

Table of contents

|       |                                       |
|-------|---------------------------------------|
| 1     | Introduction                          |
| 2     | Abbreviations                         |
| 3     | The vessels                           |
| 4     | The fishing gear                      |
| 5     | Methods                               |
| 6-10  | Tables                                |
| 11-15 | Typifications of the fish-collections |

PELAGIC TRANSECTS OF FRVs "WALTHER HERWIG"  
 AND "ANTON DOHRN" IN THE ATLANTIC OCEAN  
 1966 TO 1986

station lists and technical data

by

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Introduction

In the past 20 years a series of oceanic transects was carried out by the German research vessels "Walther Herwig" and "Anton Dohrn", in order to study the species compositions of pelagic fish assemblages and the ecosystems of midwater fishes in the Atlantic Ocean.

Fish samples taken from these cruises include about 75 % of the off-shore fish species of the Atlantic Ocean, covering an essential part of the ISH-collection. Up to now numerous publications appeared on the basis of this collection, dealing with various subjects and across a broad spectrum of fish families. About 70 of these papers were published under the common title "results of the research cruises of FRV "Walther Herwig" to South America." As far as technical data of the trawling stations have been published, they are partly redundant and scattered to many papers. But many data are still unpublished.

The aim of this paper is to give a survey of the pelagic transects which have been carried out by "Walther Herwig" and "Anton Dohrn" from 1966 to 1986, including methods, gears employed for fishing, and lists of the technical data of these transects.

|         |   |
|---------|---|
| USA     | University of Buenos Aires                    |
| YPR     | Time Depth Recorder                           |
| temp.   | temperature                                   |
| z       | zone  |
| stac.   | station                                       |
| SAM     | South African Museum, Cape Town               |
| sal     | salinity                                      |
| FMT (8) | Rectangle Midwater Trawl (8 mm meshsize)      |
| no.     | number  |
| MI      | Midwater Trawl                                |
| MNF     | Museu municipal do Funchal                    |
| MBI     | Marine Biological Institute, Galveston, Texas |
| kn      | nautical knots                                |
| ISH     | Institut für Seefischerei, Hamburg            |
| IOZ     | Institute of Oceanographic Science, Wormley   |

Abbreviations

|         |   |
|---------|---|
| AD      | FRV "Anton Dohrn"   |
| AMS     | Australian Museum, Sidney                                     |
| BAH     | Biologische Anstalt Helgoland, Hamburg                        |
| brt     | brutto register tons  |
| BT      | bottom trawl  |
| CMBT    | combined midwater and bottom trawl                            |
| DFHC    | Danmark Fiskeri-og Havundelsøger, Charlottenlund              |
| f       | fathom  |
| FRV     | fisheries research vessel                                     |
| GARP    | Global Atmospheric Research Programme                         |
| GATE    | GARP Atlantic Tropical Experiment                             |
| GPI     | Geologisch Paleontologisches Institut, Kiel                   |
| hp      | horse power   |
| IBAP    | Instituto di Biologia Animale, Padua                          |
| IBT     | Institut für Biochemie und Technologie, Hamburg               |
| IfMB    | Institut für Meeresforschung, Bremerhaven                     |
| IfMK    | Institut für Meereskunde, Kiel                                |
| IHFH    | Institut für Hydrobiologie und Fischereiwissenschaft, Hamburg |
| IKMT    | Isaac Kid Midwater Trawl                                      |
| IOS     | Institute of Oceanographic Science, Wormley                   |
| ISH     | Institut für Seefischerei, Hamburg                            |
| kn      | nautical knots  |
| MBI     | Marine Biomedical Institute, Galveston, Texas                 |
| MMF     | Museu municipal do Funchal                                    |
| MT      | Midwater Trawl  |
| no.     | number  |
| RMT (8) | Rectangle Midwater Trawl (8 mm meshsize)                      |
| sal     | salinity  |
| SAM     | South African Museum, Cape Town                               |
| stat.   | station   |
| t       | tons  |
| temp.   | temperature   |
| TDR     | Time Depth Recorder   |
| UBA     | University of Buenos Aires                                    |

|      |  |
|------|--|
| USNM | United States National Museum, Washington D.C. |
| WH   | FRV "Walther Herwig"                           |
| WHOI | Woods Hole Oceanographic Institution           |
| XBT  | expendable bathythermograph                    |
| ZMH  | Zoologisches Museum, Hamburg                   |
| ZMUC | Universitetets Zoologiske Museum, Copenhagen   |

The vessels

The cruises included herein have been carried out with the German Fisheries Research Vessels "Walther Herwig" and "Anton Dohrn", which are stern-trawlers both.

The vessels run by the German Federal Ministry of Food, Agriculture and Forestry.

1. FRV "Walther Herwig" (I) = FRV "Anton Dohrn" was put into service in 1964. She carried out the transects to the South Atlantic in 1966, 1968 and 1971. After the reconstruction of some interior equipments (labs, scientist rooms) in 1973, her name was altered into "Anton Dohrn". Under the new name, the vessel took part in the GARP Atmospheric Tropical Experiment (GATE) in 1974 and in the Sargasso Sea Expedition in 1979.

Technical data:

|  |           |
|--|-----------|
| length over all                        | 82.2 m    |
| length between perpendiculars          | 73.8 m    |
| beam moulded                           | 12.5 m    |
| depth moulded to upper deck            | 6.9 m     |
| draught                                | 5.2 m     |
| tonnage                                | 1987 brt  |
| main engine (gasoil-electric)          | 2400 hp   |
| speed                                  | 14.5 kn   |
| pull of the warps                      | 2 x 2.7 t |
| length of warps                        | 1800 f    |
| crew                                   | 41        |
| scientists before/after reconstruction | 9/17      |

Pelagic trawling can be carried out in a maximum depth of 2200 m.

FRV "Anton Dohrn" is out of service since August 1986.

2. FRV "Walther Herwig" (II) was put into service in 1973. Cruises included herein: transect from the Denmark Strait to Lisbon, 1973; the first Antarctic Expedition, 1975/76; the transect along the Middle Atlantic Ridge 1982; cruises to the banks west of the British Islands in 1983 and 1986.

Technical data:

|                                |          |
|--------------------------------|----------|
| length over all                | 77.45 m  |
| length between perpendiculars  | 69.00 m  |
| beam moulded                   | 14.80 m  |
| depth moulded to upper deck    | 9.90 m   |
| draught                        | 5.75 m   |
| tonnage                        | 2250 brt |
| main engine (mechanic gas-oil) | 4600 hp  |
| speed                          | 15.5 kn  |
| pull of the warps              | 2x25 t   |
| length of the warps            | 4.200 f  |
| crew                           | 40       |
| scientists                     | 12       |

Under optimal conditions pelagic trawling can be carried out to a maximum depth of 3.200 m.

The fishing gear.

According to the purpose of the research programme, non-commercial and commercial gears were used.

Non-commercial gears:

IKMT = Isaac Kid Midwater Trawl; rectangular opening 6 m<sup>2</sup>; mesh size 500 µm; length 10 feet.

RMT 1+8 = Rectangular Midwater Trawl 1+8. Two closing nets are combined in one gear; the upper one small, opening 1 m<sup>2</sup>, mesh size 320 µm. The lower one larger, opening 8 m<sup>2</sup>, mesh size 4.5 mm.

Commercial gears:

the fishing gear includes: warps, net, trawl boards, bridles, frontweights, headline floats and net sounder. Net sounders are optional and can be used to a maximum depth of 800 m.

MT 1600: (fig. after Schärfe, 1969:29)

The Engel Midwater Trawl has been used since 1965 as a commercial trawl. It is a 4-seam net with rectangular cross section. Top- and bottom panel have 435 meshes each, sides have 365 meshes each respectively: altogether 1600 meshes circumference. The maximum mesh size of the forenet is 20 cm (stretch). The net is opened horizontally by two trawl boards, vertically by headline floats along the top, and by frontweights at the bottom bridles.

Maximum height: 20 m; width: 30 m; Opening: 600 m<sup>2</sup>; length: 120 m. For our purposes the cod-end was equipped with a 10 mm inlet.

\*)

MT 1000: rectangular cross section with 1000 meshes circumference. The maximum mesh size of the forenet is 40 cm (stretch).

Maximum height: 23 m; width: 25 m; opening: 575 m<sup>2</sup>; length: 144 m. For our purposes the cod-end was equipped with a 10 mm inlet.

\*) The MT 1600 has been used as a standard gear in all cruises here included, except for the first transect of the Antarctic expedition 1975/76.

MT 1216: rectangular cross section with 1216 meshes circumference. The maximum mesh size of the forenet is 20 cm (stretch). This net is a special construction to catch krill, not fishes; stations are included in tab. 6 only as far as fishes were caught accidentally.

Maximum height: 13 m; width: 23 m; opening: 260 m<sup>2</sup>;

BT 140: 140 feet standard bottom trawl; used for a few trials during pelagic trawling in 1982 and 1986.

Collecting and preserving methods on board of the vessels.

Depending on duration of trawling, depth, daytime and geographical area, the outcome of trawling was quite different, ranging in volume from about 10 to 200 litres (kilograms). This includes fishes as well as evertbrate organisms.

Collecting of the catch began when the forenet came on deck. The net was stopped in sequences of one deck length, and animals were picked from the meshes by hand. Finally the content of the cod-end was filled into plastic containers.

As a first step, fishes were separated from other organisms and fixed for about 8 to 12 hours in 2 % formalin. Evertbrates were fixed and stored whenever scientists on board were in charge of them. The Evertbrates are stored in the collections of the ZMH.

