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Short Cruise Report

RV Maria S. Merian Cruise MSM41

St. Georges, Bermuda – Dockyards, Bermuda

01 April – 29 April 2015

Chief Scientist: Reinhold Hanel

Captain: Ralf Schmidt

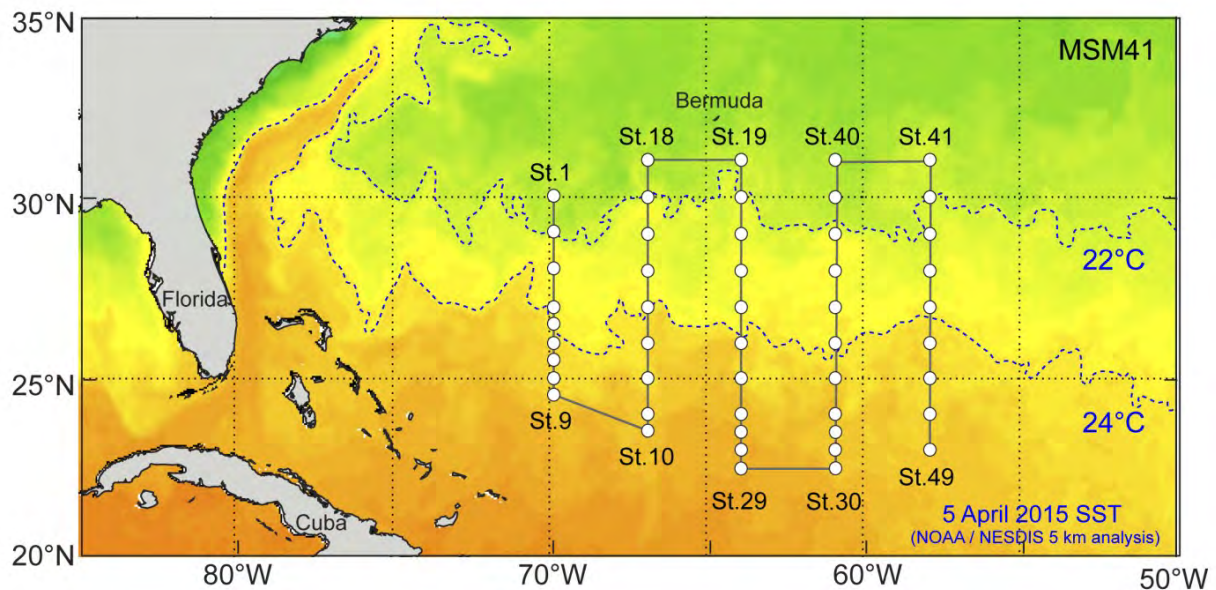


Figure 1. Map of the sampling stations of the MSM41 research cruise conducted in the Sargasso Sea in April 2015 showing the sea surface temperature (SST) patterns estimated for 5 April 2015 by the data-assimilative analysis of NOAA/Nesdis, which uses all available data for each day. The 22°C (northern front) and 24°C (southern front) are shown, since these temperature isotherms are associated with the locations where fronts can form in the Subtropical Convergence Zone of the Sargasso Sea during the autumn to spring seasons.

Objectives

This comprehensive and interdisciplinary research cruise was intended to assess the hydrographic and ecological situation of the central Sargasso Sea pelagic community, its key components and major trophic pathways. Special focus was given to the early life history stages (leptocephali) of the two Atlantic freshwater eel species of the genus *Anguilla* in their presumed spawning grounds to elucidate potential causes for the catastrophic decline of the commercially important European eel stock.

The huge Atlantic garbage patch in this area was analysed for interactions between microbial processes and microplastic particles, which may also impact the fitness of eel larvae. In addition, the apparent decline of the habitat---shaping pelagic *Sargassum* macroalgae was investigated via an ecophysiological approach to identify stressors in relation to climate change (e.g. temperature, UV).

Narrative

The MSM41 research cruise started on 01 April 2015, when RV Maria S. Merian left Pennos Wharf in St. George's, Bermuda and – after bunkering at Dockyards – steamed southwest to the first sampling station. The survey consisted of 5 meridional transects spread across 8.5 degrees of latitude (Figure 1). Six types of sampling gears (Figure 2) were used and, additionally, *Sargassum* seaweed and floating anthropogenic objects were collected from the ship or from the fast rescue boat (FRB) (Figs. 3, 6). Meso--- and macrozooplankton as well as micronekton and neuston were collected by various nets, whereas phytoplankton was obtained from the rosette water sampler attached to the Conductivity, Temperature, Depth Profiler (CTD). Stations were positioned at 1 degree latitude intervals and transects spaced every 3 degrees of longitude, but some additional stations were added at the southern ends of the first 4 transects (Figure 1).

The ship arrived at St. 1 at 30°N and 70°W on 2 April and all the sampling gears were deployed. The standard sequence involved a CTD cast either to 500 or 1.000 m depth first, followed alternatively by a vertical MultiNet haul to 1.000 m depth or a MOCNESS (Multiple Opening and Closing Net with Environmental Sensing System) trawl to 500 m maximum depth. Every station was completed with either one or two double oblique IKMT trawls (0.5 mm mesh size as standard, 5 mm mesh size at selected additional stations). In parallel, the Manta Trawl was deployed to catch neuston organisms and microplastic particles from the surface (Fig. 5). A technical problem of the CTD identified at St. 1 could be fixed soon.

Only at the middle transect at 64°W, the MOCNESS was deployed to a depth of 1.000 m at stations at the northern, middle, and southern station of the transect. To facilitate the collection of larger debris, nautical officers watched for drifting objects, recorded their locations in a data log, and alerted the scientific team when a promising object could be recovered onto the ship.

Leptocephali of the American eel, *Anguilla rostrata*, were abundant along the southern part of the first transect (Figure 8, Figure 9), but only a few European eel,

Anguilla anguilla, leptocephali were collected, presumably Transect 1 is at the western edge of their spawning area. Previous surveys for anguillid larvae in the Sargasso Sea did not cover the southern areas systematically. Therefore, the transects of the MSM41 survey were extended to the south and some extra stations were added at half-degree intervals (Figure 1).

