGCCAAGAATGTTTCTATTAGCCAAGAACGAAAGTCGGAGGTTCGAAGGCAGTCAGATAACGCCCTAG  
TTCGACCATAAACGATGCCAGTCACATCCGCAAGGAGTTATTACAATGACTCTCGGGCAGCTCCCGGGA  
AACCAAAGTCTATGGTCCGGGGAGTATGGTGCACAGCTAAAGGAAATTGACCGAAGGGCAG  
CACCAGGAGTGGAGCCTCGGGCTTAATTGACTCAACACGGGAAACCTCACCGGTCGGACACTGTAAGGA  
TTGACAGATTGAGAGCTTTCTGATTGAGTCAGTGGTGGTGCATGGCGTTCTAGTTGGTGGAGTGATTG  
TCTGGTTAATTCCGATAACGAACGAGACTCTGGCTACTAAATAGTTGCTGAGTCACACGGTGTGGCGCTAA  
CTTCTTAGGGGAACAAGCAGCTTATAGCTGACGAAATAGAGCAATAACAGGTCTGTGATGCCCTTAGATGTC  
CCGGCCGACGCCGCTACACTGAAGGAGGAGCGCGTGTGCCTACCCCTTCCGGAAGGAATGGTAACCCC  
ATGAATCCTTCTGCTAGGGACTGGCGCTTGCACACCGCCCCGCGTACTACAGATTGAAATGATTTA  
GTCATAAGCTCGTGTGATTACGCCCCCTGCGAGGCTGGCAACAGTCGCGCCGGTGTGCATGGGAAGA

**547G S30/5FK:**

TCAAATGCTGTCTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGC  
TCATTAATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATG  
GATAACCGCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAAACCAATCGGCTCCGGGCCGTACAGT  
GGTGAACCATGATAACCTCTACGCTGACCGCACGGTCACGCACCGCGGCCATCTTCGAATGTCTGCCTTA  
TCAACTTCTGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGA  
GAGGGAGGCTGAGAAACGGCTACCAAGGAAGGCAGCACGGCAGGCAAATTACCACTCCCGCACGG  
GGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAAC  
CTTAAACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGCGTAATTCCAGCTCAATAGCGTATAT  
TAATGCTGCTGAGTTAAAAGCTGTAGTTGGATCTGGTACGGCTTGCAGGTGGCAGTCAC

TGCACGTCCGGCGTACCTCTGGTTCCTAGTTGCTCTAGTGACTAGGGTTACCGGAATGTTAC  
TTGAAAAAATTAGAGTGTCAAAGCAGGGCATGCCCTGAATAGTGGTGATGGAATAATGGAACAAGACCT  
CGGTTCTATTGTTGGTTCCGAAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTG  
CGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAGAA

**547H S30/5FK:**

AGTAAAACCGCACAAGGCTCATTAATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCA  
ATTCTAGAGCTAATACATGGATACCGCCCTGACCTCGCGAAAGGGCGCTTGTGAGACTAAAAACCAATC  
GGCTTCGGGCCGTACAGTGGTAACCATGATAACCTCTACGCTGACCGCACGGTACCGCACCCGGCGGCCAT  
CTTCGAATGTCGCCCTATCAACTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAA  
ATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAACCGCTACCCATCCAAGGAAGGCAGCAGGCACGCAA  
TTACCCCACCTCCGGCACGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGG  
AATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGGCGTAATT  
CAGCTCAAATAGCTATATTAGCTGCTGAGTAAAGCTCGTAGTTGGATCTGGTACCGGCCCTGGG  
TCACCTTCAGGTGGCGACTGCACTGCCCGCTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGAGTGACTA  
GGGTTACCGGAATGTTACTTGA AAAAATTAGAGTGTCAAAGCAGGGCATGCCCTGAATAGTGGTGATGG  
AATAATGGAACAAGACCTCGGTCTATTTGGTTCCGAAACACGAGGTAAATGATTAAGAGGGACTGCTG  
GGGCATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTG  
CCAAA

**547J S30/5FK:**

TCTTGTCTTAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGCAAAGTAAAACCGCACAAGGCTCATTA  
AATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACC  
CGCCCTGACCTCGCGAAAGGGCGCTTGTGAGACTAAAAACCAATCGGCTTCCGGGCCGTACAGTGGTGA  
CCATGATAACCTCTACGCTGACCGCACGGTACCGCACCCGGCGCTATCTTCGAATGTCGCCCTATCAACT  
TCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAACTCAGGGTTGATTCCGGAGAGGG  
GCCTGAGAACGGTACCCATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGAGG  
AGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAAATGAGTACACTTAAATCCTTAA  
CGAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGGGTAAATTCCAGCTCAAATAGCTATATTAG  
TGCTGAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCCTACCTCAGGTGGCGACTGCACG  
TCCCGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGACTAGGGTTACCGGAATGTTACTTGA  
AAAATTAGAGTGTCAAAGCAGGGCATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
TATTTGTTGGTTCCGAAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAA

**547K S30/5FK:**

TTGTCTTAAAGATTAAGCCATGCATGCTAAGTACACGCTCCGCAAAGTAAAACCGCACAAGGCTCATTA  
TCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCG  
CCCTGACCTCGCGAAAGGGCGCTTGTGAGACTAAAAACCAATCGGCTTCCGGGCCGTACAGTGGTGA  
ATGATAACCTCTACGCTGACCGCACGGTACCGCACCCGGCGCTATCTTCGAATGTCGCCCTATCAACT  
GATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAACTCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAACGGTACCCATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGAGG  
TGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAAATGAGTACACTTAAATCCTTAA  
AGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGGTAATTCCAGCTCAAATAGCTATATTAGCT  
CTGAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCCTACCTCAGGTGGCGACTGCACG  
CCGGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGTGACTAGGGTTACCGGAATGTTACTTGA  
AAAATTAGAGTGTCAAAGCAGGGCATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
TTGTTGGTTCCGAAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAG  
TGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAA

**547L S30/5FK:**

AAAGATTAAGCCATGCATGCTAAGTACACGCTCCGCAAAGTAAAACCGCACAAGGCTCATTA  
GTATTCTTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCGGCCGTGAC  
CTCGCGGAAAGGGCGCTTGTGAGACTAAAAACCAATCGGCTTCCGGGCCGTACAGTGGTGAACCATGATA  
ACCTCTACGCTGACCGCACGGTACCGCACCCGGCGCTATCTTCGAATGTCGCCCTATCAACT  
AGATTAAAGTGCCTACCATGGTATAACGGGTAACGGGAACTCAGGGTTGATTCCGGAGAGGGAGG  
AACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGAGGG  
GAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAAATGAGTACACTTAAATCCTTAA  
AGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGGTAATTCCAGCTCAAATAGCTATATTAGCT  
TTAAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCCTACCTTCAGGTGGCGACTGCACGT  
TACCTCTCGGCTTCCCTAGTTGCTCTAGTGACTAGGGTTACCGGAATGTTACTTGA  
AAAATTAGAGTGTCAAAGCAGGGCATGCCCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTT  
GGTTCCGAAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAA

**547M S30/5FK:**

TCTTGTTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
AATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACC  
CGCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGCTTCCGGGCCGTACAGTGGTGA  
CCATGATAACCTCTACGCTGACCGCACGGCACGCCCCGGCTATCTTCGAATGTCTGCCTTATCAACTT  
TCGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGA  
GCCCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGGAGG  
AGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATGAGTACACTTTAACCTTAA  
CGAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGGCTAATTCCAGCTCAATAGCGTATATTAA  
TGCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGGTCCACCTTCAGGTGGCGACTGCACG  
TCCC GGCGTACCTCTCGGCTTCCCTAGTTGCTTCTAGCTGAGTGA  
AAAATTAGAGTGTCAAAGCAGCGATGCCCTGAATAGTGGTGCATGGATAATGAAACAAGACCTCGGTT  
TATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGGATCCGTATTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGCAAAGCATTGCAAAA

**548C S30/5FK:**

CTTGTCTTCAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
AATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACC  
CGCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGCTTCCGGGCCGTACAGTGGTGA  
CCATGATAACCTCTACGCTGACCGCACGGCACGCCCCGGCTATCTTCGAATGTCTGCCTTATCAACTT  
TCGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGA  
GCCCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGGAGG  
AGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATGAGTACACTTTAACCTTAA  
CGAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGGCTAATTCCAGCTCAATAGCGTATATTAA  
TGCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGGTCCACCTTCAGGTGGCGACTGCACG  
TCCC GGCGTACCTCTCGGCTTCCCTAGTTGCTTCTAGCTGAGTGA  
AAAATTAGAGTGTCAAAGCAGCGATGCCCTGAATAGTGGTGCATGGATAATGAAACAAGACCTCGGTT  
TATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGGATCCGTATTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGCAAAGCATTGCAAAA

**550A S30/5FK:**

TTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
TAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCGCCCTG  
ACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGCTTCCGGGCCGTACAGTGGTGAACCATGAT  
AACCTCTACGCTGACCGCACGGCACGCCCCGGCTATCTTCGAATGTCTGCCTTATCAACTTCA  
TAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGGCTGAG  
AAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGGAGGTA  
AGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATGAGTACACTTTAACCTTAA  
CTATTGGAGGACAAGTCTGGTCCAGCACCCGGCTAATTCCAGCTCAATAGCGTATATTAA  
TGCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGGTCCACCTTCAGGTGGCGACTGCACG  
GTACCTCTCGGCTTCCCTAGTTGCTTCTAGCTGAGTGA  
GAGTGTCAAAGCAGCGATGCCCTGAATAGTGGTGCATGGATAATGAAACAAGACCTCGGTT  
TGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGGATCCGTATTGCTGCGTTAGAGGTGAAA  
TTCTGGATCGCAGCAAGACGAACACTCGCAAAGCATTGCA

**554C S30/5FK:**

CTTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
ATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGCTTCCGGGCCGTACAGTGGTGAAC  
CATGATAACCTCTACGCTGACCGCACGGCACGCCCCGGCTATCTTCGAATGTCTGCCTTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGATGAGTACACTTTAACCTTAA  
GAGGATCTATTGGAGGACAAGTCTGGTCCAGCACCCGGCTAATTCCAGCTCAATAGCGTATATTAA  
GCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGGTCCACCTTCAGGTGGCGACTGCACG  
CCC GGCGTACCTCTCGGCTTCCCTAGTTGCTTCTAGCTGAGTGA  
AAATTAGAGTGTCAAAGCAGCGATGCCCTGAATAGTGGTGCATGGATAATGAAACAAGACCTCGGTT  
ATTTGTTGGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGGATCCGTATTGCTGCGTTAGA  
GGTGAAATTCTGGATCGCAGCAAGACGAACACTCGCAAAGCATTGCA

**555A S30/5FK:**

CTTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
ATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC

GCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAAACCAATCGGCTCCGGCCGTACAGTGGTGAAC  
 CATGATAACCTTACGCTGACCGCACGGTACGCACCGCGGCCATCTTCGAATGTCTGCCTTATCAACTTT  
 CGATGGTAGATTAAGTGCCTACCACATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
 CCTGAGAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTA  
 GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTATTGGAATGAGTACACTTTAAATCCTTAAAC  
 GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATAATTAATGCT  
 GCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCAGTCCACCTTCAGGTGGCGACTGCACGT  
 CCCGGCGTACCTCTCGCTTCCCTAGTTGCTCTAGTGAAGTCACTAGGGTTACCGGAATGTTACTTTGAAA  
 AAATTAGAGTGTCAAAGCAGGGCATGCCATGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT  
 ATTGTTGTTGCTCGGAACACGGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGITAGA  
 GGTGAAATTCTTGATCGCAGCAAGACGAACACTCGCAGAA

**555F 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
 GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGAACAAGAAATAACAATACAGGACTCTT  
 TCGAGGCCCTGTAAATTGGAATGAGTACACTTTAAATCCTTAAACGAGGATCTATTGAGGACAAGTCTGGTGC  
 CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATAATTGCTGCTGCAGTTAAAAGCTCGTAGTTGGATC  
 TGGCGTACGGGCTTGCAGTCCCTAGGTGAAGTCACTAGGGTTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGGCATCGC  
 CTGAATAGTGGTGCATGGAATAA

**555G S30/5FK:**

CTGTTAAAGATTAACCATGCATGTGAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTATTAAA  
 TCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCCG  
 CCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGGCTTCCGGGGCGTACAGTGGTGAACC  
 ATGATAACCTCTACGCTGACCGCACGGTCACGCACCCGGCGGCCATCTTCGAATGTCTGCCTTATCAACTTT  
 GATGGTAGATTAAGTGCCTACCACATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGC  
 CTGAGAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTTAG  
 TGACAAGAAATAACAATACAGGACTTTGAGGCCCTGTAAATTGGAATGAGTACACTTTAAATCCTTAAACG  
 AGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATAATTGCTG  
 CTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCAGTCCACCTTCAGGTGGCGACTGCACGTC  
 CCCCGTACCTTCGGCTTCCCTAGTTGCTCTAGTGAAGTCACTAGGGTTACCGGAATGTTACTTGAAAAA  
 AATTAGAGTGTCAAAGCAGGGATGCCATGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCTAT  
 TTGTTGGTTCCGGAACACGGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
 TGAAATTATGGATCGCAGCAAGACGAACACTCGCAGAAAGCATTGCAAGAAA

**555I 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
 GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGAACAAGAAATAACAATACAGGACTCTT  
 TCGAGGCCCTGTAAATTGGAATGAGTACACTTTAAATCCTTAAACGAGGATCTATTGAGGACAAGTCTGGTGC  
 CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATAATTGCTGCTGCAGTTAAAAGCTCGTAGTTGGATC  
 TGGCGTACGGGCTTGCAGTCCACCTTCAGGTGGCGACTGCACCTCCGGCGTACCTCTCGGCTTCCCTAGTT  
 GCTCTAGCTGAGTCACTAGGGTTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGGCATCGC  
 CCTGAATAGTGGTGCATGGAATAA

