Progress report on the eel expedition of R.V. ‘Anton Dohrn’ and R.V. ‘Friedrich Heincke’ to the Sargasso Sea 1979

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Synopsis
This report presents preliminary results of the 1979 Sargasso Sea expedition from February to May 1979. Information is given on horizontal and vertical distribution of eel larvae and adults, adult eel tracking and pelagic trawling. Related matters such as electrophoretic studies on anguilliform larvae, feeding of eel larvae, predation on leptocephali, occurrence of other anguilliform larvae and hydrography are mentioned.

Introduction
The expedition was planned as a reconnaissance cruise for an international expedition suggested by the 1976 ICES/EIFAC eel symposium to take place in 1981 or 1982.

In addition to information collected during Danish cruises (Schmidt 1922, Bertelsen 1967) and other investigations (Vladgkov 1964, Smith 1968, Tesch 1978), more details on horizontal and vertical distribution of eggs, larvae and adult Anguilliformes and some experience with gear would be advantageous for planning further expeditions. We deal here only with eel research and related matters. First results of current investigations such as distribution of eel larvae, eggs in the Sargasso Sea, electrophoretic studies on anguilliform larvae and adults, adult eel tracking and pelagic trawling, feeding of eel larvae, predation on leptocephali, occurrence and systematics of other anguilliform larvae, and hydrography are presented. A more detailed report has been presented to the ICES (Tesch et al. 1979). Observations on deep sea fishes, invertebrates and Sargassum epi-fauna and flora, which were also investigated on this cruise, are reported elsewhere (e.g. Ulken 1979).

Methods of sampling
We used two ships: R.V. ‘Anton Dohrn’ (length 74 m, power 1680 kw) was equipped with a commercial pelagic trawl with 1600 front meshes and an inlet in the codend of 4 mm mesh size to catch adult Anguilliformes. Larvae and eggs were caught with an Isaacs Kidd Midwater trawl (IKMT, opening 6 m², length 9 m, mesh size 0.5 mm), one multiple opening and closing net and environmental sensing system (Wiebe et al. 1979) (MOCNESS, 9 nets with
an opening of 1 m², each and a mesh size of 0.35 mm), and one multiple opening and closing net (MCN, 5 nets with an opening of 0.25 m² each and a mesh size of 0.35 mm). The MOCNESS and the MCN were also used for plankton investigations. Neuston nets with mesh sizes of 0.335 mm and 0.47 mm were towed by both ships. R.V. 'Friedrich Heincke' (length 38 m, power 676 kw) was equipped with a commercial trawl with 600 front meshes and an inlet in the codend of 10 mm mesh size to catch adult Anguilliformes. One MCN and an Apstein net with various mesh sizes were towed for plankton investigations in the Sargasso Sea area. Leptocephali were collected on two sections between the Sargasso Sea and Europe with an IKMT (opening 2 m², length 6 m, mesh size 0.8 mm).

Results

Collections of adult eels

Pelagic trawls were towed day and night for 111 hours from March 7 to April 23 mainly from the surface to a depth of 300 m, fairly often at 600 m, and occasionally at 2000 m (Cohen et al. 1979). The hauls were made in an area from 52° 10' W to 67° 50' W and 31° 40' N to 23° 10' N. No adult Anguilla was caught, but other species of deep sea eels were taken. Most common was Serrivomer beani, which was found at all stages from newly metamorphosed juveniles to adults over 70 cm. Different species of Nemichthys, including very rare ones, were collected. Among them were a few ripe individuals. Some Derichthys serpentinus were taken, including a running ripe female.

Tracking of hormone treated eels

Hormone treated silver eels (Fontaine et al. 1964) from the Baltic Sea were tagged with an ultrasonic transmitter and tracked in the Sargasso Sea area (Tesch 1978). Four trackings were carried out, three on the northern boundaries and one in the Central Sargasso Sea. Mean horizontal swimming directions were 209°, 242°, and 296°. The eel tracked in the Central Sargasso Sea did not move in a distinct direction. Different depth preferences, ranging from the surface to 700 m and deeper, were observed during day and night.

Collections of eel larvae

Although about 25 species of anguilliform larvae were collected, we report here mainly on Anguilla spp. Except of O-group larvae, most larvae were identified by meristic characters on board immediately after the hauls (Smith 1979). About 130 specimens were identified by electrophoretic analysis; there were significant differences in allele frequencies of enzyme loci between A. anguilla and A. rostrata (Comparini & Rodino 1980).

Horizontal distribution

2800 of an estimated 3000 specimens have been sorted so far. As shown in Figure 1, 0-group larvae were distributed from 22° N to 29° N. The easternmost occurrence (50° W) in our samples may be too far west; no samples were taken in southern areas at latitudes east of 52° W. High numbers in western samples, dominated by A. rostrata, indicate that the westernmost stations were nowhere near the western boundary of the 0-group (Smith 1968) distribution. East of 56 °W no A. rostrata was found.

Hydrographically (Wegner 1979) the occurrence of the O-group can best be described in terms of horizontal isotherms at a depth of 100 m; salinity and density are less consistent with this distribution. In the south the 22.5°C isotherm at 100 m depth (24° on the surface) is limiting, in the north the 19.5°C isotherm at 100 m depth (21.5°C on the surface).

O-group larvae of other Anguilliformes (Nemichthys scolopaceus, N. curvirostris, Serrivomer beani, S. brevidentatus, Derichthys serpentinus) caught in the same area show that the Central Sargasso Sea is also a preferred spawning place for these species.

About 440 larvae of the I- and II-groups were collected with mean lengths of 46.2 and 69.9 mm, respectively; 5 were A. rostrata (1.1%). The mean myomere count of A. anguilla was 113.9. On the transects to the Sargasso Sea and back to Europe the catches of I- and II-group larvae were low compared with the average collections of earlier years (Tesch 1980). But more leptocephali were caught north of the Sargasso Sea between 50° W and 57° W, on a southern transect west of the