Along Transect 2, European eel larvae were abundant only at the central stations (Figure 8). It was also apparent from the abundances and species compositions of eel leptocephali, zooplankton and fish collections that there was a latitudinal gradient in the assemblages of organisms. Some species of marine eel leptocephali (Figure 10) were abundant in the northern or central stations of the first two transects and this trend continued in the later transects.

At Transect 3, where the frontal zone was located further north, European eel leptocephali were collected also at the northernmost stations (Figure 8). Anthropogenic debris objects continued to be encountered and recovered, and the organisms that had colonized them were sampled and documented (Figure 11).

Two extra IKMT stations were added at the southern ends of Transect 3 and 4 at 64°W. At the southernmost station of Transect 4, the CTD was deployed to a depth of 4000 m to allow the cable to unwind properly. Along Transect 4, European eel larvae were most abundant at the central stations close to the frontal zones, whereas none were collected at the southernmost stations (Figure 8).

At the fifth and final transect at 58°W, large catches of zooplankton were collected again at the northernmost stations, and European eel leptocephali continued to be collected in the middle parts of the transect, while they were absent from the southernmost stations again. The last station, St. 49, was sampled on 26 April, with the IKMT being the last gear to come back onboard late in the evening.

With the extensive data collected by the different research teams at stations spread over such a large geographic area, the MSM41 research cruise was very successful, and could fully achieve its objectives. More than 360 anguillid leptocephali and almost 2000 marine eel leptocephali were collected and identified onboard, but the final identifications of the anguillid larvae will be made using molecular genetic methods later in the laboratory. Extensive samples and data sets were also obtained from all the other gears, and many ecophysiological measurements were made on the freshly collected *Sargassum*. Many samples will be analyzed later, and methodologies such as nitrogen and carbon stable isotopic and fatty acid analyses will be conducted to evaluate the trophic structure of the marine food web and the possible interactions of the various components of the food web of the Sargasso Sea. Distributions and abundances of different taxonomic groups will be examined in relation to the hydrographic regime of the Subtropical Convergence Zone of the Sargasso Sea, and the results of each research group will be compared and integrated as the findings of the cruise move toward publication in international journals.

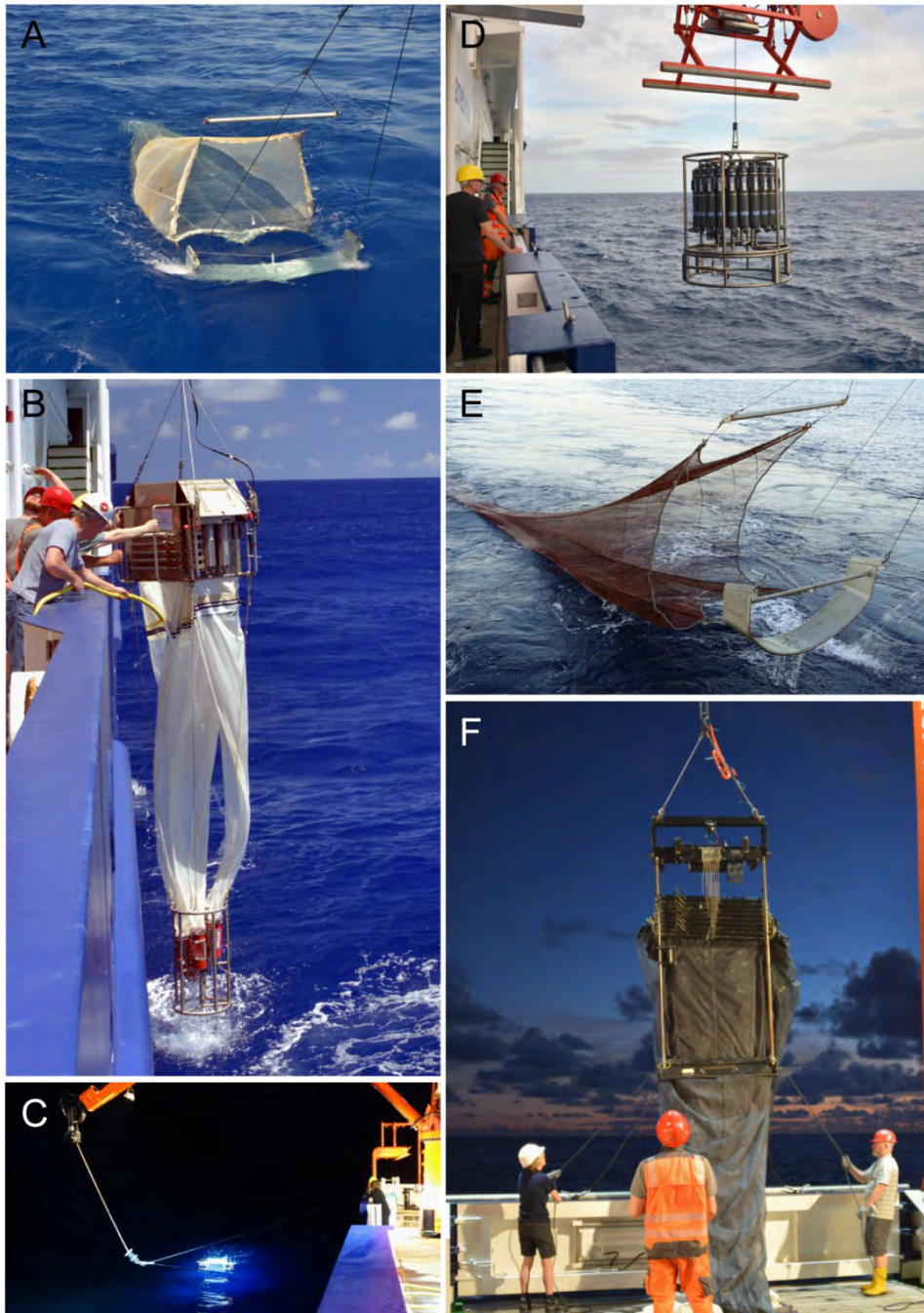


Figure 2. Photographs of the 5 types of nets that were used to collect leptocephali, fishes, mesozooplankton, and cephalopods during the MSM41 sampling survey in the Sargasso Sea in April 2015 (A-C, E, F) and the CTD (D) that collected hydrographic data and water samples at each station. The 0.5 mm mesh IKMT (A) was the primary net used to collect leptocephali, the Multinet (B) sampled vertically to collect zooplankton in different depth ranges, the Manta Trawl (C) collected marine debris, algae, fishes, crustaceans and other organisms at the surface, the large-mesh IKMT (E) was used to collect larger leptocephali, fishes, cephalopods and crustaceans, and the 1-m MOCNESS (F) was used to collect zooplankton and other animals.