After the period of preliminary preservation, fishes were worked up by the ichthyological staff on board:

- determination of families, genera and species;
- description of special observations;
- counts of specimens of each species;
- measuring of subsamples;
- selection of specimens for the ISH collection;
- labelling of samples;
- preservation of samples in 4 - 5 % formalin.

Technical and biological data were noted down in diaries.

Stations lists, tables 1 to 10.

The lists include 9 columns:

1. Station number: this number refers to the annual counting of stations, beginning on 1st of January with no. 1 and ending on 31st of December every year. On ISH labels and cataloge sheets, station numbers and years are linked around a dash, e.g.: 177/66 = station number 177 in 1966.

During the Sargasso Sea Expedition in 1979 (AD cruise no. 210 (92)) the annual counting and the total counting were used simultaneously, therefore in tab. 7a and 7b the corresponding station numbers are given in the first column. For special counting of cruise WH no. 20 see page 36.

2. Date: only day and month are indicated, the year is included in the legend of the table.
3. Hour: beginning of the trawling when the gear was set; always lokal time indicated.
4. Time: from the beginning to the end of trawl, given in minutes.
5. Position: only the beginning of trawling is indicated; seconds are rounded to the nearest minute.
6. Depth: trawling depth is indicated. As no closing nets were used, it should be read as trawling depth to surface.
7. and 8.: salinity and water temperature are indicated for the trawling depth. If hydrographical and trawling data do not fit exactly into the same depth, the nearest point is indicated, if not farther away vertically than 20 m. Otherwise the depth is given in column 9 "remarks".

For the cruise WH no. 36 the trawling depth usually does not fit into the depth where temperature and salinity were checked. Therefore in tab. a complete list of hydrographical series is given.

9. Remarks: additional information.

Table 1:

"Walther Herwig" cruise no. 15: transect from the Bay of Biskay to Mar del Plata (Argentina); 7.5. to 30.5.1966. (Figure 1).

Commander captain Th. Frerichs.

Scientific crew:

|                                  |                   |     |
|----------------------------------|-------------------|-----|
| Kreffft, G., scientist in charge | ichthyology       | ISH |
| Döhring, U.                      | techn. ass.       | ISH |
| Schulz, H.                       | plancton, benthos | ISH |
| Schumacher, A.                   | fisheries biology | ISH |
| Weidemann, K.                    | hydrography       | ISH |

Gear: MT 1600.

Hydrography: mechanical bathythermograph; water sampling with Nansen-bottles.

Diaries: 3 volumes, handwritten.

Trawling was carried out in step hauls, i.e., the net was trawled in various depth layers and not heaved on deck until the station was finished. All hauls, except for station 180a, were started after sunset when the scattered echo layer indicated the end of the vertical migration of organisms.

Station 180a was carried out in order to check the operability of the gear, thus being out of the regular working order. There is no qualified depth record for this station. Nevertheless the fishes of this haul have been collected and included in the samples.

Tab. 1: "Walther Herwig" cruise no. 15, Gulf of Biskay to Mar del Plata, 1966.

| stat. no. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks                       |
|-----------|-------|-------|-----------|----------|--------|---------|--------|----------|-------------------------------|
|           |       |       |           | N        | W      |         |        |          |                               |
| 174       | 7.5.  | 21.00 | 30        | 44°13'   | 08°38' | 100     | 35.54  | 12.5     |                               |
| 175       | 8.5.  | 23.05 | 30        | 40°35'   | 11°25' | 155     | 35.65  | 12.8     |                               |
| 176       | 9.5.  | 22.30 | 30        | 37°17'   | 13°50' | 650     | -      | -        |                               |
| 177       | 10.5. | 21.10 | 30        | 33°45'   | 16°00' | 600     | 35.90  | 11.0     |                               |
| 178       | 11.5. | 21.40 | 30        | 31°41'   | 17°19' | 600     | 35.51  | 11.6     |                               |
| 179       | 12.5. | 20.50 | 30        | 27°30'   | 18°48' | 500     | 35.60  | 12.1     | sal. in 270 m depth           |
| 180       | 13.5. | 19.30 | 15        | 23°50'   | 20°08' | 500     | -      | -        | gear check                    |
| 180 a     | 13.5. | 22.00 | 30        | 23°50'   | 20°08' | 500     | 36.19  | -        | sal. and temp. in 250 m depth |
| 181       | 14.5. | 21.00 | 30        | 19°11'   | 21°58' | 220     | 36.12  | 15.8     |                               |
| 182       | 16.5. | 21.00 | 30        | 10°46'   | 23°54' | 460     | 35.35  | 11.2     |                               |
| 183       | 17.5. | 21.00 | 30        | 06°30'   | 24°33' | 120     | -      | 17.2     | sal. and temp. in 272 m depth |
| 184       | 17.5. | 23.40 | 30        | 06°25'   | 24°34' | 300     | 35.04  | 10.4     |                               |
| 185       | 18.5. | 20.30 | 30        | 02°44'   | 25°12' | 200     | -      | 11.2     |                               |
|           |       |       |           |          |        | 50      | -      | 18.0     |                               |
|           |       |       |           |          |        | 320     | 35.21  | 11.4     | sal. and temp. in 305 m depth |
|           |       |       |           |          |        | 150     | -      | 13.3     |                               |
|           |       |       |           |          |        | 380     | 35.18  | 11.5     | sal. and temp. in 425 m depth |
|           |       |       |           |          |        | 175     | 35.25  | 13.3     | sal. and temp. in 200 m depth |

Tab. 1: "Walther Herwig", cruise no. 15, 1966, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks                                   |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|---|
|          |       |       |              | S        | W      |            |           |             |   |
| 186      | 19.5. | 20.00 | 30           | 01°24'   | 25°58' | 330        | -         | -           |   |
|          |       |       | 30           |          |        | 170        | -         | 12.5        |   |
| 187      | 20.5. | 20.00 | 35           | 05°34'   | 26°58' | 320        | 34.77     | 9.1         |   |
|          |       |       | 30           |          |        | 160        | 35.39     | 14.5        | sal. and temp. in 180 m depth             |
| 188      | 21.5. | 20.00 | 30           | 09°41'   | 27°39' | 400        | 34.75     | 9.0         | sal. and temp. in 356 m depth             |
|          |       |       | 30           |          |        | 160        | -         | (20.0)      |   |
| 189      | 22.5. | 20.00 | 30           | 13°31'   | 28°09' | 160        | -         | 21.8        |   |
|          |       |       | 15           |          |        | 45         | -         | 26.7        |   |
| 190      | 23.5. | 20.00 | 30           | 17°36'   | 28°53' | 660        | 34.53     | 6.7         | sal. and temp. in 593 m depth             |
|          |       |       | 15           |          |        | 400        | 34.89     | 10.4        | sal. and temp. in 425 m depth             |
|          |       |       | 15           |          |        | 250        | 35.71     | 16.6        |   |
|          |       |       | 15           |          |        | 160        | -         | 21.8        |   |
| 191      | 24.5. | 20.00 | 30           | 21°00'   | 30°00' | 200        | -         | 18.3        |   |
|          |       |       | 30           |          |        | 120        | -         | 22.6        |   |
| 192      | 25.5. | 20.00 | 05           | 23°02'   | 33°19' | 180        | -         | 19.0        |   |
|          |       |       | 30           |          |        | 160        | -         | 20.0        |   |
|          |       |       | 30           |          |        | 80         | -         | 24.8        |   |
| 193      | 26.5. | 21.00 | 30           | 25°27'   | 36°56' | 160        | -         | 18.2        |   |
|          |       |       | 30           |          |        | 90         | -         | 22.3        |   |
| 194      | 27.5. | 21.00 | 30           | 27°57'   | 40°52' | 580        | 34.74     | 9.1         |   |
|          |       |       | 15           |          |        | 180        | -         | 16.8        |   |
|          |       |       | 15           |          |        | 110        | -         | -           | temp. in 100 m: 25.5°; in<br>125 m: 19.3° |

12

Tab. 1: "Walther Herwig", cruise no. 15, 1966, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks  |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|--|
|          |       |       |              | S        | W      |            |           |             |  |
| 195      | 28.5. | 22.00 | 30           | 30°34'   | 44°55' | 560        | 34.62     | 8.5         | sal. and temp. in 580 m depth                                  |
|          |       |       | 15           |          |        | 320        | 35.35     | 13.7        | sal. and temp. in 350 m depth                                  |
|          |       |       | 15           |          |        | 155        | -         | 17.4        |  |
| 196      | 29.5. | 22.00 | 30           | 32°44'   | 48°43' | 580        | 34.99     | 11.4        |  |
|          |       |       | 15           |          |        | 190        | -         | 20.4        |  |
|          |       |       | 15           |          |        | 70         | -         | 21.7        |  |
| 197      | 30.5. | 22.00 | 30           | 35°56'   | 52°33' | 480        | 35.02     | 11.7        | sal. and temp. in 445 m depth                                  |
|          |       |       | 15           |          |        | 170        | -         | -           | sal. in 130 m depth: 35.62 ‰;<br>temp. in 130 m depth: 16.5°C. |
|          |       |       | 15           |          |        | 70         | -         | -           | sal. in 240 m depth: 35.36 ‰;<br>temp. in 240 m depth: 14.4°C. |

