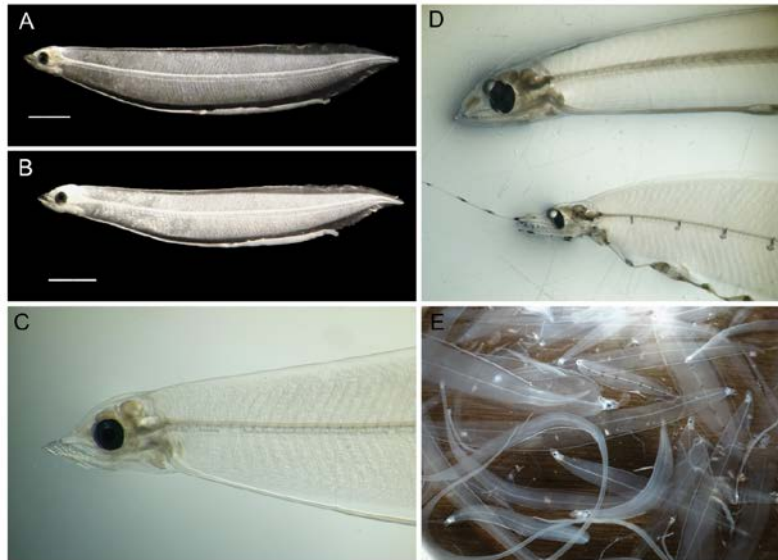


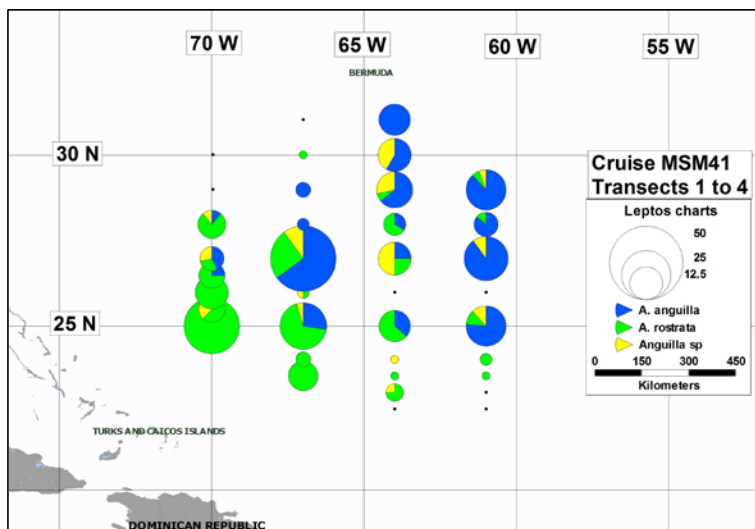
## MERIAN MSM 41

Weekly report, Leg 4 (19.04. to 26.04.2015)

One of the primary objectives of the MSM41 sampling survey in April 2015 was to collect eel larvae, which are called leptocephali (**Figure 1**), of the Atlantic freshwater eels *Anguilla anguilla* (European eel) and also *Anguilla rostrata* (American eel), which spawn in the Sargasso Sea. The leptocephali of marine eels are also abundant in the Sargasso Sea and can be collected and compared to the abundances of anguillid larvae. Leptocephali were collected using the large mouth-opening IKMT pelagic trawl that has fine-mesh (0.5 mm) for catching all sizes of eel larvae and other planktonic organisms such as zooplankton and small fishes. A few leptocephali were also collected by the other smaller mouth-opening gear such as the MOCNESS depth sampling trawl and the Manta surface net. Leptocephali were immediately sorted out of the plankton samples and then identified on board using a dissecting microscope before being preserved in ethanol or frozen. Leptocephali were widely distributed across the study area and were collected at every station. In the first 4 transects, 301 *Anguilla* leptocephali ranging in size from 6.7 – 46.0 mm total length (average:  $14.0 \pm 5.7$  mm) were collected and 1354 marine eel leptocephali were collected (6 – 405 mm). The distributions and abundances of anguillid (131 *A. anguilla*, 133 *A. rostrata*, 37 *Anguilla* sp.; final species identification will be done using genetic sequences) and marine eel leptocephali (~36 species, 14 families) showed various different patterns in the transects of stations that sampled at a range of latitudes between 22.5°N and 31°N and from 70°W and 61°W. The leptocephali of the American eel were most abundant in the western and southwestern stations of the two western transects, and those of the European eel were most abundant in the middle or northern parts of the transects, but were rare in the westernmost transects and in the northernmost and southernmost stations (**Figure 2**). European eel larvae were 6.7 – 46.0 mm in size (average:  $15.2 \pm 4.5$  mm), and American eel larvae were 9.8 – 36.3 mm (average:  $17.2 \pm 4.8$  mm), with fewer larger leptocephali being collected. The larvae of the mesopelagic snipe eels (Nemichthyidae) were most abundant at the northern stations, and especially north of the frontal zone. Other abundant species such as the larvae of the congrid eel *Ariosoma balearicum*, were most abundant within the frontal regions of the more central parts of the transects. Small larvae of other mesopelagic species of the sawtooth eels (Serrivomeridae) and the gulper eels (Eurypharyngidae) were collected, which indicates these species were spawning offshore. However, the larvae of the other species of eels whose adults live in coastal areas, such as *A. balearicum*, other Congridae, Chlopididae, Muraenidae, and Moringuidae were all large in size and had been transported offshore into the sampling area. The distributions, abundances and sizes of the *Anguilla* and other species of leptocephali will be analyzed in relation to the hydrographic structure and current flow patterns that were observed across the southern Sargasso Sea during the MSM41 oceanographic survey.