Figure 3. Photographs of the efforts to collect *Sargassum* algae (A-C) or anthropogenic marine debris such as pieces of styrofoam (D) or parts of old fishing nets (E).

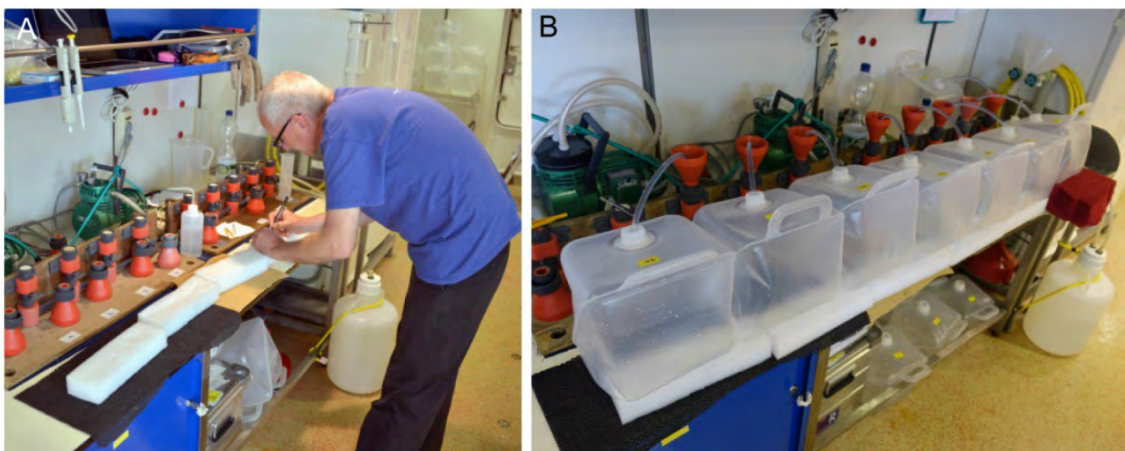


Figure 4. Photographs of the methodology for preserving filter samples of phytoplankton (A) that are obtained by filtering water samples collected by the CTD water bottles.

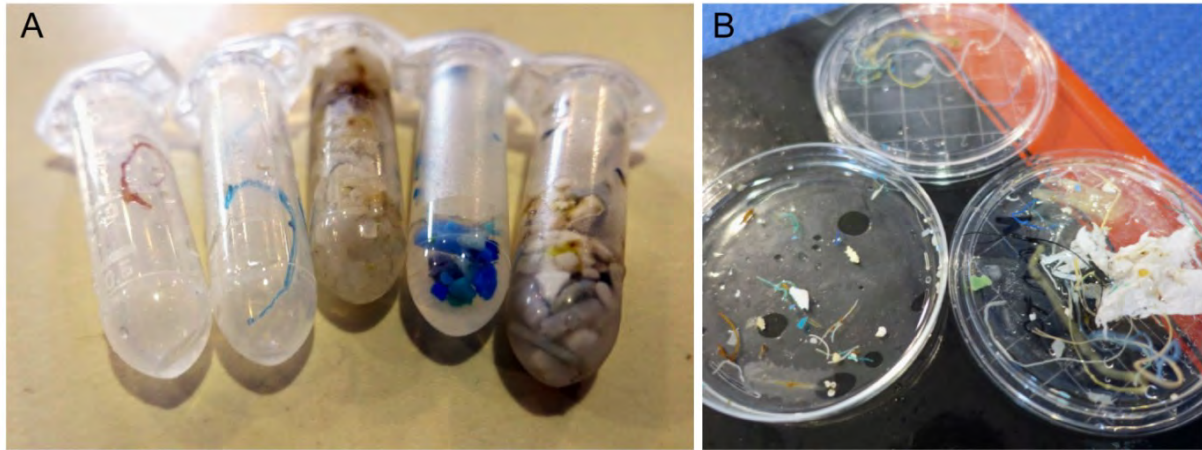


Figure 5. Vials containing marine microplastic particles (A) and other plastic and fishnet debris (B) collected at the ocean surface by the Manta Trawl.

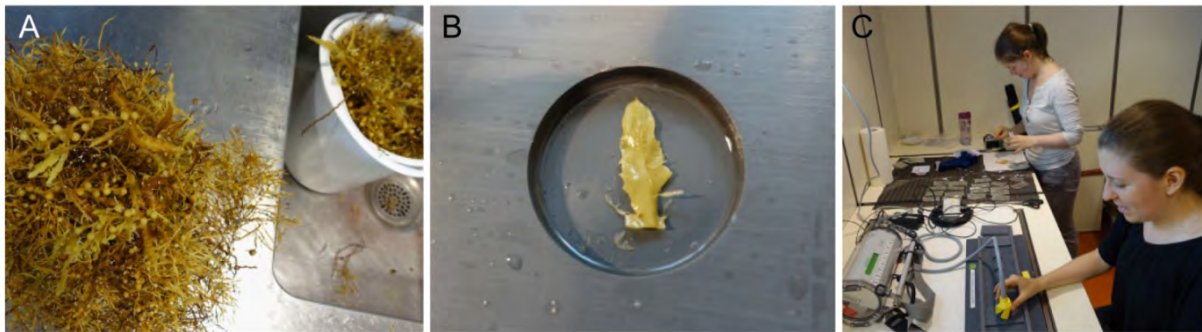


Figure 6. Photographs of collected *Sargassum* algae samples (A) used for onboard respiration measurements (B, C).