13



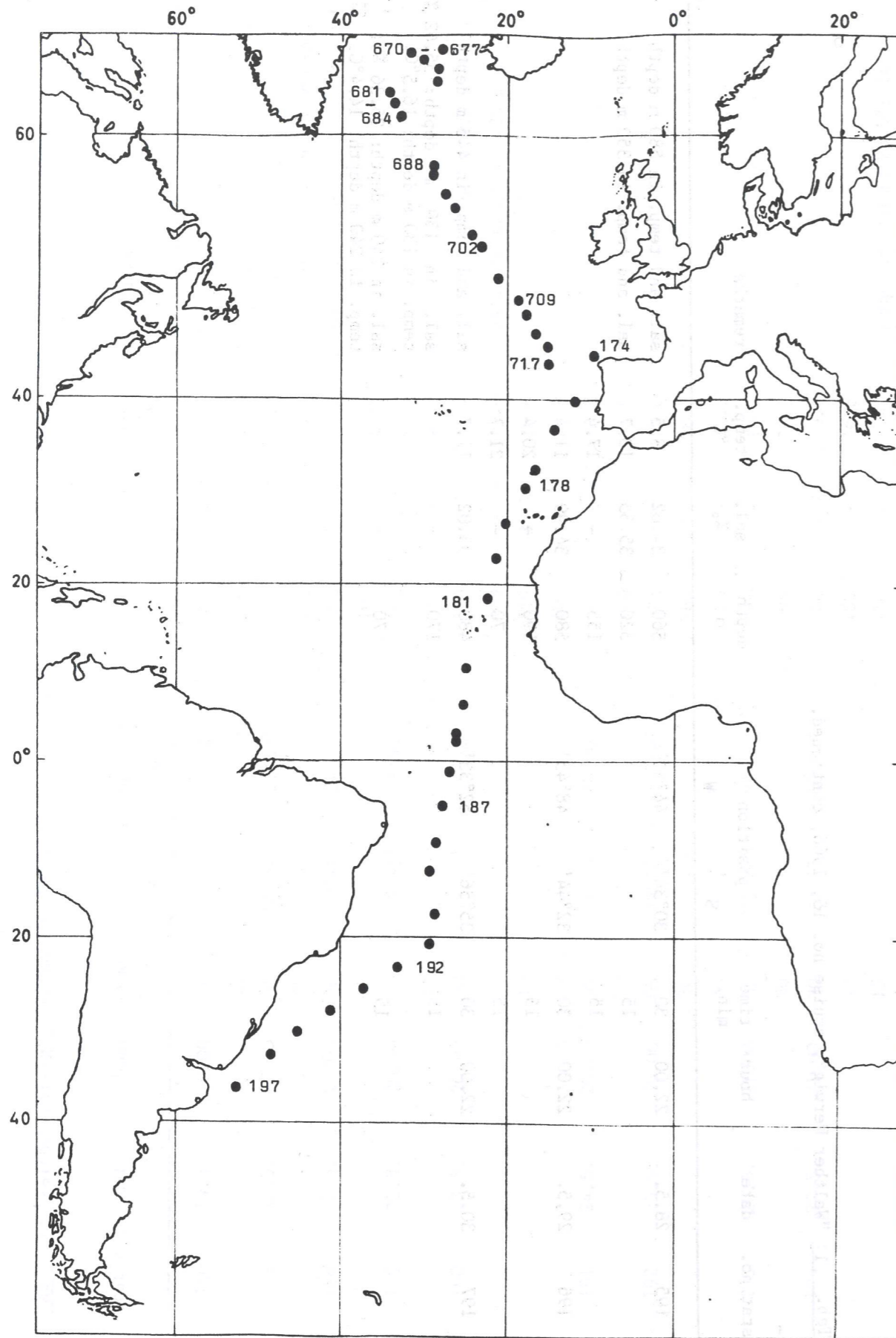


Fig. 1: "Walther Herwig", cruise no.15, 1966 (stat. 174-197);  
 "Walther Herwig", cruise no.51, 1973 (stat. 670-716).

Table 2:

"Walther Herwig" cruise no. 23: transect from the Bay of Biskay to Mar del Plata (Argentina); 14.1. to 16.2.1968. (Figure 2).

Commander captain Th. Frerichs.

Scientific crew:

|                                 |                   |      |
|---------------------------------|-------------------|------|
| Kreffft, G. scientist in charge | ichthyology       | ISH  |
| Bertelsen, E.                   | ichthyology       | ZMUC |
| Döhring, U.                     | techn. ass.       | ISH  |
| Lübben, Ch. (Mrs.)              | techn. ass.       | ISH  |
| Nielsen, J.                     | ichthyology       | ZMUC |
| Post, A.                        | ichthyology       | ISH  |
| Schulz, H.                      | evetebrates       | ISH  |
| Schumacher, A.                  | fisheries biology | ISH  |
| Wagner, G.                      | hydrography       | ISH  |

Gear: MT 1600.

Hydrography: mechanical bathythermograph; water sampling with Nansen-bottles.

Diaries: 2 volumes, handwritten.

Except for station 17, all hauls were carried out after sunset, when the scattered layer indicated the end of the vertical migration of organisms. If stations were subdivided into two or three hauls, depth increased from haul I to haul III. After each haul the net was emptied on deck.

Hauls from about 2.000 m depth could not be heaved in one, but had to be stopped twice for 20 minutes each in order to cool the winch. Thus these hauls became tripple-step-hauls in about 2.000, 1.300 and 600 m depth respectively.

Tab. 2: "Walther Herwig", cruise no. 23, Gulf of Biskay to Mar del Plata, 1968.

| stat.no. | date  | hour  | time min. | position |        | depth m  | sal. ‰ | temp. °C | remarks |
|----------|-------|-------|-----------|----------|--------|----------|--------|----------|---------|
|          |       |       |           | N        | W      |          |        |          |         |
| 1 I      | 14.1. | 19.55 | 15        | 46°27'   | 06°55' | 60       | 35.62  | 12.3     |         |
| 1 II     | 14.1. | 20.52 | 15        | 46°22'   | 07°01' | 120      | 35.62  | 12.3     |         |
| 1 III    | 14.1. | 22.10 | 30        | 46°17'   | 07°06' | 320      | 35.60  | 11.5     |         |
| 2 I      | 15.1. | 19.37 | 15        | 43°49'   | 08°58' | 140-160  | 35.62  | 12.1     |         |
| 2 II     | 15.1. | 20.35 | 15        | 43°47'   | 09°00' | 320-340  | 35.60  | 11.4     |         |
| 2 III    | 15.1. | 21.48 | 30        | 43°45'   | 09°04' | 560-580  | 35.65  | 10.5     |         |
| 3 I      | 16.1. | 19.32 | 15        | 41°03'   | 11°09' | 140-160  | -      | 14.3     |         |
| 3 II     | 16.1. | 20.45 | 15        | 40°57'   | 11°14' | 300-320  | 35.61  | 11.7     |         |
| 3 III    | 16.1. | 22.13 | 30        | 40°49'   | 11°18' | 520-540  | 35.58  | 10.9     |         |
| 4 I      | 17.1. | 19.48 | 15        | 37°22'   | 13°42' | 140-160  | -      | 14.5     |         |
| 4 II     | 17.1. | 20.58 | 15        | 37°12'   | 13°50' | 320-340  | 35.73  | 12.5     |         |
| 4 III    | 17.1. | 22.25 | 30        | 37°08'   | 13°52' | 560-580  | 35.63  | 11.1     |         |
| 5        | 18.1. | 19.50 | 30        | 33°49'   | 16°19' | 740-840  | 35.62  | 10.6     |         |
| 6 I      | 20.1  | 22.25 | 30        | 32°34'   | 16°53' | 900-1000 | 35.61  | 9.0      |         |
| 6 II     | 21.1. | 00.25 | 15        | 32°31'   | 16°54' | 90       | -      | 18.2     |         |
| 7 I      | 21.1. | 19.50 | 15        | 29°40'   | 18°02' | 200-220  | 36.25  | 15.8     |         |
| 7 II     | 21.1. | 21.05 | 15        | 29°34'   | 18°05' | 340-360  | 35.87  | 14.4     |         |
| 7 III    | 22.1. | 00.42 | 30        | 29°23'   | 18°10' | 2000     | -      | -        |         |
| 8 I      | 22.1. | 20.00 | 15        | 26°20'   | 19°21' | 200-220  | -      | 16.9     |         |
| 8 II     | 22.1. | 21.10 | 15        | 26°18'   | 19°22' | 340-360  | 36.03  | 14.6     |         |
| 8 III    | 22.1. | 22.33 | 30        | 26°10'   | 19°26' | 580      | 35.56  | 11.0     |         |

Tab. 2: "Walther Herwig", cruise no. 23, 1968, continued.