**Fig. 1.** Photographs of eel larvae, called 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, (C) the head region of a 23.3 mm American eel larva, (D) the head regions of two types of Synphobranchidae larvae, and (E) the leptocephali of a variety of eel families including the Congridae, Chlopsidae, Moringuidae, and Muraenidae. Scale bar is 2 mm in (A) and (B).



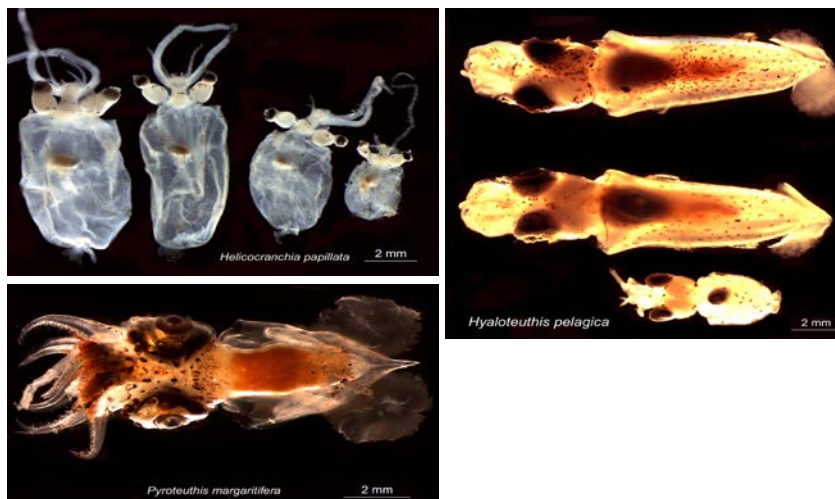
**Fig. 2.** Map showing the number of leptocephalus larvae of the freshwater eels of *Anguilla anguilla* (European eel) and *Anguilla rostrata* (American eel) collected at each station of the first 4 transects during the MSM41 survey in the Sargasso Sea in April 2015 according to the morphological identifications 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. The fifth transect along 58°W is not shown.

One of the most fascinating animal groups of the macroplankton of the Sargasso Sea are the early life stages of cephalopods. A working group of the GEOMAR Kiel investigates their

species diversity, abundance and distribution patterns in the research area on board during MSM41. The animals are directly sorted out from the IKMT trawls (0 – 300m), identified to the lowest possible taxon, photographed and measured. For further diet analysis, like the investigation of amino acids and stable isotopes, specimens are frozen, or fixed in ethanol for genetic analysis or in formalin for further functional morphological studies.

Up to now, more than 2000 specimens were sampled, representing at least 25 species of 15 different families. The distribution pattern seems to vary strongly between night and day catches. Furthermore, the subtropical convergence zone that has been found approximately between 27°N and 28°N during most transects seems to depict a significant faunal frontier for several species. The surface water temperature changes in those latitudes from approximately 22°C to 24°C from north to south. The early life stages of the fire squid, *Pyroteuthis margaritifera* (**Figure 3**) and species of the hooked-squids (family Onychoteuthidae) are so far the most abundant species of the investigated area. Some species like the glass squid *Leachia lemur* (family Cranchiidae) are only encountered in the northern water masses, whereas other squids of that family, for example *Helicocranchia papillata* (**Figure 3**), are distributed throughout the whole research area. The early life stages of the flying squid, *Hyaloteuthis pelagica* (family Ommastrephidae, **Figure 3**) tend to be more abundant in the southern stations.

The work on the ship is excellent and the material delivers new and broad insights into the distribution, taxonomy and diet of the early life stages of subtropical cephalopod species.



**Fig. 3.** Selected cephalopods sampled with the IKMT during MSM41.