Figure 7. Euphausiid crustaceans (krill) collected during the MSM41 survey that were the focus group of one research team. Their depth distributions, species compositions, and geographic distributions will be analyzed primarily using the collections made with the MOCNESS and Mutlinet sampling systems.

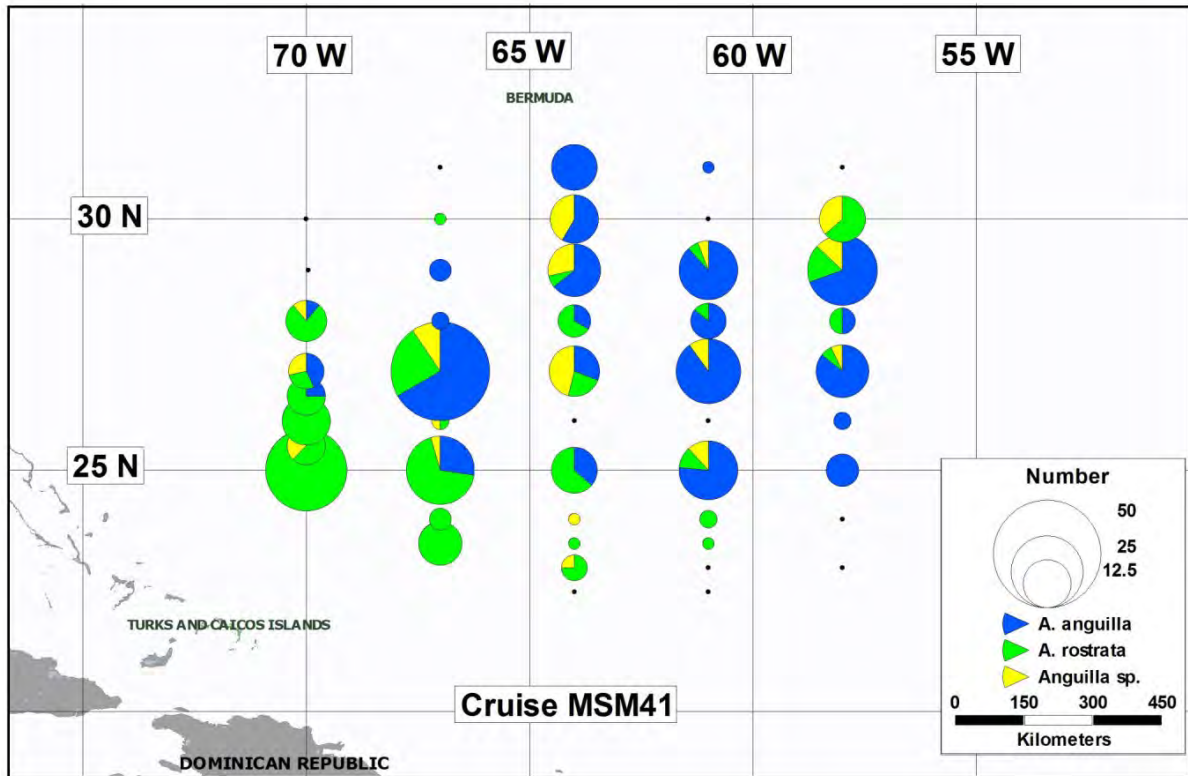


Figure 8. Map showing the number of leptocephalus larvae of the freshwater eels of *Anguilla anguilla* (European eel) and *Anguilla rostrata* (American eel) collected at each station of the 5 transects during the MSM41 survey in the Sargasso Sea in April 2015 according to the morphological identifications onboard (counting of the number of myomere muscle segments), also showing the larvae that could not be distinguished to the species level (*Anguilla* sp.). The sizes of the circles indicate the number of anguillid larvae at each station.

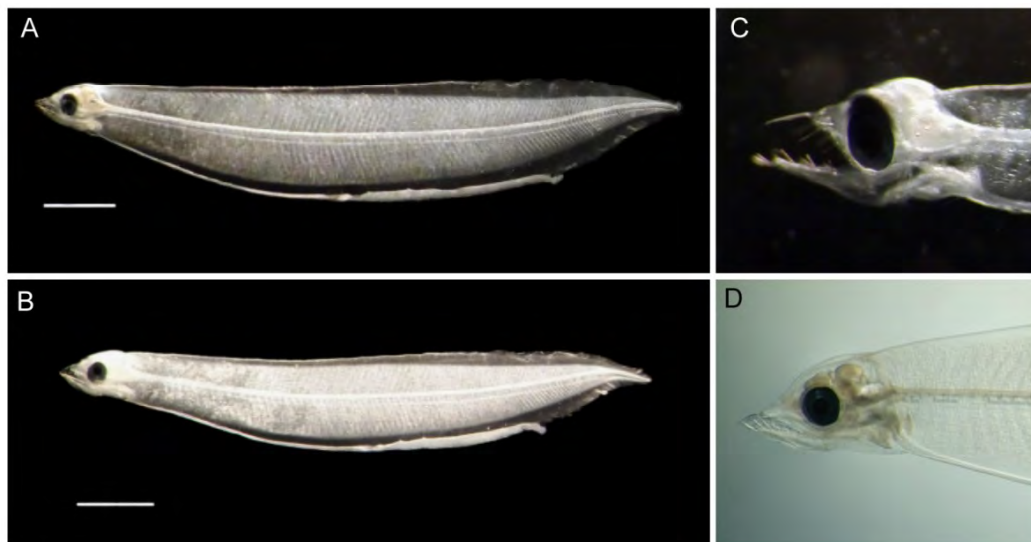


Figure 9. Photographs of anguillid leptocephali, that were collected during the MSM41 research cruise in the Sargasso Sea showing (A) a 17.9 mm European eel, *Anguilla anguilla*, larva, (B) a 14.4 mm American eel, *Anguilla rostrata*, larva, and the head regions of an 11.3 mm European eel larva (C) and a 23.3 mm American eel larva. Scale bars in (A,B) are 2 mm.