| stat.no. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|----------|-------|-------|-----------|----------|--------|---------|--------|----------|---------|
|          |       |       |           | N        | W      |         |        |          |         |
| 10 I     | 28.1. | 20.35 | 15        | 20°14'   | 21°35' | 40-60   | 36.60  | 20.5     |         |
| 10 II    | 28.1. | 21.25 | 15        | 20°10'   | 21°40' | 120-140 | -      | 17.0     |         |
| 10 III   | 28.1. | 22.40 | 30        | 20°04'   | 21°46' | 600-540 | 35.27  | 9.7      |         |
| 11 I     | 29.1. | 20.40 | 15        | 16°14'   | 22°24' | 140-160 | -      | 13.3     |         |
| 11 II    | 29.1. | 21.40 | 15        | 16°11'   | 22°24' | 220-240 | -      | 12.2     |         |
| 11 III   | 29.1. | 22.55 | 30        | 16°08'   | 22°22' | 560-580 | 35.11  | 9.1      |         |
| 12 I     | 30.1. | 20.30 | 15        | 12°16'   | 23°05' | 180-200 | -      | 12.0     |         |
| 12 II    | 30.1. | 22.35 | 30        | 12°07'   | 23°08' | 2000    | -      | -        |         |
| 13 I     | 31.1. | 20.25 | 15        | 08°29'   | 24°07' | 140-160 | -      | 12.2     |         |
| 13 II    | 31.1. | 21.40 | 30        | 08°21'   | 24°10' | 500-520 | 34.93  | 7.3      |         |
| 14 I     | 1.2.  | 20.30 | 15        | 04°16'   | 24°37' | 70-90   | 35.82  | 21.8     |         |
| 14 II    | 1.2.  | 21.21 | 15        | 04°11'   | 24°39' | 180-200 | -      | 13.9     |         |
| 14 III   | 1.2.  | 22.25 | 30        | 04°08'   | 24°41' | 580-600 | 34.73  | 6.5      |         |
| 15 I     | 2.2.  | 21.13 | 15        | 00°20'   | 25°20' | 70-90   | 36.00  | 23.2     |         |
| 15 II    | 2.2.  | 22.10 | 15        | 00°18'   | 25°20' | 180-200 | -      | 12.7     |         |
| 15 III   | 2.2.  | 23.22 | 30        | 00°14'   | 25°22' | 580-600 | 34.70  | 6.3      |         |
| 16       | 3.2.  | 19.15 | 30        | 03°00'   | 26°16' | 2000    | -      | -        |         |
| 17       | 4.2.  | 11.55 | 30        | 04°43'   | 26°39' | 2000    | 35.06  | 3.6      |         |

Tab. 2: "Walther Herwig", cruise no. 23, 1968, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|---------|
|          |       |       |              | S        | W      |            |           |             |         |
| 18 I     | 4.2.  | 20.30 | 15           | 05°58'   | 26°52' | 100-120    | -         | 25.3        |         |
| 18 II    | 4.2.  | 21.27 | 15           | 06°04'   | 26°56' | 220-240    | -         | 11.0        |         |
| 18 III   | 4.2.  | 22.40 | 30           | 06°06'   | 27°00' | 540-560    | 34.66     | 6.2         |         |
| 19 I     | 5.2.  | 20.45 | 15           | 09°43'   | 27°07' | 80-100     | -         | 22.5        |         |
| 19 II    | 5.2.  | 21.38 | 15           | 09°50'   | 27°10' | 180-200    | -         | 13.0        |         |
| 19 III   | 5.2.  | 23.05 | 30           | 09°54'   | 27°11' | 540-560    | 34.66     | 6.2         |         |
| 20 I     | 6.2.  | 20.50 | 15           | 13°50'   | 27°36' | 80-100     | -         | 22.3        |         |
| 20 II    | 6.2.  | 21.45 | 15           | 13°53'   | 27°37' | 180-200    | -         | 17.7        |         |
| 20 III   | 6.2.  | 22.55 | 30           | 13°56'   | 27°38' | 560-580    | 34.59     | 5.6         |         |
| 21       | 7.2.  | 23.05 | 30           | 17°33'   | 28°13' | 2000       | 34.85     | 3.4         |         |
| 22 I     | 8.2.  | 21.30 | 15           | 20°58'   | 29°59' | 140-160    | -         | 21.7        |         |
| 22 II    | 8.2.  | 22.25 | 15           | 21°02'   | 30°05' | 240-260    | -         | 16.2        |         |
| 22 III   | 8.2.  | 23.35 | 30           | 21°04'   | 30°08' | 540-560    | 34.57     | 8.1         |         |
| 23 I     | 9.2.  | 22.05 | 15           | 23°20'   | 33°22' | 140-160    | -         | 20.7        |         |
| 23 II    | 9.2.  | 23.00 | 15           | 23°24'   | 33°28' | 300-320    | 35.28     | 14.1        |         |
| 23 III   | 10.2. | 00.10 | 30           | 23°26'   | 33°30' | 540-560    | 34.65     | 8.8         |         |
| 24 I     | 10.2. | 21.50 | 15           | 25°54'   | 36°59' | 100-120    | -         | 20.0        |         |
| 24 II    | 10.2. | 23.45 | 30           | 25°58'   | 37°05' | 2000       | 34.81     | 3.4         |         |
| 25 I     | 11.2. | 21.45 | 15           | 27°46'   | 39°38' | 100-120    | -         | 18.0        |         |
| 25 II    | 11.2. | 22.40 | 15           | 27°48'   | 39°42' | 220-240    | -         | 14.7        |         |
| 25 III   | 11.2. | 23.50 | 30           | 27°50'   | 39°46' | 540-560    | 34.62     | 8.4         |         |

Tab. 2: "Walther Herwig", cruise no. 23, 1968, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|---------|
|          |       |       |              | S        | W      |            |           |             |         |
| 26 I     | 12.2. | 22.30 | 15           | 29°56'   | 42°23' | 32-54      | 36.48     | 21.9        |         |
| 26 II    | 12.2. | 23.28 | 15           | 29°58'   | 42°27' | 380-400    | 35.50     | 13.0        |         |
| 26 III   | 13.2. | 00.40 | 30           | 30°01'   | 42°30' | 570-590    | 34.95     | 10.4        |         |
| 27 I     | 13.2. | 22.50 | 15           | 32°05'   | 45°00' | 140-160    | -         | 16.6        |         |
| 27 II    | 13.2. | 23.50 | 15           | 32°08'   | 45°03' | 315-335    | 35.59     | 14.6        |         |
| 27 III   | 14.2. | 01.00 | 30           | 32°11'   | 45°08' | 560-580    | 34.78     | 9.5         |         |
| 28 I     | 14.2. | 22.52 | 15           | 34°00'   | 47°34' | 130-150    | -         | 16.6        |         |
| 28 II    | 15.2. | 00.45 | 30           | 34°01'   | 47°39' | 2000       | 34.81     | 3.6         |         |
| 29 I     | 15.2. | 22.45 | 15           | 35°12'   | 49°17' | 130-150    | -         | 19.6        |         |
| 29 II    | 15.2. | 23.48 | 15           | 35°13'   | 49°22' | 220-240    | 35.62     | 16.5        |         |
| 29 III   | 16.2. | 00.57 | 30           | 35°16'   | 49°26' | 540-560    | 35.70     | 11.0        |         |
| 30       | 16.2. | 23.40 | 60           | 36°37'   | 51°32' | 2000       | 34.76     | 3.5         |         |

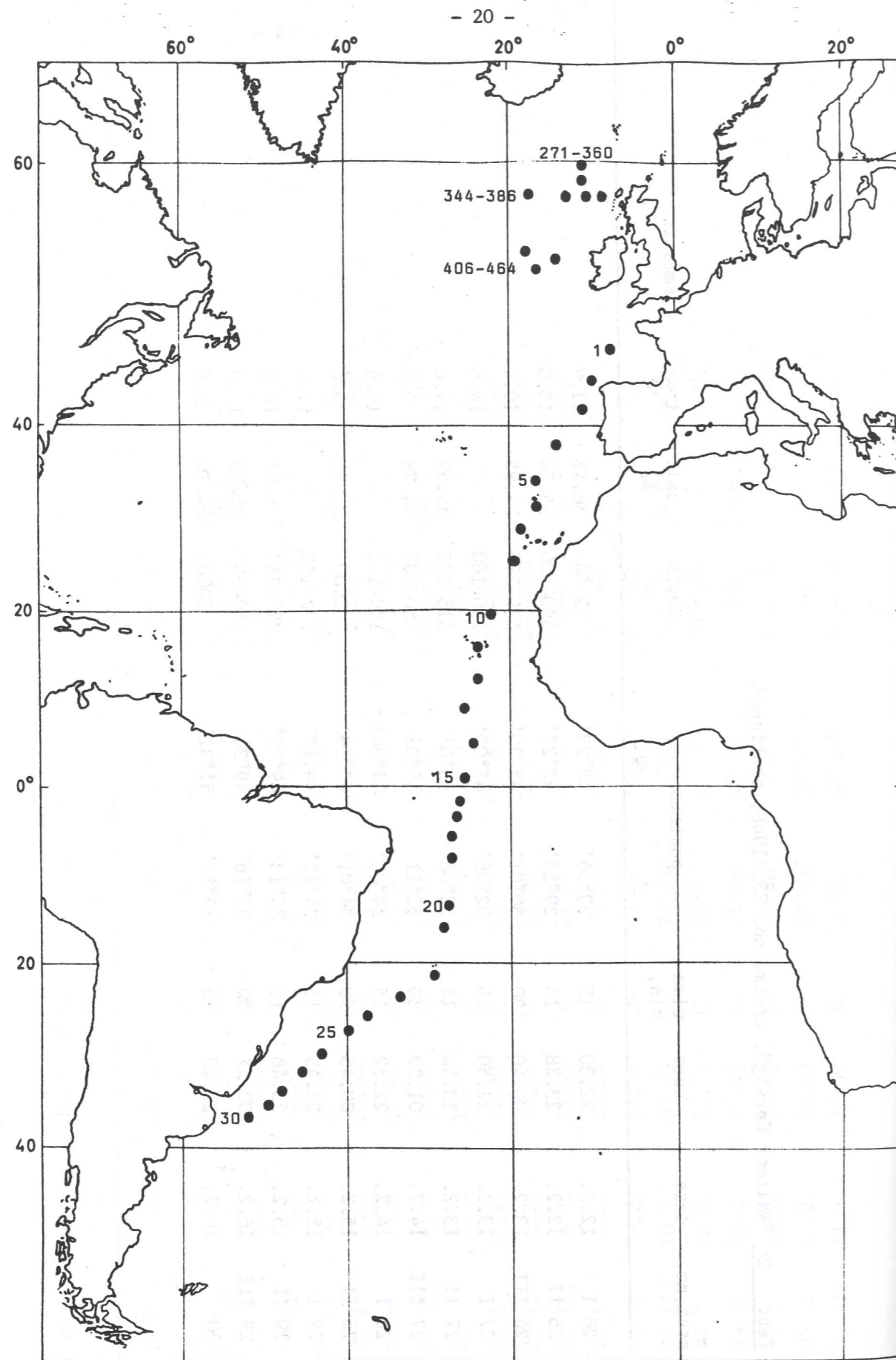


Fig. 2: "Walther Herwig", cruise no. 23, 1968 (stat. no. 1-30);  
cruise no. 58, 1983 (stat. no. 271-360);  
cruise no. 76, 1986 (stat. no. 344-464).