**559H 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
 GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGAACAAGAAATAACAATACAGGACTCTT  
 TCGAGGCCCTGTAAATTGGAATGAGTACACTTTAAATCCTTAAACGAGGATCTATTGAGGACAAGTCTGGTGC  
 CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATAATTGCTGCTGCAGTTAAAAGCTCGTAGTTGGATC  
 TGGCGTACGGGCTTGCAGTCCACCTTCAGGTGGCGACTGCACCTCCGGCGTACCTCTCGGCTTCCCTAGTT  
 CTCTTAGCTGAGTCACTAGGGTTACCGGAATGTTACTTGAAAAAATTAGAGGTTCAAAGCAGGGCATGCC  
 TGAATAGTGGTGCATGGAATAA

**569C S30/5FK:**

CTGCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTATTAA  
 ATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
 GCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATCGGCTTCCGGGGCGTACAGTGGTGAAC  
 CATGATAACCTTACGCTGACCGCACGGTCACGCACCCGGCGCTATCTTCGAATGTCTGCCTTATCAACTTT  
 CGATGGTAGATTAAGTGCCTACCACATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
 CCTGAGAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTA  
 GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAAATTGGAATGAGTACACTTTAAATCCTTAAAC  
 GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCGGTAATTCCAGCTCCAATAGCGTATAATTGCT  
 GCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGCTTGCAGTCCACCTTCAGGTGGCGACTGCACGT

CCCGCGTACCTCTGGTTCCTAGTTGCTCTAGTGACTAGGGTTACCGGAATGTTACTTGAAA  
AAATTAGAGTGTCAAAGCAGGCATGCCATGGATAACTGTGGCATGGAATAATGGAACAAGACCTCGGTTCT  
ATTGTGTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGA  
GGTAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAGAAA

**569D S30/5FK:**

TTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
TCAGTTAGTATTGATCAATGCCATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCCG  
CCCTGACCTCGCGAAAGGGCGCTTGTCAACTAAACCAATCGGCTCCGGGGCGTACAGTGGTAACC  
ATGATAACCTCTACGCTGACCGCACGGTCACGACCCGGCGGCATCTTCGAATGTCTGCCTTATCAACTTC  
GATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAAACGGCTACACATCCAAGGAAGGCAGCAGGCCAACATTACCCACTCCGGCACGGGGAGGTAG  
TGACAAGAAATAACAATACAGGACTTTGAGGCCGTAAATTGGAATGAGTACACTTAAATCCTTAACG  
AGGATCTATTGAGGACAAGTCTGGTGCAGCACCCCGGTAATTCCAGCTCAATAGCGTATTTAATGCTG  
CTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTGCGGTCCACCTTCAGGTGGCAGTGCACGTC  
CCGGCGTACCTCTCGCTTCCCTAGTTGCTTAGCTGAGTGAATAGGGTTACCGGAATGTTACTTGAAAA  
AATTAGAGTGTCAAAGCAGGCATGCCGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTCTAT  
TTTGTGTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
TGAAATTCTGGATCCAGCAAGACGAACACTGCGAAAGCATTGCCAAAAAA

**569F 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGAACAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGAGGACAAGTCTGGTGC  
CAGCACCCCGGTAATTCCAGCTCCAATAGCGTATTTAATGCTGCTGAGTAAAAGCTCGTAGTTGGATC  
TGGCGTAGCGGCTTGGCGTCCACCTTCAGGTGGCAGTGCACCTCCGGCGTACCTCTCGGCTTCCCTAGTTG  
CTCTTAGCTGAGTGAATAGGGTTACCGGAATGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTCATGGAATAAA

**569G S30/5FK:**

TTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
TCAGTTAGTATTGATCAATGCCATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCCG  
CCCTGACCTCGCGAAAGGGCGCTTGTCAACTAAACCAATCGGCTCCGGGGCGTACAGTGGTAACC  
ATGATAACCTCTACGCTGACCGCACGGTCACGACCCGGCGGCATCTTCGAATGTCTGCCTTATCAACTTC  
GATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAAACGGCTACACATCCAAGGAAGGCAGCAGGCCAACATTACCCACTCCGGCACGGGGAGGTAG  
TGACAAGAAATAACAATACAGGACTTTGAGGCCGTAAATTGGAATGAGTACACTTAAATCCTTAACG  
AGGATCTATTGAGGACAAGTCTGGTGCAGCACCCCGGTAATTCCAGCTCAATAGCGTATTTAATGCTG  
CTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTGCGGTCCACCTTCAGGTGGCAGTGCACGTC  
CCGGCGTACCTCTCGCTTCCCTAGTTGCTTAGCTGAGTGAATAGGGTTACCGGAATGTTACTTGAAAA  
AATTAGAGTGTCAAAGCAGGCATGCCGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTTCTAT  
TTTGTGTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
TGAAATTCTGGATCCAGCAAGACGAACACTGCGAAAGCATT

**569H S30/5FK:**

CTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
AATCAGTTAGTATTGATCAATGCCATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
CGCCCTGACCTCGCGAAAGGGCGCTTGTCAACTAAACCAATCGGCTCCGGGGCGTACAGTGGTGA  
CCATGATAACCTCTACGCTGACCGCACGGTCACGACCCGGCGGCATCTTCGAATGTCTGCCTTATCAACTT  
TCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGA  
GCCTGAGAAACGGTACACATCCAAGGAAGGCAGCAGGCCAACATTACCCACTCCGGCACGGGGAGGT  
AGTGACAAGAAATAACAATACAGGACTTTGAGGCCGTAAATTGGAATGAGTACACTTAAATCCTTAA  
CGAGGATCTATTGAGGACAAGTCTGGTGCAGCACCCCGGTAATTCCAGCTCAATAGCGTATTTAATGCT  
TGCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTGCGGTCCACCTTCAGGTGGCAGTGCACG  
TCCCAGCGTACCTCTCGCTTCCCTAGTTGCTTAGCTGAGTGAATAGGGTTACCGGAATGTTACTTGAA  
AAAATTAGAGTGTCAAAGCAGGCATGCCGAATAGTGGTCATGGAATAATGGAACAAGACCTCGGTT  
TATTGTTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATT

**569I S30/5FK:**

CTGTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
TCAGTTAGTATTGATCAATGCCATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCCG  
CCCTGACCTCGCGAAAGGGCGCTTGTCAACTAAACCAATCGGCTCCGGGGCGTACAGTGGTGAACC  
ATGATAACCTCTACGCTGACCGCACGGTCACGACCCGGCGGCATCTTCGAATGTCTGCCTTATCAACTTC

GATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCCAAATTACCCACTCCCGCACGGGAGGTAG  
TGACAAGAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCCTTAACG  
AGGATCTATTGGAGGACAAGTCTGGTGCCAGCACCCCGCGTAATTCCAGCTCAATAGCGTATTTAATGCTG  
CTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCAGGTGGCGACTGCACGTC  
CCGGCGTACCTCTCGCTTCCCTAGTGTCTAGTGTGACTAGGGTTACCGGAATGTTACTTGAAAA  
AATTAGAGTGTCAAAGCAGGGATGCCGTAATAGTGTGCATGGAATAATGAAACAAGACCTCGGTCTAT  
TTTGTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
TGAAATTCTGGATCCGAGCAAGACGAACACTGCGAAAGCATT

**569J 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGCGTAATTCCAGCTCAATAGCGTATTTAATGCTGCTGCAGTTAAAAGCTCGTAGTTGGATC  
TGGCGTAGGGGCTTGCCTCACCTCAGGTGGCGACTGCACCTCCCGCGTACCTCTGGCTTCCCTAGTTG  
CTCTAGCTGAGTGAATAGGGTTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGGATCGC  
CTGAATAGTGGTGCATGGAATAA

**569K 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCATTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGCGTAATTCCAGCTCAATAGCGTATTTAATGCTGCTGCAGTTAAAAGCTCGTAGTTGGATC  
TGGCGTAGGGGCTTGCCTCACCTCAGGTGGCGACTGCACCTCCCGCGTACCTCTGGCTTCCCTAGTTG  
CTCTAGCTGAGTGAATAGGGTTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGGATCGC  
CCTGAATAGTGGTGCATGGAATAA

**573C S30/5FK:**

ATATCTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCA  
TTAAATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGAT  
ACCCGCCCTGACCTCGCGAAAGGGCGCCCTTGTCACTGAAACTAAAACCAATCGGCTTCCGGGCCGTACAGTGGT  
GAACCATGATAACCTCTACGCTGACCGCACGGTCACCGCACCGCGCTATCTTCAATGTCTGCCTTATCA  
ACTTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAG  
GGAGCCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGG  
GGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGGCCTGTAATTGAATGAGTACACTTAAATCCTT  
TAACGAGGATCTATTGGAGGACAAGTCTGGTGCCAGCACCCCGGTAATTCCAGCTCAATAGCGTATTTAA  
TGCTGCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCTACGGGCTTGCCTCACCTCAGGTGGCGACTGC  
ACGTCCCGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGACTAGGGTTACCGGAATGTTACTTT  
AAAAAAATTAGAGTGTCAAAGCAGGGATGCCGTAATAGTGGTGCATGGAATAATGAAACAAGACCTCGG  
TTCTATTTGTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTT  
AGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATT

**573E S30/5FK:**

CTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
ATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCGCCCTTGTCACTGAAACTAAAACCAATCGGCTTCCGGGCCGTACAGTGGTGAAC  
CATGATAACCTCTACGCTGACCGCACGGTCACGCACCGCGGCCCTATCTTCAATGTCTGCCTTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGGCCTGTAATTGAATGAGTACACTTAAATCCTTAA  
GAGGATCTATTGGAGGACAAGTCTGGTGCCAGCACCCCGGTAATTCCAGCTCAATAGCGTATTTAAATGCT  
GCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCTACGGGCTTGCCTCACCTCAGGTGGCGACTGCACGT  
CCGGCGTACCTCTCGGCTTCCCTAGTTGCTCTAGCTGACTAGGGTTACCGGAATGTTACTTGAAA  
AAATTAGAGTGTCAAAGCAGGGATGCCGTAATAGTGGTGCATGGAATAATGAAACAAGACCTCGGTTCT  
ATTITGTGGTTCCGGAACACGAGGTAAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATT

**573I S30/5FK:**

CTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTA  
ATCAGTTAGTATTGATCAATGCCCTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCGCCCTTGTCACTGAAACTAAAACCAATCGGCTTCCGGGCCGTACAGTGGTGAAC  
CATGATAACCTCTACGCTGACCGCACGGTCACGCACCGCGGCCCTATCTTCAATGTCTGCCTTATCAACTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG

CCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCGGCACGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTATTGGAATGAGTACACTTTAACATCCCTTAAC  
GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCT  
GCTCAGTTAAAAGCTGTAGTTGGATCTGGTGCACGGGCTTGCAGGTACCTTCAGGTGGCGACTGCACGT  
CCCGCGTACCTCTCGGTTCCCTAGTTGCTCTAGTGACTGAGTAGGGTTACCGGAATGTTACTTGA  
AAATTAGAGTGTCAAAGCAGGCAGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT  
ATTGTTGGTGTCCCGAACACCGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTCGCAGAA

**575B 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTATTGGAATGAGTACACTTTAACATCCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGC  
CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCTGCTGCAGTTAAAAGCTGTAGTTGGATC  
TGGCGTACCGGCTTGCAGGTACCTTCAGGTGGCGACTGCACCTCCCGCGTACCTCTCGGTTCCCTAGTTG  
CTCTAGCTGAGTGACTAGGGTTACCGGAATGTTACTTGA  
AAAAAATTAGAGTGTCAAAGCAGGCAGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT  
ATTGTTGGTGTCCCGAACACCGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTCGCAGAA

**579H S30/5FK:**

CTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAA  
ATCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCGCTTGTCACTAAACCAATCGGCTCCGGCGTACAGTGGTGAAC  
CATGATAACCTCTACGCTGACCGCACGGTACCGCACCCGGCGCTATCTTCGAATGCTGCCTTATCAACTTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CTTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGACCGCAAATTACCCACTCCGGCACGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTATTGGAATGAGTACACTTTAACATCCCTTAAC  
GAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCT  
GCTCAGTTAAAAGCTGTAGTTGGATCTGGTGCACGGGCTTGCAGGTGGCGACTGCACCTCCCGCGTACCTCTCGGTTCCCTAGTTG  
CTCTAGCTGAGTGACTAGGGTTACCGGAATGTTACTTGA  
AAAAAATTAGAGTGTCAAAGCAGGCAGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT  
ATTGTTGGTGTCCCGAACACCGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTCGCAGAA

**579O 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCGCACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCCTGTATTGGAATGAGTACACTTTAACATCCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGC  
CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCTGCTGCAGTTAAAAGCTGTAGTTGGATC  
TGGCGTACCGGCTTGCAGGTACCTTCAGGTGGCGACTGCACCTCCCGCGTACCTCTCGGTTCCCTAGTTG  
CTCTAGCTGAGTGACTAGGGTTACCGGAATGTTACTTGA  
AAAAAATTAGAGTGTCAAAGCAGGCAGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT  
ATTGATAGTGGTGCATGGAATAA

**580D S30/5FK:**

TTGTCTTAAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAA  
TCAGTTAGTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
CCCTGACCTCGCGAAAGGGCGCTTGTCACTAAACCAATCGGCTCCGGCGTACAGTGGTGAACC  
ATGATAACCTCTACGCTGACCGCACGGTACCGCACCCGGCGCTATCTTCGAATGCTGCCTTATCAACTTT  
GATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGACCGCAAATTACCCACTCCGGCACGGGAGGAG  
TGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTATTGGAATGAGTACACTTTAACATCCCTTAACG  
AGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTAAATGCT  
CTGCAGTTAAAAGCTGTAGTTGGATCTGGCTACGGGCTTGCAGGTGGCGACTGCACGTC  
CCGGCGTACCTCTCGGTTCCCTAGTTGCTCTAGTGAGTGACTAGGGTTACCGGAATGTTACTTGA  
AAAAATTAGAGTGTCAAAGCAGGCAGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTCT  
TTGTTGGTGTCCCGAACACCGAGGTAATGATTAAGAGGGACTGCTGGGGCATCCGTATTGCTGCGTTAGAGG  
TGAATTCTGGATCGCAGCAAGACGAACACTCGCAGAA

**580G S30/5FK:**

AAAGATTAAGCCATGCATGTCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAAATCAGTTA  
GTATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
CTCGCGAAAGGGCGCTTGTCACTAAACCAATCGGCTCCGGCGTACAGTGGTGAACC  
ACCTCTACGCTGACCCACGGTACCGCACCCGGCGCTATCTTCGAATGCTGCCTTATCAACTTTGATGGT  
AGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGA  
AACGGTACCCACATCCAAGGAAGGCAGCAGGACCGCAAATTACCCACTCCGGCACGGGAGGGTAGTGACAA