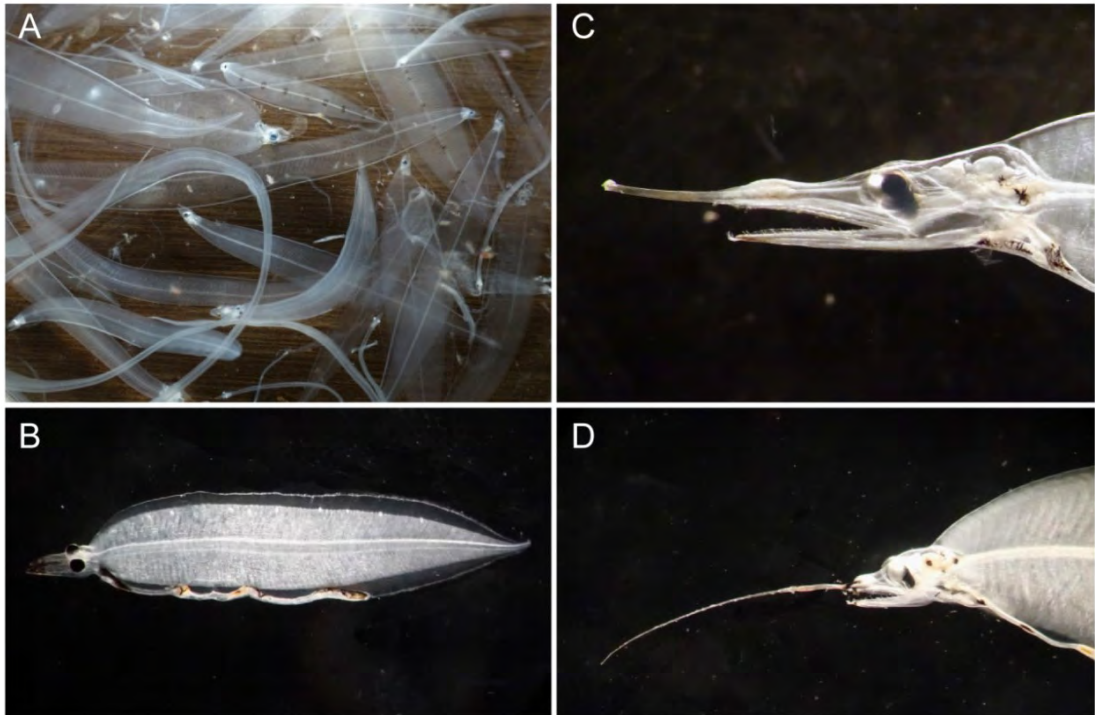


Figure 10. Photographs of a variety of marine eel leptocephali including the Congridae, Chlopsidae, Moringuidae, and Muraenidae (A), a rare species of bobtail eel of the Cyematidae (a type of the species group of *Leptocephalus holti*), whose adult species are unknown (B), and rare species of leptocephali of the Synaphobranchidae, which are unique in having extensions from the head that are referred to as rostral cartilages (C,D).

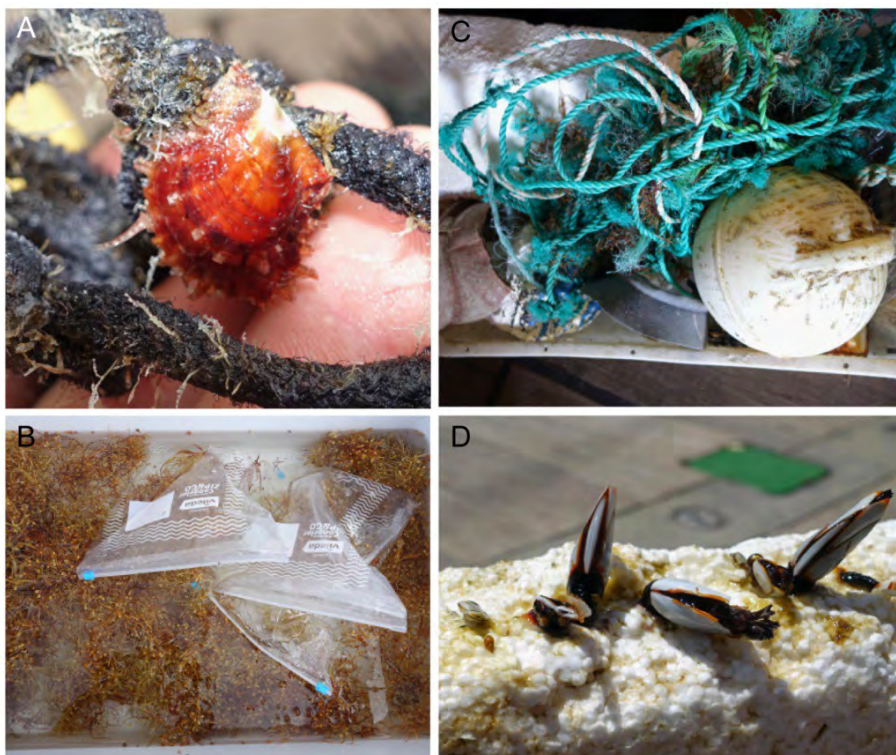


Figure 11. Materials collected to examine the colonizing organisms (e.g., bivalves, barnacles, gastropods) on anthropogenic debris (A,C,D) and *Sargassum* algae (B).

Acknowledgements

We would like to thank captain Ralf Schmidt, his officers and the crew of the RV Maria S. Merian for their interest and enthusiasm for the objectives of this survey and their excellent cooperation and support that enabled us to successfully achieve all our research goals. We acknowledge the members of the Maria S. Merian advisory board for providing ship time funding and the members of the Control Station of German Research Vessels for their kind support during the preparations for this cruise.