Table 3a:

"Walther Herwig" cruise no. 36, part 2, section I: transect from Mar del Plata (Argentina) to Cape Town (South Africa); 5.3. to 21.3.1971. (Figure 3).

Commander captain Th. Frerichs.

Scientific crew:

|                                 |                |      |
|---------------------------------|----------------|------|
| Krefft, G., scientist in charge | ichthyology    | ISH  |
| Bertelsen, E.                   | ichthyology    | ZMUC |
| Boltovskoy, E.                  | neuston        | UBA  |
| Gibbs, R.H.                     | ichthyology    | USNM |
| John, H.Ch.                     | ichthyoplanton | BAH  |
| Lübben, Ch. (Mrs.)              | techn. ass.    | ISH  |
| Lenz, W.                        | hydrography    | ISH  |
| Mathieu, F. (Mrs.)              | techn. ass.    | ISH  |
| Post, A.                        | ichthyology    | ISH  |
| Roper, C.                       | evertebrates   | USNM |
| Stehmann, M.                    | ichthyology    | ISH  |

Gear: MT 1600.

Hydrography: mechanical bathythermograph; water sampling with Nansen-bottles.  
Diaries: 3 volumes, handwritten, for both sections of the cruise.

The transect was provided to meet the presumed subtropical convergence along the 40°S latitude from the Patagonian slope to Gough Island and to continue from Gough Island along the shortest cruise to Cape Town. Actually one additional station was carried out off Tristan da Cunha Island. The transect became short of time and had to be interrupted in order to arrive in Cape Town on time. Three stations which had been omitted, were recovered at the beginning of section II of the transect; these stations are listed in tab. 3a.

Hauls were carried out the same way as in 1968 but stops were not necessary to heave the net from the deep layers (see page 15).

Tab. 3a: "Walther Herwig", cruise no. 36, part 2, section I, Mar del Plata - Cape Town, 1971.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | hydrography |       |       |       |       |       |       |  |
|----------|-------|-------|--------------|----------|--------|------------|-------------|-------|-------|-------|-------|-------|-------|--|
|          |       |       |              | S        | W      |            |             |       |       |       |       |       |       |  |
| 348      | 5.3.  | 07.35 | 15           | 38°20'   | 54°33' | 997-1040   | m depth     | 974   | 1185  |       |       |       |       |  |
|          |       |       |              |          |        |            | temp. °C    | 2.50  | 2.42  |       |       |       |       |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.34 | 34.38 |       |       |       |       |  |
| 350 I    | 5.3.  | 20.47 | 20           | 38°29'   | 52°09' | 119        | m depth     | 102   | 225   | 407   | 509   | 616   |       |  |
| 350 II   | 5.3.  | 22.00 | 20           | 38°38'   | 52°02' | 262-240    | temp. °C    | 20.4  | 16.2  | 14.5  | 13.1  | 10.4  |       |  |
| 350 III  | 5.3.  | 23.30 | 20           | 38°38'   | 51°55' | 610-600    | sal. ‰      | 36.51 | 35.78 | 35.53 | 35.28 | 34.87 |       |  |
| 354 I    | 6.3.  | 20.10 | 15           | 39°18'   | 48°12' | 100        | m depth     | 5     | 156   | 1763  | 2073  |       |       |  |
| 354 II   | 6.3.  | 22.00 | 30           | 39°19'   | 48°02' | 2000       | temp. °C    | 18.6  | 9.8   | 2.8   | 2.8   |       |       |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.82 | 34.71 | 34.68 | 34.76 |       |       |  |
| 358 I    | 7.3.  | 19.04 | 15           | 39°45'   | 43°47' | 100-106    | m depth     | 5     | 104   | 207   | 310   | 830   | 1039  |  |
| 358 II   | 7.3.  | 19.52 | 15           | 39°47'   | 43°38' | 200-212    | temp. °C    | 18.3  | 12.8  | 9.3   | 6.1   | 3.1   | 2.7   |  |
| 358 III  | 7.3.  | 21.42 | 15           | 39°47'   | 43°30' | 1000-1015  | sal. ‰      | 34.77 | 35.17 | 34.65 | 34.32 | 34.33 | 34.33 |  |
| 363 I    | 8.3.  | 20.15 | 15           | 40°18'   | 39°22' | 105-110    | m depth     | 5     | 105   | 262   | 418   | 628   | 893   |  |
| 363 II   | 8.3.  | 21.20 | 15           | 40°18'   | 39°12' | 316-328    | temp. °C    | 16.0  | 9.2   | 5.0   | 4.1   | 3.4   | 2.7   |  |
| 363 III  | 8.3.  | 22.57 | 15           | 40°18'   | 39°04' | 800-785    | sal. ‰      | 34.46 | 34.57 | 34.20 | 34.18 | 34.20 | 34.26 |  |
| 367      | 9.3.  | 21.00 | 60           | 40°18'   | 35°07' | 1850-1750  | m depth     | 1653  | 2072  |       |       |       |       |  |
|          |       |       |              |          |        |            | temp. °C    | 2.7   | 2.7   |       |       |       |       |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.65 | 34.76 |       |       |       |       |  |
| 371 I    | 10.3. | 19.20 | 15           | 40°00'   | 30°40' | 99-102     | m depth     | 5     | 105   | 209   | 627   | 838   |       |  |
| 371 II   | 10.3. | 20.18 | 15           | 40°00'   | 30°35' | 192-200    | temp. °C    | 18.4  | 15.6  | 14.5  | 4.9   | 3.8   |       |  |
| 371 III  | 10.3. | 21.55 | 15           | 40°00'   | 30°30' | 700-677    | sal. ‰      | 35.44 | 35.68 | 35.54 | 34.24 | 34.21 |       |  |
| 376      | 11.3. | 20.15 | 90           | 39°55'   | 26°02' | 2000       | m depth     | 1780  |       |       |       |       |       |  |
|          |       |       |              |          |        |            | temp. °C    | 2.8   |       |       |       |       |       |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.70 |       |       |       |       |       |  |

Tab. 3a: "Walther Herwig", cruise no. 36, part 2, section I, 1971, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | hydrography |       |       |       |       |       |  |  |
|----------|-------|-------|--------------|----------|--------|------------|-------------|-------|-------|-------|-------|-------|--|--|
|          |       |       |              | S        | W      |            |             |       |       |       |       |       |  |  |
| 380 I    | 12.3. | 20.07 | 15           | 39°53'   | 21°49' | 100-110    | m depth     | 54    | 211   | 422   | 632   | 843   |  |  |
| 380 II   | 12.3. | 21.13 | 15           | 39°53'   | 21°44' | 256-260    | temp. °C    | 14.3  | 13.0  | 7.6   | 4.6   | 3.7   |  |  |
| 380 III  | 12.3. | 23.25 | 15           | 39°53'   | 21°33' | 708-696    | sal. ‰      | 35.40 | 35.26 | 34.50 | 34.21 | 34.21 |  |  |
| 384 I    | 13.3. | 20.45 | 30           | 39°45'   | 17°40' | 2000       | m depth     | 1653  | 2060  |       |       |       |  |  |
|          |       |       |              |          |        |            | temp. °C    | 2.8   | 2.8   |       |       |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.64 | 34.78 |       |       |       |  |  |
| 395      | 17.3. | 01.45 | 120          | 36°49'   | 12°17' | 1750-2000  | m depth     | 1249  |       |       |       |       |  |  |
|          |       |       |              |          |        |            | temp. °C    | 2.9   |       |       |       |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.36 |       |       |       |       |  |  |
| 399 I    | 18.3. | 05.45 | 15           | 40°35'   | 09°57' | 98         | m depth     | 84    | 116   | 210   | 316   |       |  |  |
| 399 II   | 18.3. | 06.44 | 15           | 40°34'   | 09°50' | 300-310    | temp. °C    | 11.1  | 9.8   | 8.7   | 7.1   |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.66 | 34.61 | 34.51 | 34.41 |       |  |  |
| 402 I    | 18.3. | 19.24 | 15           | 40°03'   | 07°30' | 100-110    | m depth     | 62    | 104   | 313   | 522   | 731   |  |  |
| 402 II   | 18.3. | 20.26 | 15           | 40°02'   | 07°28' | 300-320    | temp. °C    | 14.3  | 11.2  | 8.3   | 4.9   | 3.8   |  |  |
| 402 III  | 18.3. | 22.18 | 15           | 40°01'   | 07°25' | 800-820    | sal. ‰      | 34.70 | 34.87 | 34.54 | 34.22 | 34.19 |  |  |
| 406      | 19.3. | 20.00 | 90           | 39°19'   | 03°15' | 2000       | m depth     | 1577  |       |       |       |       |  |  |
|          |       |       |              |          |        |            | temp. °C    | 2.7   |       |       |       |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.61 |       |       |       |       |  |  |
| 490 I    | 20.3. | 19.32 | 15           | 38°16'   | 01°12' | 100-110    | m depth     | 73    | 105   | 687   | 902   |       |  |  |
| 409 II   | 20.3. | 21.00 | 15           | 38°14'   | 01°15' | 750-760    | tem. °C     | 13.7  | 11.8  | 4.2   | 3.4   |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.57 | 34.78 | 34.22 | 34.25 |       |  |  |
| 412 I    | 21.3. | 18.51 | 15           | 37°10'   | 05°12' | 72-76      | m depth     | 5     | 83    | 1659  | 2072  |       |  |  |
| 412 II   | 21.3. | 20.00 | 90           | 37°08'   | 05°23' | 2100-2200  | temp. °C    | 16.1  | 13.6  | 2.7   | 2.7   |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.80 | 35.08 | 34.63 | 34.76 |       |  |  |