GAAATAACAATACAGGACTCTTCGAGGCCGTAAATTGAATGAGTACACTTTAACGAGGATC  
TATTGGAGGACAAGTCTGGCCAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTATGCTGCTGCAG  
TTAAAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTTGCCTCACCTTCAGGTGGCGACTGCACGTCCCAGCG  
TACCTCTGGCTTCCCTAGTTGCTCTAGTGACTAGGGTACCGGAATGTTACTTGAaaaaATAG  
AGTGTCAAAAGCAGCGATCGCTGAATAGTGGTGCATGGAATAATGGACACAAGACCTCGTTCTATTTGTT  
GGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCGTATTGCTGCGITAGAGGTGAAAT  
TCTTGGATCGCAGCAAGACGAACACTCGGAAAGCATTGCCAAA

**580M 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCCGACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCGTAAATTGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTATGCTGCTGCAGTTAAAAGCTCGTAGTTGATC  
TGGCGTACGGGCTTGCCTCACCTTCAGGTGGCGACTGCACGTCCCAGCGTACCTCTGGCTTCCCTAGTTG  
CTCTTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAaaaaATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTGCATGGAATAAA

**580N 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCCGACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCGTAAATTGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTATGCTGCTGCAGTTAAAAGCTCGTAGTTGATC  
TGGCGTACGGGCTTGCCTCACCTTCAGGTGGCGACTGCACGTCCCAGCGTACCTCTGGCTTCCCTAGTTG  
CTCTTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAaaaaATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTGCATGGAATAAA

**580P 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCCGACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCGTAAATTGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTATGCTGCTGCAGTTAAAAGCTCGTAGTTGATC  
TGGCGTACGGGCTTGCCTCACCTTCAGGTGGCGACTGCACGTCCCAGCGTACCTCTGGCTTCCCTAGTTG  
CTCTTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAaaaaATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTGCATGGAATAAA

**580R 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCCGACGGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTT  
TCGAGGCCGTAAATTGAATGAGTACACTTTAACCTTAAACGAGGATCTATTGGAGGACAAGTCTGGTC  
CAGCACCCCGCGTAATTCCAGCTCCAATAGCGTATATTATGCTGCTGCAGTTAAAAGCTCGTAGTTGATC  
TGGCGTACGGGCTTGCCTCACCTTCAGGTGGCGACTGCACGTCCCAGCGTACCTCTGGCTTCCCTAGTTG  
CTCTTAGCTGAGTGACTAGGGTACCGGAATGTTACTTGAaaaaATTAGAGTGTCAAAGCAGGCATCGC  
CTGAATAGTGGTGCATGGAATAAA

**581C S30/5FK:**

CTTGTCTTAAAGATTAAGCCATGCTAAGTACACGCTCCGGCAAAGTAAAACCGCACAAGGCTCATTAA  
ATCAGTTAGTATTCAATTGATCAATGCCTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATACCC  
GCCCTGACCTCGCGAAAGGGCCCTTGTCAACTAAAAACCAATGGCTCCGGCGTACAGTGGTAAC  
CATGATAACCTCTACGCTGACCGCACGGTACGCACCGCGGCTATCTTCAATGTCTGCCTTATCAACTTT  
CGATGGTAGATTAAGTGCCTACCATGGTATAACGGTAACGGGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCAACTCCGGCACGGGAGGTA  
GTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTAAAC  
GAGGATCTATTGGAGGACAAGTCTGGTGCACGCCGGTAATTCCAGCTCCAATAGCGTATATTATGCT  
GCTCAGTTAAAAGCTCGTAGTTGGATCTGGTACGGGCTTGCCTCACCTTCAGGTGGCGACTGCACGT  
CCCGCGTACCTCTGGCTTCCCTAGTTGCTCTAGTGACTAGGGTACCGGAATGTTACTTGA  
AAATTAGAGTGTCAAAGCAGGCATGCCGTAAATGAGTGGCATGGAATAATGGAACAAGACCTCGTTCT  
ATTGGTGTGTTCCGGAACACGAGGTAATGATTAAGAGGGACTGCTGGGGCATCGTATTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTCGCAGAA

**581D S30/5FK:**

AGTAAAACCGCACAAGGCTCATTAATCAGTTAGTATTCAATTGATCAATGCCTTACATGGATAACTGTGGCA  
ATTCTAGAGCTAATACATGGATACCGCCCTGACCTCGCGAAAGGGCGCTTGTCAAGACTAAAACCAATC  
GGCTTCCGGCGTACAGTGGTAACCATGATAACCTCTACGCTGACCGCACGGTACGCACCGCGGCTAT

CTTCGAATGTCTGCCTTATCAACTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACGGGAA  
 ATCAGGGTTGATTCCGGAGAGGGAGCGCTGAGAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCCAAA  
 TTACCCACTCCCGCACGGGAGGTAGTGACAAGAATAACAATACAGGACTCTTCGAGGCCCTGTAATTGG  
 AATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGCACGCCAGCAGGCCGGTAATT  
 CAGCTCAAATAGCGTATATTAGCTGCTGAGTTAAAAGCTCGTAGTTGGATCTGGCTACGGGCTTGG  
 TCCACCTTCAGGTGGCGACTGCACGTCGGCGTACCTCTGGCTTCCCTAGTTGCTCTAGCTGAGTGACTA  
 GGGTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCCATGCCGTAATAGTGGTGCATGG  
 AATAATGGAACAAGACCTCGGTTCTATTGGTTCCGAAACACGAGGTAATGATTAAGAGGGACTGCTG  
 GGGGCATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTG  
 CCAAA

*Paracentrophyes quadridentatus*:

500H S30/5FK:

CTCACTACAAGCTCCGGCATAGTGAAACCGCGAATGGCTCATTAATCAGTTATGGTCATTGACGAATGCC  
 GTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACACGGCTCCGACCTTACAGGGACGAGC  
 GCACTTGTCAAGTCAAAACCAATCGGTGGCGCGCTTCGTCGAAGGCAGGGCGTCGCGTCTGCACCG  
 TCCTCGTGGCGAATCATGACAACACTCTACGCTGACCCGACGCCCTTTCGCGCCGGCGCTGTCTTCGAGTG  
 TCTGCCATTCAACTTCGTTGGTGTCTATCGCTTACCAAGGGTATAACGGGTAACGGGAAATCAGGGTTC  
 GATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCCACGCAAATTACCCACTC  
 CCGGCTCGGGGAGGTAGTGACAAGAACTAACATCCGAGACTCTTCGAGGCCTCGGAATTGGAATGAGTAC  
 ACTTAAATCCTTAAACGAGGATCTATTGGAGGGCAAGTCTGGTGCAGCAGCCGCGTAATCCAGCTCAA  
 TAGCGTATACCAATGCTGCTGAGTTAAAAGCTCGTAGTTGGATCTGGCGCTCGGCCCGCGATGCGACGCA  
 CGTCGGCTATCGCGTITTATTGTCGCGCTTCGCGTCTTAACCGGGCGGCCGGCGCGTTGTC  
 CGACGCACACCTCCCGCTTCCGACGCGTCTTAACGAGTGCCTGCGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTC  
 GGTGCGTGAATTGTTGGTTCCGGACCGAGGTAATGATTAAGAGGGACTGCCGGGACATCAGTATTGCT  
 GCAAGAGAGGTGAAATTCTAGGACTGTAGCAGGACTAACCAAGGCAGAAGCATT

511B 18S-323dir/18S-823rev:

ATAACGGGTAACGGTGAATCAGGGTTCGATTCCGGAGAGGGAGCCTGAGAAACGGCTACCACATCCAAGGAA  
 GGCAGCAGGCACGCAAATTACCCACTCCCGCTCGGGGAGGTAGTGACAAGAACTAACATCCGAGACTCTT  
 TCGAGGCCTCGGAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGC  
 CAGCAGCCCGGTAAATTCCAGCTCCAATAGCGTATACCAATGCTGCTGAGTTAAAAGCTCGTAGTTGGATC  
 TGCGCTCGGGCCCGCGATGCGACGACGTCGGCTATCGCGTITTATTGTCGCGCTTCGCGCGTCTCGTCTT  
 AACCGGGCGCGCCGGGCGCGTCCGACGCACACCTCCCGCTTCCGACGCGTCTTAACGAGTG  
 CCTCGCGTGGACCGGAACGTTACTTGAAAAAATTAGAGTGTCAAGGCAGGCCGTGTCGCTGAATAGTG  
 GTGCATGGAATAA

511C 18S-323dir/18S-823rev:

ATAACGGGTAACGGTGAATCAGGGTTCGATTCCGGAGAGGGAGCCTGAGAAACGGCTACCACATCCAAGGAA  
 GGCAGCAGGCACGCAAATTACCCACTCCCGCTCGGGGAGGTAGTGACAAGAACTAACATCCGAGACTCTT  
 TCGAGGCCTCGGAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGC  
 CAGCAGCCCGGTAAATTCCAGCTCCAATAGCGTATACCAATGCTGCTGAGTTAAAAGCTCGTAGTTGGATC  
 TGCGCTCGGGCCCGCGATGCGACGACGTCGGCTATCGCGTITTATTGTCGCGCTTCGCGCGTCTCGTCTT  
 AACCGGGCGCGCCGGGCGCGTCCGACGCACACCTCCCGCTTCCGACGCGTCTTAACGAGTG  
 CCTCGCGTGGACCGGAACGTTACTTGAAAAAATTAGAGTGTCAAGGCAGGCCGTGTCGCTGAATAGTG  
 GTGCATGGAATAA

511D S30/5FK:

TTCTGTTCTCTAAAAATAAGCCATGCATGTCAGTACAAGCTCCGGCATAGTGAAACCGCGAATGGCTCA  
 TAAATCAGTTATGGTTCATTTGACGAATGCCGTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGG  
 ACACGGGCTCCGACCTTACCAAGGGACGAGCGCACTGTCAGATCAAAACCAATCGGTGCGGCCGGCGCTTTC  
 GTCGCAAGGCAGGGCGTCGCTTGCACCGTCTCGTGGCGAATCATGACAACACTCTACGCTGACCCGACCG  
 CCTTTGCGCCCGGGCGCTGTCTCGAGTGTCTGCCCTATCAACTTCTGGTGTGCTAATCGCTTACCAAG  
 GTGATAACGGGTAACGGGAATCAGGGTTCGATTCCGGAGAGGGAGCCTGAGAAACGGCTACCACATCCAAG  
 GAAGGCAGCAGGCCACGCAAATTACCCACTCCCGCTCGGGGAGGTAGTGACAAGAACTAACATCCGAGACT  
 CTTCGAGGCCCTCGGAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGG  
 TGCCAGCAGCCCGGTAAATTCCAGCTCCAATAGCGTATACCAATGCTGCTGAGTTAAAAGCTCGTAGTTGG  
 ATCTGGCGCTCGGGCCCGCGATGCGACGACGTCGGCTATCGCGTGTGTTATTGTCGCGCTTCGCGCGTCTCGT  
 TTAAACCGGGCGCGCCGGGGCGCTGTGTCGACGCACACCTCCCGCTTCCGACGCGTCTTAACG  
 GTGCCCTGCCGTGGACCGGAACGTTACTTGAAAAAATTAGAGTGTCAAGGCAGGCCGTGTCGCTGAATA

GTGGTGCATGGAATAATGGAACAAGACCTCGTCGCTGATTGTTGGTTCCGGGACGCGAGGTAATGATTA  
AGAGGGACCGCCGGGACATCAGTATTGCTGCAAGAGAGGTAAATCTAAGGACTGTAGCAAGGACTAACCA  
AAGGCAGAAAGCATTTGCCAAGGAAAAAAA

521MM 4FB/1806R:

CTCAGTACAAGCTCCGGCATAGTGAAACCGCGAATGGCTCATTAATCAGTTATGGTCATTGACGAATGCC  
GTTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACACGGGCTCCGACCTTACCAAGGGACGAGC  
GCACTTGTCAAGATCAAAACCAATCGGTGCGGCGCGCTTCGCAAGGCGGGCGTCGCTTGCACCG  
TCCTCGTGGCGAATCATGACAACACTCTACGCTGACCCGACGGCCTTTGCGCCTGGCGCGCTGTCTTCGAGTG  
TCTGCCATTCAACTTCTGGTGTGCTAATCGCTTACCAAGGTGATAACGGGAAACGGGAAATCAGGGTTC  
GATTCCGGAGAGGGAGCCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCAAAATTACCCACTC  
CCGGCTCGGGAGGTAGTGACAAGAACTAACATCCGAGACTCTTCGAGGCCTCGAATTGGAATGAGTAC  
ACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGTGCTTACCGCGTGTCTTAACCGGGCGCCGGGCGCGTTGTC  
CGACGCACACCTCCCGCTTCCGACCGCGTGTCTTAACCGAGTGCCTGCGGTGGACCGGAACGTTACTTG  
AAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTC  
GGTCGCTGATTGTTGGTTCCGGACCGGAGGTAAATGATTAAGAGGGACTGCCGGGACATCAGTATTGCT  
GCAAGAGAGGTGAAATTCTAGGACTGTAGCAGGACTAACCAAGGCAGA

521PP 18S-323dir/18S-823rev:

ATAACGGGTAACGGTGAATCAGGGTCATTCCGGAGAGGGAGCCTGAGAAACGGTACCAACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCACTCCCGCTCGGGGAGGTAGTGACAAGAAACTAACATCCGAGACTCTT  
TCGAGGCCTCGGAATTGGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGC  
CAGCAGCCCGGTAACTCAGCTCCAATAGCGTATACCAATGCTGTGAGTTAAAAGCTGTAGTTGGATC  
TGGCGCTCGGGCCCGATGCGACGACGACGCGTATCGCGTGTCTTAACCGGGCGCCGGGCGCGTTGTC  
AACCGGGCGGCGCCGGGCGCGTTGTCGCGCACACCTCCCGCTTCCGACCGCGTGTCTTAACCGGG  
CCTCGCGTGGACCGGAACGTTACTTGAAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTG  
GTGCATGGAATAA

521ÆÆ S30/5FK:

CTCAGTACAAGCTCCGGCATAGTGAAACCGCGAATGGCTCATTAATCAGTTATGGTCATTGACGAATGCC  
GTTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACACGGGCTCCGACCTTACCAAGGGACGAGC  
GCACTTGTCAAGATCAAAACCAATCGGTGCGGCGCGCTTCGCAAGGCGGGCGTCGCTTGCACCG  
TCCTCGTGGCGAATCATGACAACACTCTACGCTGACCCGACGGCCTTTGCGCCTGGCGCGCGCTGTCTTCGAGTG  
TCTGCCATTCAACTTCTGGTGTGCTAATCGCTTACCAAGGTGATAACGGGAAACGGGAAATCAGGGTTC  
GATTCCGGAGAGGGAGCCTGAGAAACGGTACCAAGGAAGGCAGCAGGCAAAATTACCCACTC  
CCGGCTCGGGAGGTAGTGACAAGAAACTAACATCCGAGACTCTTCGAGGCCTCGAATTGGAATGAGTAC  
ACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGTGCTTACCGCGTGTCTTAACCGGGCGCCGGGCGCGTTGTC  
CGACGCACACCTCCCGCTTCCGACCGCGTGTCTTAACCGAGTGCCTGCGGTGGACCGGAACGTTACTTG  
AAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTC  
GGTCGCTGATTGTTGGTTCCGGACCGGAGGTAAATGATTAAGAGGGACTGCCGGGACATCAGTATTGCT  
TGCAAGAGAGGTGAAATTCTAGGACTGTAGCAGGACTAACCAAGGCAGA

522A S30/5FK:

CTCAGTACAAGCTCCGGCATAGTGAAACCGCGAATGGCTCATTAATCAGTTATGGTCATTGACGAATGCC  
GTTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACACGGGCTCCGACCTTACCAAGGGACGAGC  
GCACTTGTCAAGATCAAAACCAATCGGTGCGGCGCGCTTCGCAAGGCGGGCGTCGCTTGCACCG  
TCCTCGTGGCGAATCATGACAACACTCTACGCTGACCCGACGGCCTTTGCGCCTGGCGCGCGCTGTCTTCGAGTG  
TCTGCCATTCAACTTCTGGTGTGCTAATCGCTTACCAAGGTGATAACGGGAAACGGGAAATCAGGGTTC  
GATTCCGGAGAGGGAGCCTGAGAAACGGTACCAAGGAAGGCAGCAGGCAAAATTACCCACTC  
CCGGCTCGGGAGGTAGTGACAAGAAACTAACATCCGAGACTCTTCGAGGCCTCGAATTGGAATGAGTAC  
ACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGTGCTGAGCCGGTAATTCCAGCTCAA  
TAGCGTATACCAATGCTGTGAGTTAAAAGCTGTAGTTGGGATCTGGGCTCGGCGCCGGCGATGCGACCGA  
CGTCGGCTATCGCGTGTATTGTCGCGCTTCGCGCGTGTCTTAACCGGGCGCCGGGCGCGTTGTC  
CGACGCACACCTCCCGCTTCCGACCGCGTGTCTTAACCGAGTGCCTGCGGTGGACCGGAACGTTACTTG  
AAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTC  
GGTCGCTGATTGTTGGTTGTCCGGACCGGAGGTAAATGATTAAGAGGGACTGCCGGGACATCAGTATTGCT  
TGCAAGAGAGGTGAAATTCTAGGACTGTAGCAGGACTAACCAAGGCAGA

**523C S30/5FK:**

CTCACTACAAGCTCCGGCATAGTGAACCGCAATGGCTATTAAATCAGTTATGGTCATTGACGAATGCC  
GTTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACACGGGCTCCGACCTTACCAAGGGACGAGC  
GCACTTGTCAAGATCAAAAACCAATCGGTGCGCGGGCGTTTCGCAAGGCAGGGCGTCGCGTCTTGACCG  
TCCTCGTGGCAATCATGACAAACTCTACGCTGACCCGACGGCTTTCGCGCCGGCGCTGTCTTGAGTG  
TCTGCCTTATCAACTTCGTTGGTGTCTAACAGGTGATAACGGTAACGGGAATCAGGGTC  
GATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCAAGGAAGGCAGCAGGACGCAAATTACCCACTC  
CCGGCTCGGGAGGTAGTACAAGAAACTAACATCCGAGACTCTTCGAGGCCTCGGAATTGAATGAGTAC  
ACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGCAGCCGGTAATTCCAGCTCAA  
TAGCGTATACCAATGCTGTAGTTAAAAGCTGTAGTTGGATCTGGCGCTCGGGCCCGATGCGACGCA  
CGTCGGCTATCGCGTCTTATTGGCGCGTCTTCGCGTCTTAACCGGGCGGCCGGCGCTGTCTTG  
CGACGCACACCTCCCGCTTCCGACGCGTCTTAACATGAGTGCCTGCGGTGGACCGAACGTTACTTG  
AAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTC  
GGTCGCTGATTGGTTCCGGACCGAGGTAAATGATTAAGAGGGACTGCCGGGACATCAGTATTGCT  
GCAAGAGAGGTGAAATTCTAGGACTGTAGCAGGACTAAACAA

**523F S30/5FK:**

CTCACTACAAGCTCCGGCATAGTGAACCGCAATGGCTATTAAATCAGTTATGGTCATTGACGAATGCC  
GTTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACACGGGCTCCGACCTTACCAAGGGACGAGC  
GCACTTGTCAAGATCAAAAACCAATCGGTGCGCGGGCGTTTCGCAAGGCAGGGCGTCGCGTCTTGACCG  
TCCTCGTGGCAATCATGACAAACTCTACGCTGACCCGACGGCTTTCGCGCCGGCGCTGTCTTGAGTG  
TCTGCCTTATCAACTTCGTTGGTGTCTAACAGGTGATAACGGTAACGGGAATCAGGGTC  
GATTCCGGAGAGGGAGCCTGAGAAACGGTACCATCAAGGAAGGCAGCAGGACGCAAATTACCCACTC  
CCGGCTCGGGAGGTAGTACAAGAAACTAACATCCGAGACTCTTCGAGGCCTCGGAATTGAATGAGTAC  
ACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGCAGCCGGTAATTCCAGCTCAA  
TAGCGTATACCAATGCTGTAGTTAAAAGCTGTAGTTGGATCTGGCGCTCGGGCCCGATGCGACGCA  
CGTCGGCTATCGCGTCTTATTGGCGCGTCTTCGCGTCTTAACCGGGCGGCCGGCGCTGTCTTG  
CGACGCACACCTCCCGCTTCCGACGCGTCTTAACATGAGTGCCTGCGGTGGACCGAACGTTACTTG  
AAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTC  
GGTCGCTGATTGGTTCCGGACCGAGGTAAATGATTAAGAGGGACTGCCGGGACATCAGTATTGCT  
GCAAGAGAGGTGAAATTCTAGGACTGTAGCAGGACTAACCAAGGCGA

**548A S30/5FK:**

CTCACTACAAGCTCCGGCATAGTGAACCGCAATGGCTATTAAATCAGTTATGGTCATTGACGAATGCC  
GTTTACATGGTATTGGTGTGGACAGATTAGACCATAATATGTGGACGTATACTGACCTTGGCAAGGACGA  
GAATGGCTCTCAGATAAAAACAAATCGATGTGATGGTCAATTAGTACCAAGATGAGGGGGCTAATCTTGCA  
CCGTATACATGGCACTCATGACAATCTGTAGAAGGACCGCACGGCTAGATACAGCCGGCGCTGTCTT  
GAGTGTCTGCCTTATCAACTTAATATGGTGTGCAATCGATAGCAAGGTGATAACGGGTATGGGAATCA  
GGGTCGATTCAGGAGAGGGAGCTAGAGAAACGGTACCCACATCAAGGAAGGCAGCAGGCAAACAAATT  
CCCACTCCGGGTGGGGAGGTAGAAACAAAGAACCAATACGAGAGTCATCAGAGGCTAAGAATTGAA  
TGAGTACACTTAAATCCTTAACAAAGGATCTATTGGAGGGCAAGTCCGGTCCAGCAGCCGGTAATTCCA  
GCTCCAATAGCGTATACCAATGCTCGGTAGTTAAAAGCTCGTAGTTGGATCGGGGATTGGCCCTCATG  
AGACGCAAGTAGAGTATTGCGTGTAAAAATTCTGTTTCGAGTTGCGTAACCGGGGTGCGCCGGTC  
GGGTTGTCATACGCACACCTCCGGCTTTGCAACGCGTGTAGATGCACTCCCTGCGTGGACGGGTCCGT  
TTACTTTGAAAAAATTAGAGTGTCAAGGCACAAGCATGTGCCCGAATAGTGGTGCATGGAATAATGGAAC  
AAGACCTCGGTGCTGATTGGTTCCGGACCGCAGGTAAATGATTAAGAGGGACTGCCGGGACATCA  
GTATTGCTGCAAGAGAGGTGAAATTCTAGGACTGTAAAGCAGACTAACCAAGGCAAAGCATT

**548B S30/5FK:**

TTAAAGATTAAGCCATGCTCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCAATGGCTATTAAATCAGC  
TATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGGCC  
TGACTTACGAAAGGGTGCACTGCCAGACCAAAAACCAATCGGGCGTCAGCCCGTCAAGCGTCTGCCATTCAACTGTG  
CAAACCTATCGACGCCATGGTCCAGAACGGCGCATGTCCTCAAGCGTCTGCCATTCAACTGTG  
GGTAGGGTAAC TGCTTACCATGGTATAACGGTAACGGAGAATCAGGGTTGATTCGGAGAGGGAGCCTG  
AGAAACGGTACACATCAAGGAAGGCAGCAGGCCAGCAATTACCCACTCCCAGCAGGGGAGGTAGTGA  
CGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTACCGAGG  
ATCTATTGGAGGGCAAGTCTGGTGCAGCAGCCGGTAATTCCAGTCAATAGCGTATATTAAAGTTGCTG  
CAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCTGATATAGCGATTACTACGTCTCCG  
ACGTACCTCTCGATTCCCTCGGTGCTTAACATGAGTGTCTGGGTTACGGGACTGTTACTTTGAAAAAAAT  
TAGAGTGTCAAAGCAGGCAGGCTGCCGTAATAGTGGTGCATGGAATAATGGAAGACGACTTCGGGTCTATT  
TGGTGGTTCCGGATACGAGGTAAATGATTAAGAGGGACTGCCGGGGACATCGTACTGCTCGTTAGAGGTG  
AAATTCTGGATCGCAGCAAGACGAACTACTGCGA

552D S30/5FK:

CTCACTACAAGCTCCGGATAGTGAACCGCGAATGGCTCATTAAATCAGTTATGGTCATTCAGAATGCC  
GTTTACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACACGGGCTCCGACCTTACCAAGGGACGAGC  
GCACTTGTCAAGATCAAAAACCAATCGGTGCGCGGGCGTTCTCGCAAGGCAGGGCGTCGCGCTTGACCG  
TCCTCGTGGCGAATCATGACAAACTCTACCGCTGACCCGACGGCCTTTCGCGCCGGCGCTGCTTCAGTG  
TCTGCCTTATCAACTTCGTTGTGCTAATCGCTACCAAGGTGATAACGGGTAACGGGAATCAGGGTC  
GATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGACGCAAATTACCCACTC  
CCGGCTCGGGGAGGTAGTACAAGAACAATCCGAGACTCTTCGAGGCCTCGGAATTGAATGAGTAC  
ACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGCAGCAGCCGCGGTAAATTCCAGCTCCAA  
TAGCGTATACCAATGCTGCTGTAGTTAAAAAGCTCGTAGTTGGATCTGGCGCTCGGCCCGCGATGCGACGCA  
CGTCGGCTATCGCGTTTATTGTTGCGCGTTCGCGCTGCTTTAACCGGGCGGCCGGCGCTGTC  
CGACGCACACCTCCCGCTTCCGACGCGTCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGC  
AAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTGGTGCATGGAATAATGGAACAAGACCTC  
GGTCGCTGATTTGGTTCCGGACGCAAGGTAAATGATTAAGAGGGACTGCCGGGACATCAATATTGCT  
GCAAGAGAGGTGAAATTCTAGGACTGTAGCAGGACTAACCAAGAGCGAAAGCATT

553B 18S-323dir/18S-823rev:

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCAACATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCCGCTGGGGAGGTAGTACAAGAACAATCCGAGACTCTT  
TCGAGGCCTCGGAATTGGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGTGC  
CAGCAGCCCGGTAAATTCCAGCTCCAATAGCGTATACCAATGCTGCTGTAGTTAAAAAGCTCGTAGTTGGATC  
TGGCGCTCGGCCCCGCGATGCGACGACGTCGGCTATCGCGTTTATTGTTGCGCGTTCGCGCTGCTTT  
AACCGGGCGGCGCCGGCGCGTGTCCGACGCACACCTCCCGCTTCCGACGCGTGCCTTAACGAGTGC  
CCTGCGGTGGACCGAACGTTACTTGAAAAAATTAGAGTGTCAAGGCAGGCCTGTGCGCTGAATAGTG  
GTGCATGGAATAA

*Kinorhynchus giganteus*:

521Æ S30/5FK:

GGCAAAGTAAACCGCACAAGGCTCATTAAATCAGTTAGTATTGATCAATGCCCTACATGGATAACTG  
TGGCAATTCTAGAGCTAATACATGGATACCGCCCTGACCTGCGGAAAGGGCGCTTGTCAACTAAAC  
CAATCGGCTTCCGGCCGTACAGTGGTGAACCATGATAACCTCTACGCTGACCGCACGGCACCGCG  
CCTATTTGAATGCTGCTTATCAACTTCGATGGTAGATTAAGTGCCTACCATGGTATAACGGGTAACG  
GGGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCAC  
GCAAATTACCCACTCCGGCACGGGAGGTAGTGACAAGAAATAACAATACAGGACTCTTCGAGGCCCTGT  
AATTGGAATGAGTACACTTTAAATCCTTAACGAGGATCTATTGGAGGACAAGTCTGGTGCAGCACCCCG  
TAATTCCAGCTCCAATAGCGTATTTAAATGCTGCTGAGTTAAAAAGCTCGTAGTTGGATCTGGCGTACGGGC  
TTGCGGTCCACCTTCAGGTGGCGACTGCACGTCCCAGCTGACCTCTCGGCTTCCCTAGTTGCTTAGCTGAG  
TGACTAGGGTTACCGGAATGTTACTTGAAAAAATTAGAGTGTCAAGCAGGCATGCCCTGAATAGTG  
GCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGTTCCGGAACACGAGGTAAATGATTAAGAGGG  
CAGCTGGGGCATCCGTATTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAG  
CGTTG