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1	Reinhold Hanel	Chief Scientist	Thünen
2	Wilhelm Hagen	Food Web Analysis	BreMarE
3	Holger Auel	Multinet, Zooplankton	BreMarE
4	Kristina Koch	Sargassum Physiology	BreMarE
5	Lea Sielhorst	Sargassum Physiology	BreMarE
6	Uwe Piatkowski	Cephalopod Biology	GEOMAR
7	Alexandra Lischka	Cephalopod Biology	GEOMAR
8	Lisa Kettmer	Larval fish biology	GEOMAR
9	Lars Gutow	Sargassum Fauna	AWI
10	Imke Petersen	Sargassum Fauna	AWI
11	Fritz Buchholz	MOCNESS	AWI
12	Cornelia Buchholz	MOCNESS	AWI
13	Stephanie Mothes	Manta Trawl	IOW
14	Manfred Kaufmann	Phytoplankton	UMA
15	Håkan Westerberg	CTD, Physical Oceanography	SLU
16	Michael Miller	Leptocephalus identification	Nihon Univ.
17	Mari Kuroki	Leptocephalus identification	Univ. Tokyo
18	Lasse Marohn	IKMT, larval fish biology	Thünen---FI
19	Klaus Wysujack	IKMT, larval fish biology	Thünen---FI
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Nihon Univ.: College of Bioresource Sciences, Nihon University, Fujisawa, Japan

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Station list RV Maria S. Merian MSM41

Gear coding

CTD/RO: CTD/and rosette sampler

MSNV: Multinet vertical sampling net

IKMT 0.5: Isaacs---Kidd Midwater Trawl, 0.5 mm mesh size

MOCN: 1---m MOCNESS (Multiple Opening and Closing, Environmental Sensing System)

MT: Manta Trawl

IKMT 5: Isaacs---Kidd Midwater Trawl, 5 mm and larger mesh sizes

Station	Date	Time (UTC)	Position Lat	Position Lon	Gear	Depth (m)
MSM41/001---1	02.04.2015	21:18	30° 0,01' N	70° 0,03' W	CTD/RO	1000
MSM41/001---2	02.04.2015	22:29	30° 0,07' N	70° 0,59' W	MSNV	1000
MSM41/001---3	03.04.2015	00:02	30° 0,03' N	69° 59,95' W	IKMT 0.5	2 x 300
MSM41/001---4	03.04.2015	04:12	30° 0,00' N	70° 0,04' W	MOCN	500
MSM41/001---5	03.04.2015	06:39	30° 0,05' N	70° 0,12' W	MT	
MSM41/001---6	03.04.2015	07:19	30° 0,04' N	69° 59,80' W	IKMT 5	2 x 300
MSM41/001---7	03.04.2015	10:40	30° 1,86' N	69° 52,19' W	CTD/RO	aborted
MSM41/002---1	03.04.2015	16:12	28° 59,93' N	69° 59,70' W	IKMT 0.5	2 x 300
MSM41/002---2	03.04.2015	18:46	28° 59,98' N	70° 0,03' W	MT	
MSM41/002---3	03.04.2015	19:29	29° 0,47' N	69° 59,65' W	MOCN	500
MSM41/002---4	03.04.2015	21:11	29° 0,36' N	69° 57,87' W	CTD/RO	1000
MSM41/003---1	04.04.2015	03:21	28° 0,04' N	70° 0,04' W	CTD/RO	1000
MSM41/003---2	04.04.2015	04:20	28° 0,20' N	69° 59,99' W	MSNV	1000
MSM41/003---3	04.04.2015	06:06	28° 0,48' N	69° 59,53' W	IKMT 0.5	2 x 300
MSM41/003---4	04.04.2015	09:03	28° 0,06' N	70° 0,06' W	CTD/RO	500
MSM41/003---5	04.04.2015	09:52	27° 59,96' N	69° 59,72' W	IKMT 5	2 x 300
MSM41/003---6	04.04.2015	13:04	27° 56,25' N	69° 52,55' W	FRB	
MSM41/003---7	04.04.2015	14:52	27° 54,61' N	69° 47,94' W	IKMT 5	1000
MSM41/004---1	04.04.2015	22:08	27° 0,00' N	70° 0,00' W	CTD/RO	1000
MSM41/004---2	04.04.2015	23:16	26° 59,95' N	69° 59,89' W	MOCN	500
MSM41/004---3	04.04.2015	23:56	26° 59,42' N	69° 58,68' W	MT	

MSM41/004---4	05.04.2015	01:59	26° 59,92' N	69° 59,50' W	IKMT 0.5	2 x 300
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MSM41/008---3	06.04.2015	08:19	25° 0,30' N	69° 59,74' W	IKMT 0.5	2 x 300
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MSM41/009---1	06.04.2015	13:37	24° 30,02' N	70° 0,03' W	CTD/RO	500
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MSM41/011---2	07.04.2015	15:58	23° 59,99' N	66° 59,99' W	MSNV	300
MSM41/011---3	07.04.2015	16:31	24° 0,15' N	66° 59,94' W	IKMT 0.5	2 x 300
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MSM41/013---3	08.04.2015	16:09	26° 0,02' N	67° 0,02' W	MSNV	1000
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MSM41/019---4	11.04.2015	23:30	30° 59,61' N	64° 0,14' W	MT	
MSM41/019---5	12.04.2015	03:29	30° 59,90' N	64° 0,07' W	IKMT 0.5	2 x 300
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MSM41/021---3	13.04.2015	01:24	28° 59,52' N	63° 59,83' W	MT	
MSM41/021---4	13.04.2015	04:16	28° 59,98' N	64° 0,00' W	IKMT 0.5	2 x 300
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MSM41/022---2	13.04.2015	11:34	28° 0,00' N	64° 0,09' W	FRB	
MSM41/022---3	13.04.2015	12:12	28° 0,00' N	64° 0,09' W	MSNV	1000
MSM41/022---4	13.04.2015	13:40	28° 0,06' N	63° 59,88' W	IKMT 0.5	2 x 300
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MSM41/023---2	13.04.2015	22:37	27° 0,02' N	63° 59,87' W	MOCN	1000
MSM41/023---3	13.04.2015	22:51	27° 0,01' N	63° 59,33' W	MT	
MSM41/023---4	14.04.2015	02:23	27° 0,04' N	63° 59,80' W	IKMT 0.5	2 x 300
MSM41/024---1	14.04.2015	09:50	25° 59,99' N	63° 59,95' W	CTD/RO	1000
MSM41/024---2	14.04.2015	10:48	25° 59,99' N	63° 59,95' W	MSNV	1000
MSM41/024---3	14.04.2015	12:12	25° 59,88' N	63° 59,62' W	IKMT 0.5	2 x 300
MSM41/025---1	14.04.2015	22:22	24° 59,99' N	64° 0,01' W	CTD/RO	500
MSM41/025---2	14.04.2015	23:14	25° 0,28' N	63° 59,73' W	MOCN	500
MSM41/025---3	15.04.2015	00:20	25° 1,22' N	63° 57,54' W	MT	
MSM41/025---4	15.04.2015	01:53	25° 0,21' N	63° 59,85' W	IKMT 0.5	aborted