Tab. 3a: "Walther Herwig", cruise no. 36, part 2, section I, 1971, continued.

| stat.no. | date  | hour  | time min. | position |        | depth m | hydrography |          |        |       |       |       |       |
|----------|-------|-------|-----------|----------|--------|---------|-------------|----------|--------|-------|-------|-------|-------|
|          |       |       |           | S        | W      |         | m depth     | temp. °C | sal. ‰ |       |       |       |       |
| 417      | 28.3. | 10.00 | 60        | 34°12'   | 16°35' | 1550    | 1255        | 1674     | 2.9    | 2.9   | 34.62 | 34.80 |       |
| 419 I    | 28.3. | 21.25 | 15        | 34°25'   | 14°47' | 105-112 | 73          | 105      | 19.0   | 15.6  | 19.0  | 12.2  | 11.8  |
| 419 II   | 28.3. | 22.30 | 15        | 34°26'   | 14°47' | 300-305 | 35.51       | 35.20    | 35.51  | 35.20 | 35.02 | 35.02 | 35.02 |
| 423 I    | 29.3. | 19.44 | 15        | 35°34'   | 10°42' | 97-103  | 81          | 102      | 17.7   | 16.7  | 17.7  | 14.1  | 12.4  |
| 423 II   | 29.3. | 20.50 | 15        | 35°32'   | 10°36' | 300-305 | 35.59       | 35.52    | 35.59  | 35.52 | 35.01 | 34.98 | 34.52 |
| 423 III  | 29.3. | 22.30 | 15        | 35°29'   | 10.32' | 588-592 |             |          |        |       |       |       |       |

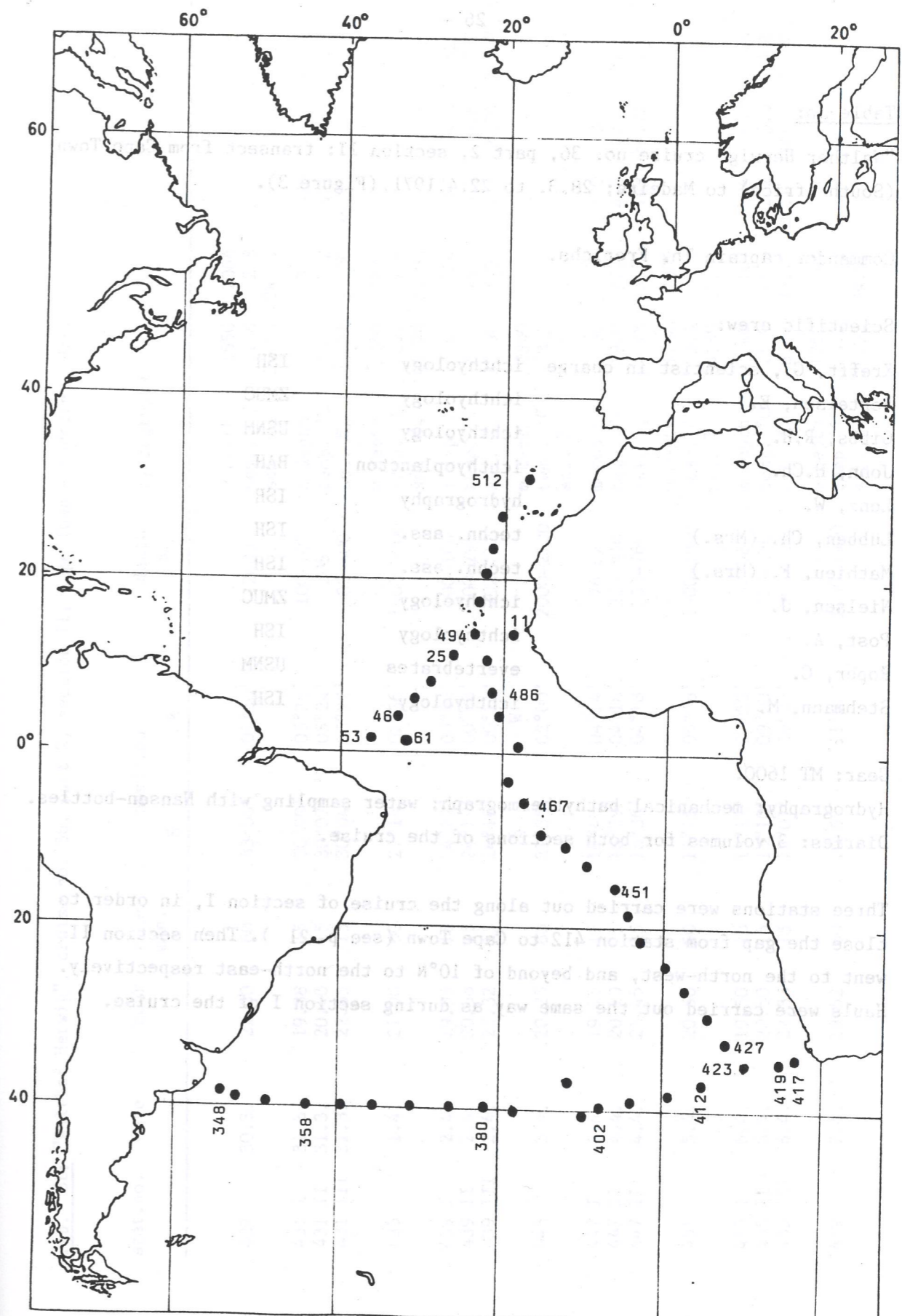


Fig. 3: "Walther Herwig", cruise no. 36, 1971 (stat. no. 348-512).  
 "Anton Dohrn", cruise no. 176 (58), 1974 (stat. no. 11-61).

Table 3b:

"Walther Herwig" cruise no. 36, part 2, section II: transect from Cape Town (South Africa) to Madeira; 28.3. to 22.4.1971. (Figure 3).

Commander captain Th. Frerichs.

Scientific crew:

|                                 |                |      |
|---------------------------------|----------------|------|
| Krefft, G., scientist in charge | ichthyology    | ISH  |
| Bertelsen, E.                   | ichthyology    | ZMUC |
| Gibbs, R.H.                     | ichthyology    | USNM |
| John, H.Ch.                     | ichthyoplanton | BAH  |
| Lenz, W.                        | hydrography    | ISH  |
| Lübben, Ch. (Mrs.)              | techn. ass.    | ISH  |
| Mathieu, F. (Mrs.)              | techn. ass.    | ISH  |
| Nielsen, J.                     | ichthyology    | ZMUC |
| Post, A.                        | ichthyology    | ISH  |
| Roper, C.                       | evertbrates    | USNM |
| Stehmann, M.                    | ichthyology    | ISH  |

Gear: MT 1600.

Hydrography: mechanical bathythermograph; water sampling with Nansen-bottles.

Diaries: 3 volumes for both sections of the cruise.

Three stations were carried out along the cruise of section I, in order to close the gap from station 412 to Cape Town (see p. 21 ). Then section II went to the north-west, and beyond of 10°N to the north-east respectively.

Hauls were carried out the same way as during section I of the cruise.