Order Cyclorrhagida;

*Echinoderes capitatus*:

514A S30/5FK:

ATGCATGTCTAAGTGCAAGCTCCGGCAAAGTGAACCGCGAATGGCTCATTAAATCAGTTATGGTCATTCGA  
TGATGCCCTTACATGGATAACCCCTGGGAAATCTAGAGCTAATACATGTCACCCGCTCCGACCTCACGGGACG  
AGCGCATTGTCAGACAAAAACCAATCGGGCTTCGGTCCGTCAGTGGTAACCATGGCAAACCGTCACGCC  
GACCGCACGGTCTAGAACCGGGCGGTGTCGTTCGAATGTCGCTTATCAACTGTCGATGGTAGGTTAAGTG  
CCTACCATGGTTATAACGGTAACGGGAATCAGGGTCCGATTCCGGAGAGGGAGGCGCTGAGAAACGGCTACC  
ACTTCTACGGAAGGCAGCAGGACGCAAATTACCCACTCCCGCACGGGAGGTAGTGACAAGAAATAACAA  
TACGGGACTCTAAACGAGGCCCGTAATTGAATGAGTACACTTAAATCCTTAACGAGGATCTATGGAGG  
GCAAGTCTGGTGCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATTTAAAGTTGCTGCAGTTAAAAGC  
TCGTAGTTGGATCTGGCGTACGGGCTGGAGGTCCGCGCATTGGTGGTTACTTCCCCTCCGACGTACCTCTCG  
GATTCCCTCGGTGCTTAACTGAGTGTCTGGTTACCGGACCGTTACTTGAAAAAAATTAGAGTGTCAA  
AGCAGGCGCGACGCCGTATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGTTCCG  
GAACCGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCCTAGAGGTGAAATTCTTGGAT  
CGCAGCAAGACGAACACTGCGAAAGCATTGCCAAGAA

551G S30/5FK:

ATGTCTAAGTGCAAGCTCCGGCAAAGTGAACCGCGAATGGCTCATTAAATCAGTTATGGTCATTCGATGGA  
TGCCCTTACATGGATAACCCCTGGGAAATCTAGAGCTAATACATGTCACCCGCTCCGACCTCACGGGACGAGCG  
CATTTGTCAGACAAAAACCAATCGGGCTTCGGTCCGTCAGTGGTAACCATGGCAAACCGTCACGCCGACC  
GCACGGTCTAGAACCGGGCGGTGTCGTTGAATGTCGCTTATCAACTGTCGATGGTAGGTTAAGTGCCTA  
CCATGGTTATAACGGTAACGGGAATCAGGGTCCATTCCGGAGAGGGAGGCGTGGAGAAACGGCTACCACTT  
CTACGGAAGGCAGCAGGACGCAAATTACCCACTCCGGCACGGGAGGTAGTGACAAGAAATAACAATACG  
GGACTCTAAACGAGGCCCGTAATTGAATGAGTACACTTAAATCCTTAACGAGGATCTATGGAGGGCAA  
GTCTGGTGCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATTTAAAGTTGCTGCAGTTAAAAGCTCGT  
AGTTGGATCTGGCGTACGGGCTGGAGGTCCGCGCATTGGTGGTTACTTCCCCTCCGACGTACCTCTCGGATT  
TCCCTCGGTGCTTAACTGAGTGTCTGGTTACCGGACCGTTACTTGAAAAAAATTAGAGTGTCAAAGCA  
GGCGCGACCCGTATAGTGGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGTTGGTTCCGGAAC  
GCGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCCTAGAGGTGAAATTCTTGGATCGCA  
GCAAGACGAACACTGCGAAAGCATTGCCAAGAA

552A 4FB/1806R:

CAGCTCCAATAGCGTATTTAAAGTTGCTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGGCTGGAGG  
TCCGCCGCATTGGTGTACTTCCGCCCCACGTACCTCTCGGATTCCCTCGGTGCTTTAACTGAGTGTCTT  
GGGTTACCGGACCGTTACTTGAAAAAAATTAGAGTGTCAAAGCAGGCCGACGCCGTGATAGTGGTGCATG  
GAATAATGGAACAAGACCTCGGTTCTATTGTTGGTGGTTCCGGAACGCCGAGGTAAATGATTAAGAGGGACTG  
GGGGGCATCCGTATTGCTCGTTAGAGGTGAAATTCTTGATCGCAGCAAGACGAAACTCGGAAAGCATT  
GCCAAGAATGTTCCATTAACTAAGAACGAAAGTCCGAGGTGCAAGGCCGATCAGATACCGCCCTAGTCCGA  
CCATAAACGATGCCGACCGACAATCAGTGGTGGTTAGTTCATGACTCCCTGGCAGCTCCGTGAAAACAA  
AGCTTTGGGTTCCGGGGGGAGTATGGTTGCAAAGCTTAAACTAAAGGAATTGACCGAAGGGCACCACAG  
GAGTGGAGCCTCGGGTTAATTGACTCAACACGGGAAAAGTACCCGGCCGACACAGTAAGGATTGACA  
GATTGATAAGCTTTCTTGATTCTGTGGTGGTGCATGGCGTTCTTAGTTGGTGGAGCGATTGTCTGGT  
AATTCCGATAACGAACGAGACTCTGGCTACTAAATAGTCCCGGGATTGCCCTCGTGGGAGTCCGTGCCCG  
ACTTCTAGGGGAACAAGCGTCAACTAGGGCGCGAGATTGAGCAATAACAGGTCTGTGATGCCCTAGATGT  
CCGGGGCCGCACGCCGCTACACTGAAAGCGGCAGCGTGTGCTTACCCCTGCCCGAGGGCCGGTAACCC  
GATAAAATCCTTTCTGTGCTAGGGATAGGGAATTGCAATTGTTCCCTCGAACGAGGAATTCCAGTAAGCG  
AGTCATAAGCTCGCGTTGATTACGTCCCTGCCCTTGACACACCGCCCGTCACTACAGATTGATGATT  
AGTGAGGTTCTCGGACTGGTCCCAGCACGCCGGAACGGTCACTGAGGCCGGGAAGACGACCGAACCT  
GATTATTAA

*Echinoderes setiger*:

525A S30/5FK:

ATGCATGTCTAAGTGCAAGCTCCGGCAAAGTGAACCGCGAATGGCTCATTAAATCAGTTATGGTCATTCGA  
TAGATGCCATTACATGGATAACCCCTGGGAAATCTAGAGCTAATACATGTCACCCGCTCCGACCTCACGGGAC  
GAGCGCATTGTCAGACTAAAACCAATCGGGCTTCGGTCCGTCAGTGGTAACCATGGCAAACCGTCACGC  
TGACCGCACGGTCTAGAACCGGGCGTGCCTCGAATGTCTGCCTTATCAACTGTCGATGGTAGGTTAAGT

GCCTACCATGGTTATAACGGGTAACGGGAATCAGGGTCGATTCCGGAGAGGGCGCTGAGAAACGGCGAC  
 CACTTCTACCGAAGGCAGCAGCACGCAAATTACCACTCCCGCACGGGAGGTAGTGACAAGAAATAACA  
 ATACGGGACTCTAACGAGGCCCGTAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAG  
 GGCAAGTCTGGTCCAGCAGCCCGTAATTCCAGCTCAATAGCTATATTAAAGTTGCTGCAGTAAAAAG  
 CTCGTAGTTGGATCTGGCGTACGGGCTCGAGGTCCGCCGTTACTTCCCGTCCGACGTACCTCTCG  
 GATTCCCTCGGTCTTAACTGAGTGTCTGGGTTACCGGACCGTTACTTGAAGGGAAATTAGAGTGTCAA  
 AGCAGGCGCGATGCCTGTATACTGAGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGGTTCCG  
 GAACCGAGGTAAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCAGGTTAGAGGTGAAATTCTGGAT  
 CGCAGCAAGACGAACACTGCAGAAAGCATT

#### 551A S30/5FK:

ATGCATGTCTAACGTGCAAGCTCCGGCAAAGTGAAACCGCGAATGGCTCATTAAATCAGTTATGGTCATTGCA  
 TAGATGCCATTACATGGATAACCCCTGGGAAATCTAGAGCTAACATGTCACCGCTCCGACCTCACGGGAC  
 GAGCGCATTGTCAGACTAAAACCAATCGGGCTCGTCCGTTCACTGGTGAACCATGGCAAACCGTCACGC  
 TGACCGCACGGTCTAGAACCGGGCGTGCCTCGAATGTCGCTTATCAACTGTCGATGGTAGGTTAAGT  
 GCCTACCATGGTTATAACGGGTAACGGGAATCAGGGTCGATTCCGGAGAGGGCCCTGAGAAACGGGAC  
 CACTTCTACCGAAGGCAGCAGCACGCAAATTACCACTCCCGCACGGGAGGTAGTGACAAGAAATAACA  
 ATACGGGACTCTAACGAGGCCCGTAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAG  
 GGCAAGTCTGGTCCAGCAGCCCGTAATTCCAGCTCAATAGCTATATTAAAGTTGCTGCAGTAAAAAG  
 CTCGTAGTTGGATCTGGCGTACGGGCTCGAGGTCCGCCGTTACTTCCCGTCCGACGTACCTCTCG  
 GATTCCCTCGGTCTTAACTGAGTGTCTGGGTTACCGGACCGTTACTTGAAGGGAAATTAGAGTGTCAA  
 AGCAGGCGCGATGCCTGTATACTGAGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGGTTCCG  
 GAACCGAGGTAAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCAGGTTAGAGGTGAAATTCTGGAT  
 CGCAGCAAGACGAACACTGCAGAAAGCATTGCAAGAA

#### 551F S30/5FK:

ATGCATGTCTAACGTGCAAGCTCCGGCAAAGTGAAACCGCGAATGGCTCATTAAATCAGTTATGGTCATTGCA  
 TAGATGCCATTACATGGATAACCCCTGGGAAATCTAGAGCTAACATGTCACCCGCTCCGACCTCACGGGAC  
 GAGCGCATTGTCAGACTAAAACCAATCGGGCTCGTCCGTTCACTGGTGAACCATGGCAAACCGTCACGC  
 TGACCGCACGGTCTAGAACCGGGCGTGCCTCGAATGTCGCTTATCAACTGTCGATGGTAGGTTAAGT  
 GCCTACCATGGTTATAACGGGTAACGGGAATCAGGGTCGATTCCGGAGAGGGCCCTGAGAAACGGGAC  
 CACTTCTACCGAAGGCAGCAGCACGCAAATTACCACTCCCGCACGGGAGGTAGTGACAAGAAATAACA  
 ATACGGGACTCTAACGAGGCCCGTAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAG  
 GGCAAGTCTGGTCCAGCAGCCCGTAATTCCAGCTCAATAGCTATATTAAAGTTGCTGCAGTAAAAAG  
 CTCGTAGTTGGATCTGGCGTACGGGCTCGAGGTCCGCCGTTACTTCCCGTCCGACGTACCTCTCG  
 GATTCCCTCGGTCTTAACTGAGTGTCTGGGTTACCGGACCGTTACTTGAAGGGAAATTAGAGTGTCAA  
 AGCAGGCGCGATGCCTGTATACTGAGTGCATGGAATAATGGAACAAGACCTCGGTTCTATTGGTTCCG  
 GAACCGAGGTAAATGATTAAGAGGGACTGCCGGGGCATCCGTATTGCTGCAGGTTAGAGGTGAAATTCTGGAT  
 CGCAGCAAGACGAACACTGCAGAAAGCATTGCAAGAA

#### *Echinoderes* sp.:

#### 500C 4FB/1806R:

GTTATGATTAGAGGGACGCCGGGCGTCCGTATTGTCGTAGAGGTGAATTCTGGATCGCAGCAAGACGA  
 GCAGGGGGCAGCAGCTCTGCACATGAATGTTCTCACTAGTCAGAGCGATAGTTGAGGTTGAGGCGATCAG  
 ATACCGCCCTAGTCCGACCATAAACGATGCCACTGACAATCCGAGGAGTTATTACAATGACTCTCGGGC  
 AGCTTCCCGGAAACCTTAAGTGTGATGGGTTCCGGGGAGTATGGTTGAAAGCTCAAACCTAAAGGAATTG  
 ACGGAAGGGCACCACCATGGAGTGGAGGCTTCTGATTCTGATTGTTGAGGCTTACTAGTTCGCTGATCTCAAC  
 GACAACGTTAGGATTGACAGATTGAGAGCTTCTGATTCTGATTGTTGAGGCTTACTAGTTCGCTGATCTCAAC  
 GTGGAGTGTATTGTCGGTTAATTCCGATAACGAACGAGACTCTGGCTACTAAATAGTCGCTGATCTCAAC  
 GCGCGTCCCCCGTGGCGTCAAGCGTAGTCAGCGTTAACTTCTAGGGAAACAGGGCGTTAGCCGACGA  
 AATAGATCAATAACAGGTCTGTGATGTCGTTAGAGGTGAAATTCTGGCCGACCGCGCTACACTGAAG  
 GAGACAGCGTGTGCTGCCGTCCGGAAGGAACGGCAACCCGATGAATCCCTTCGTCTAGGGATTGGGA  
 ATTGCAATTGTTCCCATGAACGAGGAATTCCAGTAAGCGCAGTCATCAGCTGTTGATTACGTCCTGC  
 CCTTGTACACACCGCCCGTCACTACAGATTGAATGATTAGTGTAGGACTTGGACTGCCCTGCGAGGC  
 TGGCAACATGTCG