MSM41/025---5	15.04.2015	03:04	25° 0,11' N	63° 59,89' W	IKMT 0.5	2 x 300
MSM41/026---1	15.04.2015	10:48	24° 0,00' N	64° 0,04' W	CTD/RO	1000
MSM41/026---2	15.04.2015	11:35	24° 0,00' N	64° 0,04' W	MSNV	1000
MSM41/026---3	15.04.2015	13:10	24° 0,47' N	63° 59,90' W	IKMT 0.5	2 x 300
MSM41/026---4	15.04.2015	14:00	24° 1,02' N	63° 58,18' W	MT	
MSM41/027---1	15.04.2015	19:26	23° 30,04' N	64° 0,08' W	FRB	
MSM41/027---2	15.04.2015	19:35	23° 30,03' N	64° 0,11' W	CTD/RO	300
MSM41/027---3	15.04.2015	20:08	23° 30,19' N	63° 59,91' W	IKMT 0.5	2 x 300
MSM41/028---1	16.04.2015	03:07	23° 0,00' N	64° 0,05' W	CTD/RO	1000
MSM41/028---2	16.04.2015	04:26	22° 59,85' N	63° 59,87' W	IKMT 0.5	2 x 300
MSM41/028---3	16.04.2015	07:43	22° 59,92' N	63° 59,91' W	IKMT 5	2 x 300
MSM41/028---4	16.04.2015	11:40	23° 0,02' N	63° 59,88' W	MOCN	1000
MSM41/028---5	16.04.2015	12:43	23° 0,20' N	63° 57,62' W	MT	
MSM41/029---1	16.04.2015	17:19	22° 30,00' N	64° 0,00' W	CTD/RO	300
MSM41/029---2	16.04.2015	17:53	22° 30,00' N	63° 59,70' W	IKMT 0.5	2 x 300
MSM41/030---1	17.04.2015	11:00	22° 30,01' N	61° 0,00' W	CTD/RO	5000
MSM41/030---2	17.04.2015	14:07	22° 30,12' N	60° 59,75' W	IKMT 0.5	2 x 300
MSM41/031---1	17.04.2015	21:05	23° 0,01' N	61° 0,02' W	CTD/RO	500
MSM41/031---2	17.04.2015	21:38	23° 0,01' N	61° 0,02' W	FRB	
MSM41/031---3	17.04.2015	21:51	23° 0,02' N	60° 59,84' W	MOCN	500
MSM41/031---4	18.04.2015	00:36	22° 59,92' N	60° 59,61' W	IKMT 0.5	2 x 300
MSM41/031---5	18.04.2015	01:08	23° 0,00' N	60° 59,35' W	MT	
MSM41/032---1	18.04.2015	06:17	23° 30,01' N	61° 0,04' W	CTD/RO	300
MSM41/032---2	18.04.2015	06:54	23° 29,84' N	60° 59,87' W	IKMT 0.5	2 x 300
MSM41/033---1	18.04.2015	12:50	23° 59,97' N	61° 0,01' W	CTD/RO	1000
MSM41/033---2	18.04.2015	13:49	23° 59,98' N	61° 0,01' W	MSNV	1000
MSM41/033---3	18.04.2015	15:09	24° 0,09' N	61° 0,21' W	IKMT 0.5	2 x 300
MSM41/033---4	18.04.2015	16:15	24° 2,57' N	60° 59,99' W	MT	

MSM41/034---1	18.04.2015	23:33	24° 59,97' N	60° 59,92' W	CTD/RO	500
MSM41/034---2	19.04.2015	00:22	25° 0,13' N	60° 59,82' W	MOCN	500
MSM41/034---3	19.04.2015	03:09	25° 0,12' N	60° 59,93' W	IKMT 0.5	2 x 300
MSM41/034---4	19.04.2015	03:18	25° 0,40' N	60° 59,66' W	MT	
MSM41/035---1	19.04.2015	10:26	25° 59,99' N	61° 0,02' W	CTD/RO	1000
MSM41/035---2	19.04.2015	11:26	25° 59,99' N	61° 0,03' W	MSNV	1000
MSM41/035---3	19.04.2015	12:48	26° 0,32' N	61° 0,39' W	IKMT 0.5	2 x 300
MSM41/035---4	19.04.2015	13:49	26° 2,53' N	61° 0,05' W	MT	
MSM41/036---1	19.04.2015	18:32	26° 36,37' N	60° 59,66' W	FRB	
MSM41/036---2	19.04.2015	21:41	27° 0,00' N	61° 0,02' W	CTD/RO	500
MSM41/036---3	19.04.2015	22:25	27° 0,19' N	60° 59,91' W	MOCN	500
MSM41/036---4	19.04.2015	23:14	27° 1,68' N	60° 59,09' W	MT	
MSM41/036---5	20.04.2015	01:28	27° 0,07' N	60° 59,98' W	IKMT 0.5	2 x 300
MSM41/036---6	20.04.2015	04:48	27° 0,08' N	60° 59,92' W	IKMT 5	2 x 300
MSM41/037---1	20.04.2015	11:52	27° 59,98' N	61° 0,01' W	CTD/RO	1000
MSM41/037---2	20.04.2015	12:50	27° 59,98' N	61° 0,02' W	MSNV	1000
MSM41/037---3	20.04.2015	14:12	28° 0,13' N	60° 59,88' W	IKMT 0.5	2 x 300
MSM41/038---1	20.04.2015	18:17	28° 8,77' N	60° 51,81' W	FRB	
MSM41/038---2	20.04.2015	23:00	28° 59,99' N	61° 0,07' W	CTD/RO	500
MSM41/038---3	20.04.2015	23:49	29° 0,04' N	60° 59,82' W	MOCN	500
MSM41/038---4	21.04.2015	00:48	28° 59,72' N	60° 57,67' W	MT	
MSM41/038---5	21.04.2015	02:44	29° 0,01' N	60° 59,94' W	IKMT 0.5	2 x 300
MSM41/039---1	21.04.2015	10:40	30° 0,00' N	61° 0,05' W	CTD/RO	1000
MSM41/039---2	21.04.2015	11:39	29° 59,99' N	61° 0,33' W	MSNV	1000
MSM41/039---3	21.04.2015	13:00	29° 59,88' N	61° 0,16' W	IKMT 0.5	2 x 300
MSM41/039---4	21.04.2015	14:10	29° 57,91' N	60° 58,16' W	MT	
MSM41/040---1	21.04.2015	21:11	31° 0,07' N	60° 59,93' W	CTD/RO	500
MSM41/040---2	21.04.2015	21:53	30° 59,95' N	60° 59,85' W	MOCN	500