Tab. 3b: "Walther Herwig", cruise no. 36, part 2, section II, Cape Town - Madeira, 1971.

| stat.no. | date  | hour  | time min. | position |        | depth m   | hydrography                                    |
|----------|-------|-------|-----------|----------|--------|-----------|--|
|          |       |       |           | S        | E      |           |  |
| 427      | 30.3. | 21.00 | 60        | 33°00'   | 07°50' | 2000      | m depth 1550<br>temp. °C 2.8<br>sal. ‰ 34.64   |
| 431 I    | 31.3. | 19.38 | 15        | 30°09'   | 05°26' | 100-105   | m depth 94<br>temp. °C 16.5<br>sal. ‰ 35.34    |
| 431 II   | 31.3. | 20.40 | 15        | 30°07'   | 05°24' | 308       | m depth 16.5<br>temp. °C 11.2<br>sal. ‰ 35.00  |
| 431 III  | 31.3. | 22.05 | 15        | 30°04'   | 05°22' | 502-500   | m depth 35.34<br>temp. °C 11.2<br>sal. ‰ 35.00 |
| 435      | 1.4.  | 21.00 | 60        | 27°14'   | 02°56' | 1900-2000 | m depth 1560<br>temp. °C 3.2<br>sal. ‰ 34.76   |
| 439 I    | 2.4.  | 19.55 | 15        | 24°22'   | 00°24' | 100-104   | m depth 62<br>temp. °C 19.2<br>sal. ‰ 35.90    |
| 439 II   | 2.4.  | 20.56 | 15        | 24°19'   | 00°23' | 300-296   | m depth 19.2<br>temp. °C 15.9<br>sal. ‰ 35.50  |
| 439 III  | 2.4.  | 22.32 | 15        | 24°16'   | 00°21' | 702-712   | m depth 35.90<br>temp. °C 15.9<br>sal. ‰ 35.50 |
| 443      | 3.4.  | 20.25 | 60        | 21°35'   | 02°00' | 2000-2100 | m depth 2000<br>temp. °C 3.3<br>sal. ‰ -       |
| 447 I    | 4.4.  | 19.10 | 15        | 18°43'   | 04°14' | 74-82     | m depth 50<br>temp. °C 19.8<br>sal. ‰ 35.18    |
| 447 II   | 4.4.  | 20.10 | 15        | 18°39'   | 04°16' | 300-310   | m depth 19.8<br>temp. °C 17.5<br>sal. ‰ 35.77  |
| 447 III  | 4.4.  | 21.45 | 15        | 18°36'   | 04°18' | 750-760   | m depth 35.18<br>temp. °C 17.5<br>sal. ‰ 35.77 |
| 451      | 5.4.  | 20.50 | 60        | 15°45'   | 06°06' | 1900-1800 | m depth 1764<br>temp. °C 3.4<br>sal. ‰ 34.89   |
| 455 I    | 6.4.  | 19.50 | 15        | 13°12'   | 08°58' | 102-98    | m depth 46<br>temp. °C 21.9<br>sal. ‰ 36.32    |
| 455 II   | 6.4.  | 20.50 | 15        | 13°10'   | 09°00' | 300-296   | m depth 21.9<br>temp. °C 18.5<br>sal. ‰ 36.12  |
| 455 III  | 6.4.  | 22.33 | 15        | 13°07'   | 09°02' | 990-1010  | m depth 36.32<br>temp. °C 18.5<br>sal. ‰ 36.12 |
| 459      | 7.4.  | 19.52 | 60        | 10°57'   | 11°20' | 1800-1900 | m depth 1752<br>temp. °C 3.5<br>sal. ‰ 34.92   |

Tab. 3b: "Walther Herwig", cruise no. 36, part 2, section II, 1971, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | hydrography |       |       |       |       |       |  |  |
|----------|-------|-------|--------------|----------|--------|------------|-------------|-------|-------|-------|-------|-------|--|--|
|          |       |       |              | S        | W      |            |             |       |       |       |       |       |  |  |
| 463 I    | 8.4.  | 19.47 | 15           | 08°12'   | 14°07' | 104-108    | m depth     | 62    | 208   | 416   | 623   | 720   |  |  |
| 463 II   | 8.4.  | 20.45 | 15           | 08°11'   | 14°10' | 356-342    | temp. °C    | -     | 11.3  | 7.9   | 5.9   | 5.2   |  |  |
| 463 III  | 8.4.  | 22.25 | 15           | 08°11'   | 14°12' | 640-632    | sal. ‰      | 36.40 | 35.07 | 34.69 | 34.53 | 34.49 |  |  |
|          |       |       |              |          |        |            | m depth     | 1770  | 2083  |       |       |       |  |  |
| 467      | 9.4.  | 20.00 | 60           | 05°30'   | 16°28' | 1850-1900  | temp. °C    | 3.8   | 3.3   |       |       |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.96 | 34.93 |       |       |       |  |  |
| 471 I    | 10.4. | 19.18 | 15           | 02°30'   | 18°55' | 105- 98    | m depth     | 47    | 208   | 417   | 625   | 731   |  |  |
| 471 II   | 10.4. | 20.15 | 15           | 02°29'   | 18°58' | 300-304    | temp. °C    | -     | 13.1  | 9.4   | 5.4   | 4.7   |  |  |
| 471 III  | 10.4. | 21.33 | 20           | 02°27'   | 19°00' | 657-592    | sal. ‰      | 35.88 | 35.30 | 34.85 | 34.49 | 34.46 |  |  |
|          |       |       |              |          |        |            |             |       |       |       |       |       |  |  |
|          |       |       |              | N        | W      |            |             |       |       |       |       |       |  |  |
| 478      | 12.4. | 20.20 | 60           | 01°04'   | 18°22' | 2100       | m depth     | 2000  |       |       |       |       |  |  |
|          |       |       |              |          |        |            | temp. °C    | 3.2   |       |       |       |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | -     |       |       |       |       |  |  |
| 482 I    | 13.4. | 19.39 | 15           | 04°34'   | 19°39' | 100-104    | m depth     | 93    | 206   | 412   | 721   | 1029  |  |  |
| 482 II   | 13.4. | 20.34 | 15           | 04°36'   | 19°40' | 246-256    | temp. °C    | 14.5  | 13.2  | 9.0   | 5.9   | 4.8   |  |  |
| 482 III  | 13.4. | 22.12 | 15           | 04°38'   | 19°41' | 746-756    | sal. ‰      | 35.46 | 35.30 | 34.84 | 34.60 | 34.67 |  |  |
|          |       |       |              |          |        |            | m depth     | 1031  | 1753  |       |       |       |  |  |
| 486      | 14.4. | 19.40 | 60           | 07°32'   | 20°54' | 1300       | temp. °C    | 4.8   | 3.7   |       |       |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 34.73 | 34.95 |       |       |       |  |  |
| 490 I    | 15.4. | 19.54 | 15           | 10°50'   | 22°08' | 100-111    | m depth     | 73    | 104   | 311   | 622   |       |  |  |
| 490 II   | 15.4. | 21.07 | 15           | 10°52'   | 22°09' | 608-592    | tem. °C     | 14.9  | 13.8  | 11.1  | 7.8   |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 35.51 | 35.39 | 35.13 | 34.89 |       |  |  |
|          |       |       |              |          |        |            |             |       |       |       |       |       |  |  |
| 494      | 16.4. | 20.30 | 60           | 14°05'   | 23°12' | 1900       | m depth     | 1733  |       |       |       |       |  |  |
|          |       |       |              |          |        |            | temp. °C    | 3.8   |       |       |       |       |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 35.00 |       |       |       |       |  |  |

Tab. 3b "Walther Herwig", cruise no. 36, part 2, section II, 1971, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | hydrography |       |       |     |  |  |  |  |
|----------|-------|-------|--------------|----------|--------|------------|-------------|-------|-------|-----|--|--|--|--|
|          |       |       |              |          |        |            |             |       |       |     |  |  |  |  |
| 498 I    | 17.4. | 19.55 | 15           | 17°22'   | 22°58' | 105-102    | m depth     | 100   | 300   | 600 |  |  |  |  |
| 498 II   | 17.4. | 20.50 | 15           | 17°24'   | 22°57' | 305-293    | temp. °C    | 15.0  | 13.0  | 9.5 |  |  |  |  |
| 498 III  | 17.4. | 22.03 | 15           | 17°27'   | 22°55' | 596-610    | sal. ‰      | -     | -     | -   |  |  |  |  |
|          |       |       |              |          |        |            | m depth     | 1831  |       |     |  |  |  |  |
| 502      | 18.4. | 19.40 | 60           | 20°27'   | 21°58' | 1900-2100  | temp. °C    | 3.9   |       |     |  |  |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 35.01 |       |     |  |  |  |  |
|          |       |       |              |          |        |            | m depth     | 1990  |       |     |  |  |  |  |
| 506      | 19.4. | 19.30 | 60           | 23°47'   | 20°59' | 1800-2100  | temp. °C    | 3.8   |       |     |  |  |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 35.09 |       |     |  |  |  |  |
|          |       |       |              |          |        |            | m depth     | 1750  | 2060  |     |  |  |  |  |
| 510      | 20.4. | 19.30 | 60           | 27°18'   | 19°44' | 1750-2000  | temp. °C    | 4.8   | 4.0   |     |  |  |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 35.16 | 35.05 |     |  |  |  |  |
|          |       |       |              |          |        |            | m depth     | 1777  | 2087  |     |  |  |  |  |
| 512      | 22.4. | 21.25 | 60           | 32°47'   | 16°24' | 1750-1800  | temp. °C    | 5.5   | 4.4   |     |  |  |  |  |
|          |       |       |              |          |        |            | sal. ‰      | 35.29 | 35.14 |     |  |  |  |  |



Table 4:

"Walther Herwig" cruise no. 51, part 2: Overflow Expedition; 9.9. to 19.9.1973 (pelagic stations) and "Walther Herwig" cruise no. 51, part 3: transect from the Denmark Strait to Lisbon; 20.9. to 28.9.1973. (Figure 1).

Commander captain Th. Frerichs.