#### 551E 18S-323dir/18S-823rev:

ATAACGGGTAACGGTGAATCAGGGTCGATTCCGGAGAGGGCGCTGAGAAACGGCGACCACTACGGAA  
 GGCAGCAGGCAGCAGCAAATTACCACTCCCGCACGGGAGGTAGTGACAAGAAATAACAATACGGGACTCTA  
 AACGAGGCCCGTAATTGGAATGAGTACACTTAAATCCTTAACGAGGATCTATTGGAGGGCAAGTCTGGT  
 CCAGCAGCCCGGTAATTCCAGCTCAATAGCTATATTAAAGTTGCTGCAGTTAAAAGCTCGTAGTTGGAT  
 CTGGCGTACGGGCTCGAGGTCCGCCGTTACTTCCCGTCCGACGTACCTCTCGGATTCCCTCGGT

GCTCTTAAC TGAGTGTCTGGTTACCGGACCGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCGCGAT  
GCCTGTATA GTGGTCATGGAATAA

**559B 18S-323dir/18S-823rev:**

TAACGGGTAACGGTGAATCAGGGTTCGATTCCGGAGAGGGCGCCTGAGAAACGGCACCCTACGGAAAG  
GCAGCAGGCACGCAAATTACCCACTCCCAGCAGGGGAGGTAGTGACAAGAAATAACAATACGGGACTCTAA  
ACGAGGGCCCCGTAATTGGAAATGAGTACCACTTAAATCCTTAACGAGGAATCTATTGGAAAGGGCAAGTCTGG  
TGCAGCAGCCGCGGTAACTCCAGCTCCAATAGCGTATATTAAAGCTGCTGCAGTAAAAGCTCGTAATTGG  
ATCTGGGCCGTACGGCTCGAGGTCCGCCGTTACTTCCGCTCCGACGTACCTCTCGGATTCCCT  
GGTGTCTTAAC TGAGTGTCTGGTTACCGGACCGTTACTTGAAAAAATTAAAGTGTCAAAGCAGGCG  
CATGCCGTATA GTGGTCATGGAATAA

*Semnoderes armiger:*

**521K S30/5FK:**

AGCCATGCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATCAGCTATGATTAT  
TGGATGAATACTTGACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGCCCTGACTTACGA  
AAGGGTGCACTTGCCAGACCAAAAACCAATCGGGCGTCAGCCGTTCACTGGCGAACATGGCAAACCTCTAT  
GCAGACCGCATGGTCAGAACCGCGGCATGTCCTCAAGCGTCTGCCTTATCAACTGTGATGGTAGGGTAA  
CTGCCTACCAGGTGATAACGGTAACGGAGAACATCAGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGCT  
ACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCAGCACGGGGAGGTAGTGACGAGAAATA  
ACAATACAGGACTCTTAGAGGCCCTGTAATTGGAAATGAGTACACTTAAATCCTTACCGAGGATCTATTGG  
AGGGCAAGTCTGGTCCAGCACGCCGCGTAATTCCAGCTCAATAGCGTATATTAAAGTTGCTGCAGTTAAA  
AGCTCGTAGTTGAATCTCACGTTTGGGTACGTGGTCGCTATAGCGATTACTACGTCTCCGACGTACCTC  
TCCGATTTCCTCGGTGCTTAACTGAGTGTCTGGTTACGGGACTGTTACTTGAAAAAATTAGAGTGT  
CAAAGCAGCAGGCTGCTGAATAGTGGTCATGGAATAATGGAAGACGACTTCGGGTCTATTGTTGGTT  
CCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGACTGCTCGTTAGAGGTGAAATTCTTG  
GATCGCAGCAAGACGAACACTGCGAA

**521R S30/5FK:**

TTAAGATTAAGCCATGCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATCAGCT  
ATGATTATTGGATGAATACTTGACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGCCCT  
GACTTACGAAAGGGTGCACTTGCCAGACCAAAAACCAATCGGGCGTCAGCCGTTCACTGGCGAACATGGC  
AAACTCTATGCAGACCGCATGGTCAGAACCGCGGCATGTCCTCAAGCGTCTGCCTTATCAACTGTGATG  
GTAGGGTAACTGCCTACCATGGTATAACGGTAACGGAGAACATCAGGTTGATTCCGGAGAGGGAGCCTGA  
GAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCAGCACGGGGAGGTAGTGAC  
GAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAAATGAGTACACTTAAATCCTTACCGAGGA  
TCTATTGGAGGGCAAGTCTGGTCCAGCACGCCGCGTAATTCCAGCTCAATAGCGTATATTAAAGTTGCTGC  
AGTTAAAAGCTCGTAGTTGAATCTCACGTTTGGGTACGTGGTCGCTATAGCGATTACTACGTCTCCG  
CGTACCTCTCGATTTCCTCGGTGCTTAACTGAGTGTCTGGTTACGGGACTGTTACTTGAAAAAATT  
AGAGTGTCAAAGCAGGCTGCGTGAATAGTGGTCATGGAATAATGGAAGACGACTTCGGGTCTATT  
GTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGACTGCTCGTTAGAGGTGA  
AATTCTGGATCGCAGCAAGACGAACACTGCGAA

**521Y S30/5FK:**

TTAAAGATTAAGCCATGCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATCAGC  
TATGATTATTGGATGAATACTTGACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGCC  
TGACTTACGAAAGGGTGCACTTGCCAGACCAAAAACCAATCGGGCGTCAGCCGTTCACTGGCGAACATGG  
CAAACCTATGCAGACCGCATGGTCAGAACCGCGGCATGTCCTCAAGCGTCTGCCTTATCAACTGTGAT  
GGTAGGGTAACTGCCTACCATGGTATAACGGTAACGGAGAACATCAGGTTGATTCCGGAGAGGGAGCCTG  
AGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCAGCACGGGGAGGTAGTG  
CGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAAATGAGTACACTTAAATCCTTACCGAGG  
ATCTATTGGAGGGCAAGTCTGGTCCAGCACGCCGCGTAATTCCAGCTCAATAGCGTATATTAAAGTTGCTG  
CAGTAAAAAGCTCGTAGTTGAATCTCACGTTTGGGTACGTGTTCGCTATAGCGATTACTACGTCTCCG  
ACGTACCTCTCGGATTCCCTCGGTGCTTAACTGAGTGTCTGGGTACGGGACTGTTACTTGAAAAAATT  
TAGAGTGTCAAAGCAGGCTGCTGAATAGTGGTCATGGAATAATGGAAGACGACTTCGGGTCTATT  
TGTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGACTGCTCGTTAGAGGTG  
AAATTCTTGATCGCAGCAAGACGAACACTGCGAACTTTTCCCGAGAAAAAAATTCAACTTTAACCG  
CAGCAGTACGGAAGCCCCCAGCAGTCCCTCAATCATTACCTCGTACCGGAAACCAACAAATAGACCG  
CGTCGTCTCAATATCCCTGACATCAATACAAGCGGCCGCCGTTGAACACTCTTATTITTTCAAAGT  
AGACGGTTCCGTAACCCATACACGTCACTAGGAGCACCGGTGAAATTGGAAAGGTACCGTCCGGGGAC

GTACTATCGCTATTGTCGACCGATACCGAAGTGGAAACTACCTACAGCTTTAACCTGGCCGACCTTCATA  
AGCTTTGAGCTTGGAGATATACCGGACCG

**521Z 4FB/1806R:**

CAGCTCCAATAGCGTATTAAGTTGCTGCAGTTAAAAGCTCGTAGTTGAATCTCACGTTTGGGTACGTG  
GTTCGCTATATAGCGATTACTACGTCTCCGACGTACCTCTCGATTCCCTCGTCTTAACGTGACTGCTT  
GGGTTACGGGACTGTTACTTGAAAAAAATTAGAGTGTCAAAAGCAGGCAGGCTGCTGAATAGTGGTGCATG  
GAATAATGGAAGACGACTTCGGGTCTATTGTTGGTTCGGATCACGAGGTAATGATTAAGAGGGACTGCC  
GGGGGATCCGTACTGCTGCCTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTT  
GCCAAGAATGTTTCAATTAACTAAGAACGAAAGTGGAGGTTCAAGGCGATCAGATACCGCCCTAGTCCGA  
CCATAAACGATGTCGACTGACAATCCGTGAAGGTTCTTGATGACTTGCAGGAGCTTCGGAAACCATT  
AAAGTGTTCAGGCTCCGGGGAGTATGGTGCAAAGCTGAACCTAAAGGAATTGACGGAAGGGACCAACCA  
GGAGTGGAGCCTGCAGCTTAATTGACTAACACGGAAAACCTACCCGGTCCGGACACTGTAAGGATTGACA  
GATTGAAGCTTCTGATTCACTGGTGGTGCATGGCCCTTCTAGTTGGTGGAGTGATTGCTGGTT  
AATTCCGATAACGAACGAGACTCTGGCCTACTAAATAGTCCGCCATAACGATTGTTGGCGATGACTTCTTA  
GGGGAACTAGCGCGCTTAGCCGACGAGATTGAGCAATAACAGGTCTGTGATGCCCTAGATGTCCGGGC  
CGCACCGCGCTACACTGACGTAGGCAGCGTGTGTTACCCCTTCTGGTAGGAATGGTAACCCATGAATT  
CTTGTGCTGCTAGGGATAGGAATTGCAATTATTCCCTGAACGAGGAATTCCCAGTAAGCGCGAGTCATAA  
GCTCGTGTGATTACGTCCCTGCCCTTGACACACCGCCCGTCTGACTACAGATTGAATGATTAGTGGAGGT  
CTCGGACTGGACCTGTCAACCGCAACGGTGGCATTGCTGTTCGGAAAGACGACCAAACCTGATTATTA  
GA

**521BB S30/5FK:**

GGCACAGCGAAACCGCGAATGGCTCATTAAATCAGCTATGATTATTGGATGAATACTTGCACATGGATAACT  
GTGGCAATTCTAGAGCTAATACATGGATGCCGCCCTGACTTACGAAAGGGTGCACCTGCCAGACCAAAAAC  
CAATCGGGCGTCAGCCGTTCACTGGCGAACCATGGCAAACACTATGCCAGACCGCATGGTCCAGAACCGCG  
GCATGTCCCTCAAGCGCTGCCTATCAACTGTGATGGTAGGGTAACCTGCCCTACCATGGTATAACGGTAA  
CGGAGAATCAGGGTTGATTCCGGAGAGGGAGCCTGAGAAACGGCTACCCACATCCAAGGAAGGCAGCAGGC  
ACGCAAATTACCCACTCCCAGCACGGGAGGTAGTACGAGAAATAACAATACAGGACTTTAGAGGCCCT  
GTAATTGGAATGAGTACACTTTAAATCCTTACCGAGGATCTATTGGAGGGCAAGTCTGGTGCAG  
GGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTGAGTTAAAAGCTCGTAGTTGAATCTCACGTTTGG  
GTACGTGGTCGCTATATAGCGATTACTACGTCTCCGACGTACCTCTCCGATTCCCTCGTCTTAAC  
AGTGTCTGGTACGGGACTTTACTTGAaaaaATTAGAGTGTCAAAGCAGGCTGCTGAATAGT  
GGTCATGGAATAATGGAAGACGACTCCGGTCTATTGTTGGTCCGGATCACGAGGTAATGATTAAGAG  
GGACTGCCGGGGCATCCGTACTGCTGCCTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGA  
A

**521RR S30/5FK:**

TCTCAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATCA  
GCTATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGCC  
CCTGACTTACGAAAGGGTGCACTTGCCAGACCAAAAACCAATCGGGCGTCAGCCCGTTCACTGGCGAACCAT  
GGCAAACCTATGCAGACCGCATGGTCCAGAACCGCGGATGTCTTCAAGCGTCTGCCTTATCAACTGTG  
ATGGTAGGGTAACCTGCCATGGTATAACGGGTAACGGAGAACATAGGGTTGATTCCGGAGAGGGAGGCC  
TGAGAAACGGTACACACATCCAAGGAAGGCAGCAGGACGCAAATTACCAACTCCAGCACGGGAGGGAGGTAG  
GACGAGAAATAACAATACAGGACTTTAGAGGCCCTGTAATTGGAAATGAGTACACTTTAAATCCTTACCGA  
GGATCTATTGGAGGGCAAGTCTGGTGCAGCAGCCCGGTAACTCCAGCTCAAAGCGTATATTAAAGTTGC  
TGCAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCTCGTATATAGCGATTACTACGTCTCC  
CGACGTACCTCTCGATTCCCTCGGTCTTAACGTGAGTGTCTGGTACGGGACTGTTACTTGAaaaa  
ATTAGAGTGTCAAAGCAGGCTGCCTGAATAGTGGCATGGAATAATGGAAGACGACTCCGGTCTAT  
TTGTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCCTAGAGG  
TGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAG

**542F S30/5FK:**

AAGATTAAGCCATGCTGCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATCAGCTAT  
GATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGCCCTGA  
CTTACGAAAGGGTGCACTTGCCAGACCAAAAACCAATCGGGCGTCAGCCCGTTCACTGGCGAACCATGCCAA  
ACTCTATGCAGACCGCATGGTCCAGAACCGCGGATGTCTTCAAGCGTCTGCCTTATCAACTGTGATGGT  
AGGGTAACCTGCCACCATGGTATAACGGGTAACGGAGAACATAGGGTTGATTCCGGAGAGGGAGCCTGAGA  
AACGGCTACACATCCAAGGAAGGCAGCAGGACGCAAATTACCAACTCCAGCACGGGAGGGTAGTGCAGA  
GAAATAACAATACAGGACTTTAGAGGCCCTGTAATTGGAAATGAGTACACTTTAAATCCTTACCGAGGATC  
TATTGGAGGGCAAGTCTGGTGCAGCAGCCCGGTAACTCCAGCTCAAAGCGTATATTAAAGTTGCTGCAG  
TTAAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCTCGTATATAGCGATTACTACGTCTCCGACG  
TACCTCTCCGATTCCCTCGGTCTTAACGTGAGTGTCTGGTACGGGACTGTTACTTGAaaaaATTAG  
AGTGTCAAAGCAGGCTGCCTGAATAGTGGCATGGAATAATGGAAGACGACTCCGGTCTATTG

TGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTCGTTAGAGGTGAAA  
TTCTGGATCGCAGCAAGACGAACACTCGCAA

**544C S30/5FK:**

TTAAAGATTAAGCCATGCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTATTAAATCAGC  
TATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGGCCC  
TGACTTACGAAAGGGTGCAGTGCAGACCAAAAAACCAATCGGGCGTCAGCCCGTTCAAGCGTCTGCCCTATCAACTGTG  
CAAACCTATGCAGACCGCATGGTCCAGAACCGCGGATGTCTTCAAGCGTCTGCCCTATCAACTGTG  
GGTAGGGTAACGCTCCTACCAGGTGATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGCCTG  
AGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCAGCACGGGAGGTAGTGA  
CGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTACCGAGG  
ATCTATTGGAGGGCAAGTCTGGTGCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTG  
CAGTAAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
ACGTACCTCTCGATTCCCTCGGTGCTCTAAGTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
TAGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGTGCATGGAATAATGGAAGACGACTTCGGGTCTATT  
TGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTCGTTAGAGGTG  
AAATTCTGGATCACAGCAAGACGAACACTGCTAAAGCATTCCCAA

**544E S30/5FK:**

TTAAAGATTAAGCCATGCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTATTAAATCAGC  
TATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGGCCC  
TGACTTACGAAAGGGTGCAGTGCAGACCAAAAAACCAATCGGGCGTCAGCCCGTTCAAGCGTCTGCCCTATCAACTGTG  
CAAACCTATGCAGACCGCATGGTCCAGAACCGCGGATGTCTTCAAGCGTCTGCCCTATCAACTGTG  
GGTAGGGTAACGCTCCTACCAGGTGATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGCCTG  
AGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCAGCACGGGAGGTAGTGA  
GAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTACCGAGG  
TCTATTGGAGGGCAAGTCTGGTGCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTG  
AGTAAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
CGTACCTCTCGATTCCCTCGGTGCTCTAAGTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
AGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGTGCATGGAATAATGGAAGACGACTTCGGGTCTATT  
GTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTCGTTAGAGGTG  
AAATTCTGGATCGCAGCAAGACGAACACTGCGA

**547C S30/5FK:**

AAAGATTAAGCCATGCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTATTAAATCAGC  
ATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGGCCC  
GACTTACGAAAGGGTGCAGTGCAGACCAAAAAACCAATCGGGCGTCAGCCCGTTCAAGCGTCTGCCCTATCAACTGTG  
AAACTCTATGCAGACCGCATGGTCCAGAACCGCGGATGTCTTCAAGCGTCTGCCCTATCAACTGTG  
GTAGGGTAACGCTCCTACCAGGTGATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGCCTG  
GAAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCAGCACGGGAGGTAGTGA  
GAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTACCGAGG  
TCTATTGGAGGGCAAGTCTGGTGCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTG  
AGTAAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
CGTACCTCTCGATTCCCTCGGTGCTCTAAGTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
AGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGTGCATGGAATAATGGAAGACGACTTCGGGTCTATT  
GTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTCGTTAGAGGTG  
AAATTCTGGATCGCAGCAAGACGAACACTGCGA

**549B S30/5FK:**

TTAAAGATTAAGCCATGCATGTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTATTAAATCAGC  
TATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGGCCC  
TGACTTACGAAAGGGTGCAGTGCAGACCAAAAAACCAATCGGGCGTCAGCCCGTTCAAGCGTCTGCCCTATCAACTGTG  
CAAACCTATGCAGACCGCATGGTCCAGAACCGCGGATGTCTTCAAGCGTCTGCCCTATCAACTGTG  
GGTAGGGTAACGCTCCTACCAGGTGATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGCCTG  
AGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCAGCACGGGAGGTAGTGA  
CGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAAATCCTTACCGAGG  
ATCTATTGGAGGGCAAGTCTGGTGCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTG  
CAGTAAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
ACGTACCTCTCGATTCCCTCGGTGCTCTAAGTGAATCTCACGTTGGTACGTGGTTCGCTATATAGCGATTACTACGTCTCCCG  
AGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGTGCATGGAATAATGGAAGACGACTTCGGGTCTATT  
GTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTCGTTAGAGGTG  
AAATTCTGGATCGCAGCAAGACGAACACTGCGA

**555B S30/5FK:**

AGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAATCAGCTATGATTATTGGATGAATACTTGACATGG  
ATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGCCCTGACTTACGAAAGGGTGCAGTGCACATGCCAGACCA  
AAAACCAATCGGGCGTCAGCCCCTCAGTGGCGAACCATGGCAAACCTCTATGCAGACCGCATGGTCAGAAC  
CGCGGCATGTCCCTCAAGCGTCTGCCATTCAACTGTGATGGTAGGGTAACCTGCCATGGTACAAG  
GGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGGCTGAGAAACGGCTACCATCCAAGGAAGGCAGC  
AGGCACGCAAATTACCCACTCCCAGCACGGGAGGTAGTGACGAGAAATAACAATACAGGACTCTTAGAGG  
CCCTGTAATTGGAATGAGTACACTTAAATCCTTACCGAGGATCTATTGGAGGGCAAGTCTGGTGCAGCAG  
CCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTCAGTTAAAAGCTCGTAGTTGAATCTCACGTT  
TTGGGTACGTGGTCGCTATATAGCATTACTACGTCCTCCGACGTACCTCTCCGATTCCCTCGGTGCTCTTA  
ACTGAGTGTCTGGGTACGGACTGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCAGGCTGCCTGAA  
TAGTGGTGCATGGAATAATGGAAGACGACTCGGGCTATTTGTTGGTCCGATCACGAGGTAATGATTA  
AGAGGACTGCCGGGGCATCCGTACTGCTGCGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAAC  
TGCAGAACATTGCCAAGAA

**555C 18S-323dir/18S-823rev:**

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGGCCCTGAGAAACGGCTACCATCCAAGGAA  
GGCAGCAGGCACGCAAATTACCCACTCCCAGCACGGGAGGTAGTGACGAGAAATAACAATACAGGACTCTT  
TAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTACCGAGGATCTATTGGAGGGCAAGTCTGGTGC  
CAGCAGCCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTCAGTTAAAAGCTCGTAGTTGAATC  
TCACGTTGGGTACGTGGTCGCTATATAGCATTACTACGTCCTCCGACGTACCTCTCCGATTCCCTCGGT  
GCTCTTAACTGAGTGTCTGGGTACGGACTGTTACTTGAAAAAATTAGAGTGTCAAAGCAGGCAGGCT  
GCCTGAATAGTGGTGCATGGAATAA

**555L S30/5FK:**

AAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAATCAGCT  
ATGATTATTGGATGAATACTTGACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGCCCT  
GACTTACGAAAGGGTGCACCTGCCAGACCAAAACCAATCGGGCGTCAGCCGTTAGTGGCGAACATGGC  
AAACTCTATGCAGACCGCATGGCCAGAACCGCGGCATGCTTCAAGCGTCTGCCATTCAACTGTGATG  
GTAGGGTAACTGCCTACCAGGTGATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGCCTGA  
GAAACGGTACCAAGGAAGGCAGCACGGCAAAATTACCCACTCCCAGCACGGGAGGTAGTGAC  
GAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTACCGAGGA  
TCTATTGGAGGGCAAGTCTGGTCCAGCAGCCGGTAATTCCAGCTCAAAGCGTATATTAAAGTTGCTGC  
AGTAAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCGCTATATAGCATTACTACGTCCTCCGA  
CGTACCTCTCGATTCCCTCGGTCTTAACTGAGTGTCTGGGTACGGACTGTTACTTGAAAAAATT  
AGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGTGCATGGAATAATGGAAGACGACTCGGGCTATTT  
GTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTAGAGGTGA  
AATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAGAA

**571C S30/5FK:**

TGCTCTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTA  
TCAGCTATGATTATTGGATGAATACTTGACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCC  
GGCCCTGACTTACGAAAGGGTGCACCTGCCAGACCAAAACCAATCGGGCGTCAGCCGTTAGTGGCGAAC  
CATGGCAAACCTCTATGCAGACCGCATGGCCAGAACCGCGGCATGCTTCAAGCGTCTGCCATTCAACTG  
TCGATGGTAGGTAACTGCCTACCAGGTGATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGG  
GCCTGAGAAACGGTACCAAGGAAGGCAGCACGGCAAAATTACCCACTCCCAGCACGGGAGGT  
AGTGACGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAC  
CGAGGATCTATTGGAGGGCAAGTCTGGTCCAGCAGCCGGTAATTCCAGCTCAAAGCGTATATTAAAGT  
TGCTGAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCGCTATATAGCATTACTACGTC  
TCCCGACGTACCTCTCGATTCCCTCGGTCTTAACTGAGTGTCTGGGTACGGACTGTTACTTGAA  
AAAATTAGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGTGCATGGAATAATGGAAGACGACTCGGGT  
CTATTGTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTA  
GAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAGAA

**572A S30/5FK:**

CTGTCTCAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTA  
ATCAGCTATGATTATTGGATGAATACTTGACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGC  
CGGCCCTGACTTACGAAAGGGTGCACCTGCCAGACCAAAACCAATCGGGCGTCAGCCGTTAGTGGCGAA  
CCATGGCAAACCTCTATGCAGACCGCATGGCCAGAACCGCGGCATGCTTCAAGCGTCTGCCATTCAACT  
GTCGATGGTAGGTAACTGCCTACCAGGTGATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGG  
AGCCTGAGAAACGGTACCAAGGAAGGCAGCACGGCAAAATTACCCACTCCCAGCACGGGAGG  
TAGTGACGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAA  
CCGAGGATCTATTGGAGGGCAAGTCTGGTCCAGCAGCCGGTAATTCCAGCTCAAAGCGTATATTAAAG  
TTGCTGAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCGCTATATAGCATTACTACGTC

CTCCCGACGTACCTCCGATTCCTCGGTGCTCTTAACGTAGTGCTTGGTTACGGACTGTTACTTGAA  
AAAATTAGAGTGTCAAAGCAGGCAGGCTGCCATGGATAATAGTGGCATGGAATAATGGAAGACGACTTCGGT  
CTATTTGTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTA  
GAGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGCAGAACGATTGCCAAGAA

**572C S30/5FK:**

CTTGTCTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAA  
ATCAGCTATGATTTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGC  
CGGCCCTGACTTACGAAAGGGTGCACCTGCCAGACCAAAACCAATCGGGCGTCAGCCCGTTAGTGGCGAA  
CCATGGCAAACCTATGCAGACCGCATGGCCAGAACCGCGCATGTCCCTCAAGCGTCTGCCCTATCAACT  
GTCGATGGTAGGGTAACCTGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGG  
AGCCTGAGAAACGGCTACCACATCCAAGGAAGGCAGGCAGGCAACGCAAATTACCCACTCCCAGCACGGGGAGG  
TAGTGACGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTA  
CCGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCAGCGCGTAATTCCAGCTCAAATAGCGTATATTAAAG  
TTGCTGCAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCGCTATATAGCGATTACTACGT  
CTCCCGACGTACCTCTCGATTCCTCGGTGCTCTTAACGTAGTGCTTGGTTACGGGACTGTTACTTGAA  
AAAATTAGAGTGTCAAAGCAGGCAGGCTGCCATGGATAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTA  
GAGGTGAAAT

**580A S30/5FK:**

TTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATGAGC  
TATGATTTATCGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCGGCC  
TGACTTACGAAAGGGTGCACCTGCCAGACCAAAACCAATCGGGCGTCAGCCCGTTAGTGGCGAACCATGG  
CAAACCTATGCAGACCGCATGGCCAGAACCGGCCATGTCCCTCAAGCGTCTGCCCTATCAACTGTCGAT  
GGTAGGGTAACCTGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGCCTG  
AGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCAACGCAAATTACCCACTCCCAGCACGGGGAGGTAGTGA  
CGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTACCGAGG  
ATCTATTGGAGGGCAAGTCTGGGCCAGCAGCGCGGTAAATTCCAGCTCAAATAGCGTATATTAAAGITGCTG  
CAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCGCTATATAGCGATTACTACGTCTCCG  
ACGTACCTCTCGATTCCTCGGTGCTCTTAACGTAGTGCTTGGTTACGGGACTGTTACTTGAAAAT  
TAGAGTGTCAAAGCAGGCAGGCTGCCATGGATAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTAGAGGTG  
AAATTCTGGATCGCAGCAAGACGAACACTCGCAGAACGATTGCCAAGAAAT

**580B S30/5FK:**

TTGTCTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAA  
TCAGCTATGATTTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCC  
GGCCCTGACTTACGAAAGGGTGCACCTGCCAGACCAAAACCAATCGGGCGTCAGCCCGTTAGTGGCGAAC  
CATGGCAAACCTATGCAGACCGCATGGCCAGAACCGGCCATGTCCCTCAAGCGTCTGCCCTATCAACTG  
TCGATGGTAGGGTAACCTGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGG  
GCCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCAACGCAAATTACCCACTCCCAGCACGGGGAGGT  
AGTGACGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTTAC  
CGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCAGCGCGGTAAATTCCAGCTCAAATAGCGTATATTAAAGT  
TGCTGCAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCGCTATATAGCGATTACTACGT  
TCCCGACGTACCTCTCGATTCCTCGGTGCTCTTAACGTAGTGCTTGGTTACGGGACTGTTACTTGAA  
AAAATTAGAGTGTCAAAGCAGGCAGGCTGCCATGGATAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTA  
GAGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGCAGAACGATT

**580I S30/5FK:**

CTTGTCTCAAAGATTAAGCCATGCATGTTCACTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAA  
ATCAGCTATGATTTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGC  
CGGCCCTGATTCTACGAAAGGGTGCACCTGCCAGACCAAAACCAATCGGGCGTCAGCCCGTTAGTGGCGA  
ACCATGGCAAACCTATGCAGACCGCATGGCCAGAACCGGCCATGTCCCTCAAGCGTCTGCCCTATCAAC  
TGTGATGGTAGGGTAACCTGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGAGG  
GAGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCAGGCAACGCAAATTACCCACTCCCAGCACGGGGAG  
GTAGTGACGAGAAATAACAATACAGGACTCTTAGAGGCCCTGTAATTGGAATGAGTACACTTAAATCCTT  
ACCGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCAGCGCGGTAAATTCCAGCTCAAATAGCGTATATTAA  
GTGCTGCAGTTAAAAGCTCGTAGTTGAATCTCACGTTGGTACGTGGTCGCTATATAGCGATTACTACG  
TCTCCCGACGTACCTCTCGATTCCTCGGTGCTCTTAACGTAGTGCTTGGTTACGGGACTGTTACTTGAA  
AAAAATTAGAGTGTCAAAGCAGGCAGGCTGCCATGGATAATGATTAAGAGGGACTGCCGGGGCATCCGT  
TCTATTGTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGT

580O S30/5FK:

CTTGTCTTCAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTA  
AATCAGCTATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATG  
CCGGCCCTGACTTACGAAAGGGTGCACTGCCAGACCAAAAACCAATCGGGCGTCAGCCGTTAGTGGCGA  
ACCATGGCAAACCTATGCAGACCGCATGGTCCAGAACCGGCCATGTCTTCAAGCGTCTGCCATTACAC  
TGTGATGGTAGGGTAAGTGCCTACCATGGTATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGG  
GAGCCTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGACGAAATTACCCACTCCCAGCACGGGAG  
GTAGTGACGAGAAATAACAATACAGGACTTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTT  
ACCGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCACGCCGGTAATTCCAGCTCCAATAGCGTATATTAAA  
GTTGCTGCAGTTAAAAGCTGTAGTTGAATCTCACGTTGGTACGTGGTCTGCTATATAGCGATTACTACG  
TCTCCGACGTACCTCTCGATTCCCTCGGTCTTAACGTAGTGTCTGGGTTACGGGACTGTTACTTGA  
AAAAATTAGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGCATGGAATAATGGAAGACGACTTCGG  
TCTATTGTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTA  
GAGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGGAAAGCATTTGCCAAGA

580Q S30/5FK:

TGCTTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAT  
CAGCTATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGATGCCG  
GCCCTGACTTACGAAAGGGTGCACTGCCAGACCAAAAACCAATCGGGCGTCAGCCGTTAGTGGCGAAC  
ATGCCAAACTCTATGCAGACCGCATGGTCCAGAACCGGCCATGTCTTCAAGCGTCTGCCATTACACTGT  
CGATGGTAGGGTAAGTGCCTACCATGGTATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAG  
CCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGACGCAAATTACCCACTCCCAGCACGGGAGGTA  
GTGACGAGAAATAACAATACAGGACTTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTT  
GAGGATCTATTGGAGGGCAAGTCTGGGCCAGCACGCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTT  
GCTCAGTTAAAAGCTGTAGTTGAATCTCACGTTGGTACGTGGTCTGCTATATAGCGATTACTACGTCT  
CCCGACGTACCTCTCGATTCCCTCGGTCTTAACGTAGTGTCTGGGTTACGGGACTGTTACTTGA  
AAATTAGAGTGTCAAAGCAGGCAGGCTGCCTGAATAGTGGCATGGAATAATGGAAGACGACTTCGGTC  
TATTTGTTGGTTCCGGATCACGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTAG  
AGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGGAAAGCATTTGCCAAGAA

*Condyloderes* sp.:

512B S30/5FK:

TCTTGCTTCAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATT  
AAATCAGCTATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGAC  
GCCGGCCCTGACTTACGAAAGGGTGCACTGCCAGACTAAAACCAATCGGGCTCTCACGGGCCGTTAGTG  
GCGAATCATGGCAAACCTATGCAGACTGCCAGGTCTGAACCGGCAGCAGTGTCTTCAAGCGTCTGCCATT  
CAACTGTGATGGTAGGGTAAGTGCCTACCATGGTATAACGGTAACGGAGAATCAGGGTTGATTCCGGAG  
AGGGAGCCTGAGAAACGGTACCCACATCCAAGGAAGGCAGCAGGCAGCAGCAAATTACCCACTCCCAGCTCGGG  
GAGGTAGTACGAGAAATAACAATACAGGACTTTAGAGGCCCTGTAATTGGAATGAGTACACTTTAACCT  
TTATCGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCACGCCGGTAATTCCAGCTCCAATAGCGTATATT  
AAAGTTGCTGCAGTTAAAAGCTGTAGTTGAATCTGGCTACGGCGCGCAGTCGCTTACAGCGACTAC  
TGCCTCGCCCGTGTACCTCTCCGTTCCCTCGGTCTTAACGTAGTGTCTGGGTTACGGGACTGTTACT  
TTGAAAAAAATTAGAGTGTCAAAGCAGGCAGGCCGCTGAATAGTGGCATGGAATAATGGAAGACGACCT  
CGGGTCTATTGTTGGTCCGGACTCAGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTG  
CGTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGGAAAGCATTTGCCAAGAAA

523E 18S-323dir/18S-823rev:

ATAACGGGTAAACGGTGAATCAGGGTTGATTCCGGAGAGGGAGGCCCTGAGAAACGGTACCCACATCCAAGGAA  
GGCAGCAGGCACGCCAAATTACCCACTCCCAGCTCGGGGAGGTAGTGCAGGAGAAATAACAATACAGGACTCTT  
TTGAGGCCCTGTAATTGGAATGAGTACACTTTAACCTTATCGAGGATCTATTGGAGGGCAAGTCTGGTGC  
CAGCAGGCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTGCAGTTAAAAGCTGTAGTTGGATC  
TGGCGTACGGCGCGCAGTCGCTTACAGCGACTACTCGCCTCGTACCTCTCCGTTCCCTCGGT  
GCTCTTAACGTAGTGTCTGGGTTACGGGACTGTTACTTGAaaaaATTAGAGTGTCAAAGCAGGCAGGCC  
GCCTGAATAGTGGTGCATGGAATAA

524A S30/5FK:

TTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAATCAGC  
TATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACGCCGGCC  
TGACTTACGAAAGGGTGCACTGCCAGACTAAAACCAATCGGGCTCTCACGGGCCGTTAGTGGCGAATCA  
TGGCAAACCTATGCAGACTGCACGGTCTCGAACCGGCAGCAGTGTCTTCAAGCGTCTGCCATTACACTGTC  
GATGGTAGGGTAAGTGCCTACCATGGTATAACGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGC

CTGAGAAACGGCTACCACATCCAAGGAAGGCAGCAGGCCAATTACCCACTCCCAGCTCGGGGAGGTAG  
TGACGAGAAATAACAATACAGGACTCTTGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTATCG  
AGGATCTATTGGAGGGCAAGTCTGGTGCCAGCAGCCGCGTAATTCCAGCTCCAATAGCGTATATTAAAGTTG  
CTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGCGCGCAGTCGCTTCACAGCGACTACTGCGCGT  
CCCGTCGTACCTCTCCGTTCCCGTCTTAACACTGAGTGTCTGGGTTACGGGACTGTTACTTGA  
AATTAGAGTGTCAAAGCAGGCAGGCCCTGAATAGTGGTGCATGGAATAATGGAAGACGACCTCGGGTCT  
ATTGGTGTGGTTCCGACTCAGAGGTAAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTCGCAGAAAGCATT

**541G S30/5FK:**

TTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATCAGC  
TATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACGCCGCC  
TGACTTACGAAAGGGTGCACTTGCCAGACTAAAAACCAATCGGGCTCTCACGGGCCGTTCACTGGCGAATCA  
TGGCAACTCTATGCAGACTGCACGGTCTCGAACCGGCAGCATGTCCTCAAGCGTCTGCCTTATCAACTGTC  
GATGGTAGGGTAACTGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGAGGGAGC  
CTGAGAAACGGCTACACATCCAAGGAAGGCAGCAGGCCAATTACCCACTCCCAGCTCGGGGAGGTAG  
TGACGAGAAATAACAATACAGGACTCTTGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTTATCG  
AGGATCTATTGGAGGGCAAGTCTGGTGCCAGCAGCCGCGTAATTCCAGCTCCAATAGCGTATATTAAAGTTG  
CTGCAGTTAAAAGCTCGTAGTTGGATCTGGCGTACGGCGCCAGTCGCTTCACAGCGACTACTGCGCGT  
CCCGTCGTACCTCTCCGTTCCCGTCTTAACACTGAGTGTCTGGGTTACGGGACTGTTACTTGA  
AATTAGAGTGTCAAAGCAGGCAGGCCCTGAATAGTGGTGCATGGAATAATGGAAGACGACCTCGGGTCT  
ATTGGTGTGGTTCCGACTCAGAGGTAAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTAGA  
GGTGAATTCTGGATCGCAGCAAGACGAACACTCGCAGAAAGCATT

**542J S30/5FK:**

TGTTTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAAT  
CAGCTATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACGCC  
GCCCTGACTTACGAAAGGGTGCACTTGCCAGACTAAAAACCAATCGGGCTCTCACGGGCCGTTCACTGGCGA  
ATCATGGCAAACCTCTATGCAGACTGCACGGTCTCGAACCGGCAGCATGTCCTCAAGCGTCTGCCTTATCAAC  
TGTGATGGTAGGGTAACGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGAGG  
GAGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCAGGCCAATTACCCACTCCCAGCTCGGGGAG  
GTAGTGACGAGAAATAACAATACAGGACTCTTGAGGCCCTGTAATTGAATGAGTACACTTAAATCCTT  
ATCGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTAA  
GTTGCTGCAATTAGCTCGTAGTTGGATCTGGCGTACGGCGCGAGTCGCTTCACAGCGACTACTGC  
GGTCCCGTGTACCTCTCGTTCCCTCGTCTTAACACTGAGTGTCTGGGTTACGGGACTGTTACTTG  
AAAAAATTAGAGTGTCAAAGCAGGCAGGCCCTGAATAGTGGTGCATGGAATAATGGAAGACGACCTCGG  
GTCTATTGGTGTGGTTCCGACTCAGAGGTAAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTT  
AGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGCAGAAAGCATT

**551C S30/5FK:**

CTGTCTTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAA  
ATCAGCTATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACGC  
CGGCCCTGACTTACGAAAGGGTGCACTTGCCAGACTAAAAACCAATCGGGCTCTCACGGGCCGTTCACTGGC  
GAATCATGGCAAACCTCTATGCAGACTGCACGGTCTCGAACCGGCAGCATGTCCTCAAGCGTCTGCCTTATCA  
ACTGTGATGGTAGGGTAACGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGA  
GGGAGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCAGGCCAATTACCCACTCCCAGCTCGGGG  
AGGTAGTGACGAGAAATAACAATACAGGACTCTTGAGGCCCTGTAATTGAATGAGTACACTTAAATCCT  
TTATCGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTA  
AAGTTGCTGCAATTAGCTCGTAGTTGGATCTGGCGTACGGCGCGAGTCGCTTCACAGCGACTACT  
GGCGTCCCGTGTACCTCTCGTTCCCTCGTCTTAACACTGAGTGTCTGGGTTACGGGACTGTTACTT  
TGAAAAAATTAGAGTGTCAAAGCAGGCAGGCCCTGAATAGTGGTGCATGGAATAATGGAAGACGACCTC  
GGGTCTATTGGTGTGGTTCCGACTCAGAGGTAAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGC  
GTTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTCGCAGAAAGCATTGCCAAGA

**553H S30/5FK:**

CTGTCTTAAAGATTAAGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAA  
ATCAGCTATGATTATTGGATGAATACTTGCACATGGATAACTGTGGCAATTCTAGAGCTAATACATGGACGC  
CGGCCCTGACTTACGAAAGGGTGCACTTGCCAGACTAAAAACCAATCGGGCTCTCACGGGCCGTTCACTGGC  
GAATCATGGCAAACCTCTATGCAGACTGCACGGTCTCGAACCGGCAGCATGTCCTCAAGCGTCTGCCTTATCA  
ACTGTGATGGTAGGGTAACGCCTACCATGGTATAACGGGTAACGGAGAATCAGGGTTGATTCCGGAGA  
GGGAGCCTGAGAAACGGTACCATCCAAGGAAGGCAGCAGGCCAATTACCCACTCCCAGCTCGGGG  
AGGTAGTGACGAGAAATAACAATACAGGACTCTTGAGGCCCTGTAATTGAATGAGTACACTTAAATCCT  
TTATCGAGGATCTATTGGAGGGCAAGTCTGGGCCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTA  
AAGTTGCTGCAATTAGCTCGTAGTTGGATCTGGCGTACGGCGCGAGTCGCTTCACAGCGACTACT

GCGCGTCCCGTCGTACCTCTCGCTTCCCTCGGTGCTTAAC TGAGTGCTTGGTTACGGGACTGTTACTT  
TGAAAAAAATTAGAGTGTCAAAGCAGGCAGGCCGCTGAATAGTGGTGCATGGAATAATGGAAGACGACCTC  
GGGTCTATTGTTGGTTCCGGACTCAGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGC  
TTAGAGGTGAAATTCTGGATCGCAGCAAGACGAACACTGCGAAAGCATTGCCAAGAA

**554B S30/5FK:**

AGCCATGCATGTCTCAGTACAAGCTCCGGCACAGCGAAACCGCGAATGGCTCATTAAATCAGCTATGATTAT  
TGGATGAATACTGCACATGGATAACTGTGGCAATTCTAGAGCTAACATGGACGCCGCCCTGACTTACGA  
AAAGGTGCACCTGCCAGACTAAAAACCAATCGGGCTCTCACGGGCCGTTCACTGGCGAATCATGGCAAAC  
CTATGCAGACTGCACGGTCTCGAACCGGCAGCATGCTTCAAGCGTCTGCCTTATCAACTGTCGATGGTAGG  
GTAACTGCCTACCAGGTGATAACGGTAACGGAGAACGAGGTTGATTCCGGAGAGGGAGCCTGAGAAC  
GGCTACCACATCCAAGGAAGGCAGCAGGCACGCAAATTACCCACTCCCAGCTCGGGGAGGTAGTGACGAGAA  
ATAACAATACAGGACTCTTGAGGCCGTTGATAATTGGAATGAGTACACTTAAATCCTTATCGAGGATCTATT  
GGAGGGCAAGTCTGGTCCAGCAGCCGGTAATTCCAGCTCCAATAGCGTATATTAAAGTTGCTGCAGTAA  
AAAGCTCGTAGTTGGATCTGGCGTACGGGCGCGACTTCGCTTACAGCGACTACTGCGCGTCCCGTAC  
CTCTCCGTTCCCTCGGTGCTTAACTGAGTGTCTGGGTTACGGGACTGTTACTTGAAAAAAATTAGAGT  
GTTCAAAGCAGGCAGGCCGCTGAATAGTGGTGCATGGAATAATGGAAGACGACCTCGGGCTATTGTTGG  
TTCCGGACTCAGAGGTAATGATTAAGAGGGACTGCCGGGGCATCCGTACTGCTGCGTTAGAGGTGAAATT  
TTGGATCGCAGCAAGACGAACACTGCGAA