MSM41/040---3	22.04.2015	00:43	30° 59,92' N	61° 0,05' W	IKMT 0.5	2 x 300
MSM41/040---4	22.04.2015	00:56	30° 59,45' N	61° 0,01' W	MT	
MSM41/040---5	22.04.2015	04:04	30° 59,87' N	61° 0,01' W	IKMT 5	2 x 300
MSM41/041---1	22.04.2015	21:33	31° 0,01' N	57° 59,97' W	CTD/RO	500
MSM41/041---2	22.04.2015	22:17	30° 59,96' N	58° 0,27' W	MOCN	500
MSM41/041---3	22.04.2015	23:18	30° 59,68' N	58° 2,63' W	MT	
MSM41/041---4	23.04.2015	00:46	30° 59,81' N	58° 0,14' W	IKMT 0.5	2 x 300
MSM41/041---5	23.04.2015	04:40	30° 59,87' N	58° 0,17' W	IKMT 5	2 x 300
MSM41/042---1	23.04.2015	12:09	30° 0,04' N	57° 59,97' W	CTD/RO	1000
MSM41/042---2	23.04.2015	13:05	30° 0,04' N	57° 59,96' W	MSNV	1000
MSM41/042---3	23.04.2015	14:28	29° 59,68' N	57° 59,95' W	IKMT 0.5	2 x 300
MSM41/043---1	23.04.2015	22:10	29° 0,01' N	58° 0,00' W	CTD/RO	500
MSM41/043---2	23.04.2015	22:54	28° 59,76' N	58° 0,00' W	MOCN	500
MSM41/043---3	24.04.2015	01:52	29° 0,02' N	58° 0,02' W	IKMT 0.5	2 x 300
MSM41/043---4	24.04.2015	01:58	28° 59,78' N	58° 0,08' W	MT	
MSM41/044---1	24.04.2015	08:58	28° 0,06' N	58° 0,00' W	CTD/RO	1000
MSM41/044---2	24.04.2015	10:01	28° 0,06' N	58° 0,00' W	MSNV	1000
MSM41/044---3	24.04.2015	11:31	27° 59,94' N	58° 0,15' W	IKMT 0.5	2 x 300
MSM41/044---4	24.04.2015	12:10	28° 0,10' N	58° 2,11' W	MT	
MSM41/045---1	24.04.2015	16:57	27° 36,86' N	58° 5,83' W	FRB	
MSM41/045---2	24.04.2015	21:05	27° 0,02' N	58° 0,03' W	CTD/RO	500
MSM41/045---3	24.04.2015	21:48	26° 59,88' N	58° 0,25' W	MOCN	500
MSM41/045---4	25.04.2015	00:55	26° 59,95' N	58° 0,19' W	IKMT 0.5	2 x 300
MSM41/045---5	25.04.2015	01:15	26° 59,39' N	58° 0,88' W	MT	
MSM41/046---1	25.04.2015	08:15	26° 0,05' N	57° 59,99' W	CTD/RO	1000
MSM41/046---2	25.04.2015	09:14	26° 0,06' N	58° 0,00' W	MSNV	1000
MSM41/046---3	25.04.2015	10:40	25° 59,78' N	58° 0,26' W	IKMT 0.5	2 x 300
MSM41/047---1	25.04.2015	16:50	25° 15,53' N	58° 1,44' W	FRB	

MSM41/047---2	25.04.2015	19:39	25° 0,06' N	58° 0,00' W	CTD/RO	500
MSM41/047---3	25.04.2015	21:05	25° 0,04' N	58° 0,14' W	MOCN	500
MSM41/047---4	25.04.2015	23:38	24° 59,97' N	58° 0,17' W	IKMT 0.5	2 x 300
MSM41/048---1	26.04.2015	07:28	24° 0,02' N	57° 59,96' W	CTD/RO	1000
MSM41/048---2	26.04.2015	08:26	24° 0,02' N	57° 59,96' W	MSNV	1000
MSM41/048---3	26.04.2015	09:54	23° 59,87' N	58° 0,18' W	IKMT 0.5	2 x 300
MSM41/048---4	26.04.2015	11:09	23° 58,36' N	58° 2,41' W	MT	
MSM41/049---1	26.04.2015	19:14	23° 0,04' N	57° 59,99' W	CTD/RO	1000
MSM41/049---2	26.04.2015	20:14	22° 59,91' N	58° 0,02' W	MOCN	500
MSM41/049---3	26.04.2015	22:45	22° 59,95' N	58° 0,08' W	IKMT 0.5	2 x 300
MSM41/049---4	26.04.2015	23:35	22° 58,71' N	58° 0,96' W	MT	