Scientific crew:

|                                 |             |      |
|---------------------------------|-------------|------|
| Krefft, G., scientist in charge | ichthyology | ISH  |
| Bertelsen, E.                   | ichthyology | ZMUC |
| Cohen, D.E.                     | ichthyology | USNM |
| Haedrich, R.L.                  | ichthyology | WHOI |
| Lenz, W.                        | hydrography | ISH  |
| Lübben, Ch. (Mrs.)              | techn. ass. | ISH  |
| Nielsen, J.                     | ichthyology | ZMUC |
| Post, A.                        | ichthyology | ISH  |
| Schillat, B.                    | techn. ass. | ISH  |
| Stehmann, M.                    | ichthyology | ISH  |
| Ullah, F. (Mrs.)                | techn. ass. | ISH  |

Gear: MT 1600.

Hydrography: mechanical bathythermograph, XBT, water sampling with Nansen-bottles.

Diaries: 1 volume, handwritten.

Cruise no. 51 of "Walther Herwig" was part of the contribution of the Federal Republic of Germany to the international "Overflow Expedition 1973". The cruise was subdivided into three sections. During the second section an observation programme was carried out on the fish fauna across the overflow area of the Denmark Strait, including pelagic and bottom trawling. The pelagic stations of this programme are included in tab. 4 (stations no. 627 to 680). Part 3 of the cruise included a pelagic transect from the southern Denmark Strait to the Iberian Basin.

Tab. 4 : "Walther Herwig", cruise no. 51 (6), "Overflow-expedition", 1973

| stat.no. | date  | hour  | time min. | position |        | depth m   | sal. ‰ | temp. °C | remarks |
|----------|-------|-------|-----------|----------|--------|-----------|--------|----------|---------|
|          |       |       |           | N        | W      |           |        |          |         |
| 627      | 9.9.  | 14.32 | 30        | 67°23'   | 23°20' | 360-420   | -      | 0.3      |         |
| 628      | 9.9.  | 16.36 | 30        | 67°29'   | 23°42' | 395-420   | 34.89  | 0.1      |         |
| 666      | 17.9. | 02.00 | 30        | 65°38'   | 30°26' | 150-100   | -      | 5.7      |         |
| 667      | 17.9. | 04.30 | 30        | 65°45'   | 30°40' | 350       | -      | 1.2      |         |
| 668      | 17.9. | 12.50 | 30        | 65°14'   | 28°57' | 1000      | -      | -        |         |
| 669      | 17.9. | 15.18 | 15        | 65°11'   | 28°50' | 800       | -      | 4.4      |         |
| 670      | 17.9. | 19.55 | 30        | 64°46'   | 27°23' | 496       | -      | 6.9      |         |
| 671      | 18.9. | 00.55 | 15        | 64°55'   | 27°23' | 95        | -      | 7.5      |         |
| 672      | 18.9. | 10.00 | 30        | 63°09'   | 25°22' | 100       | -      | 8.2      |         |
| 673      | 18.9. | 17.35 | 30        | 63°45'   | 27°44' | 800       | -      | 4.5      |         |
| 674      | 18.9. | 21.12 | 30        | 64°03'   | 28°51' | 100       | -      | 5.9      |         |
| 675      | 18.9. | 23.10 | 30        | 64°04'   | 29°07' | 1100      | -      | 4.1      |         |
| 676      | 19.9. | 00.30 | 90        | 64°06'   | 29°14' | 500       | -      | -        | IKMT    |
| 677      | 19.9. | 10.42 | 30        | 64°36'   | 30°59' | 1500-2000 | 34.94  | 3.8      |         |
| 678      | 19.9. | 18.45 | 30        | 65°09'   | 32°50' | 900-1100  | 34.92  | 3.9      |         |
| 679      | 19.9. | 20.20 | 60        | 65°08'   | 32°58' | 300       | 35.00  | 5.4      |         |
| 680      | 19.9. | 22.10 | 30        | 65°08'   | 33°09' | 300-310   | 35.00  | 5.4      |         |
| 681      | 20.9. | 10.45 | 60        | 62°39'   | 33°45' | 2100      | 34.97  | 3.4      |         |

Tab. 4 : "Walther Herwig", cruise no. 51 (6), 1973, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|---------|
|          |       |       |              | N        | W      |            |           |             |         |
| 682      | 20.9. | 20.25 | 30           | 61°21'   | 32°20' | 750-1000   | 34.90     | 3.8         |         |
| 683      | 20.9. | 22.15 | 30           | 61°16'   | 32°11' | 440- 450   | 34.93     | 4.3         |         |
| 684      | 20.9. | 23.35 | 15           | 61°13'   | 32°05' | 145- 150   | 34.91     | 5.3         |         |
| 685      | 21.9. | 00.25 | 45           | 61°10'   | 32°06' | 150        | 34.91     | 5.3         | IKMT    |
| 687      | 21.9. | 12.30 | 60           | 59°15'   | 29°46' | 450        | -         | 7.3         | IKMT    |
| 688      | 21.9. | 20.15 | 30           | 58°03'   | 28°30' | 2000       | 35.00     | 3.5         |         |
| 689      | 21.9. | 22.17 | 30           | 57°55'   | 28°23' | 410- 395   | 35.06     | 6.6         |         |
| 690      | 21.9. | 23.28 | 15           | 57°50'   | 28°13' | 95- 100    | 35.00     | 7.9         |         |
| 691      | 22.9. | 00.08 | 60           | 57°48'   | 28°10' | 50         | 34.83     | 8.8         | IKMT    |
| 693      | 22.9. | 10.30 | 30           | 56°28'   | 26°44' | 2200-2500  | 35.00     | 3.4         |         |
| 694      | 22.9. | 12.20 | 90           | 56°31'   | 26°35' | 450        | 34.92     | 5.9         | IKMT    |
| 695      | 22.9. | 19.45 | 30           | 55°43'   | 25°53' | 2600       | 34.98     | 3.2         |         |
| 696      | 22.9. | 22.05 | 30           | 55°39'   | 25°47' | 410- 400   | 35.00     | 6.6         | IKMT    |
| 697      | 22.9. | 23.30 | 30           | 55°34'   | 25°29' | 60- 105    | 35.01     | 9.9         |         |
| 698      | 23.9. | 00.30 | 60           | 55°29'   | 25°28' | 100        | 35.03     | 9.0         |         |
| 699      | 24.9. | 09.25 | 30           | 53°28'   | 23°17' | 2700       | 34.98     | 3.2         |         |
| 700      | 24.9. | 18.40 | 30           | 52°35'   | 22°20' | 1250       | 34.96     | 4.2         |         |
| 701      | 24.9. | 20.30 | 30           | 52°30'   | 22°12' | 300        | 35.40     | 10.2        |         |

Tab. 4 : "Walther Herwig", cruise no. 51 (6), 1973, continued

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|---------|
|          |       |       |              | N        | W      |            |           |             |         |
| 702      | 24.9. | 21.45 | 30           | 52°30'   | 22°12' | 100        | 35.47     | 11.4        |         |
| 705      | 25.9. | 16.20 | 30           | 50°08'   | 19°46' | 2550       | 34.94     | 3.4         |         |
| 706      | 25.9. | 20.38 | 30           | 50°07'   | 19°45' | 490-500    | 35.50     | 10.5        |         |
| 707      | 25.9. | 22.00 | 30           | 50°03'   | 19°38' | 245-255    | 35.49     | 10.7        |         |
| 708      | 25.9. | 23.12 | 60           | 50°00'   | 19°33' | 350        | 35.50     | 10.6        | IKMT    |
| 709      | 26.9. | 09.40 | 30           | 48°30'   | 18°00' | 2750       | 34.96     | 3.0         |         |
| 710      | 26.9. | 18.45 | 30           | 47°18'   | 16°57' | 1000       | 35.24     | 6.8         |         |
| 711      | 26.9. | 20.35 | 30           | 47°10'   | 16°53' | 400        | 35.60     | 11.0        |         |
| 712      | 26.9. | 22.00 | 30           | 47°04'   | 16°50' | 85-100     | 35.70     | 12.5        |         |
| 713      | 26.9. | 22.55 | 55           | 47°00'   | 16°50' | -          | -         | -           | IKMT    |
| 714      | 27.9. | 09.40 | 30           | 46°00'   | 15°49' | 2650       | 34.95     | 3.1         |         |
| 715      | 27.9. | 20.18 | 30           | 44°55'   | 14°55' | 490-500    | 35.63     | 10.8        |         |
| 716      | 27.9. | 21.38 | 30           | 44°44'   | 14°49' | 150- 95    | 35.71     | 11.8        |         |
| 717      | 28.9. | 09.25 | 60           | 42°56'   | 13°29' | 3000-3100  | 34.95     | 2.8         |         |

Table 5:

"Anton Dohrn" cruise no. 176 (58): GATE Expedition to the central Atlantic. 18.7. to 24.7.1974. (Figure 3).

Commander captain R. de Graaf.

Scientific crew, as far as the fisheries section is concerned:

Post, A.                    ichthyology        ISH  
 Meincke, J.               hydrography        IfM, Kiel  
 Ullah, F.                techn. ass.        ISH

Gear: MT 1600.

Hydrography: mechanical bathythermograph, XBT.

Diaries: 1 volume, handwritten.

The study of the fish fauna was outside the realm of GATE. Trawling covered only a few days of the cruise from Dakar (Senegal) to the permanent station upon the equator at 29°W. Actually this station was not permanent but drifted per 2 kn to the west, ending at 34°W on 8.8.1974. During this time fishes for the ISH collection were caught from the surface by angling and spearing.

|     |       |        |    |       |
|-----|-------|--------|----|-------|
| 11A | 38°3' | 06°52' | 30 | 13.26 |
| 11B | 31°8' | 51°33' | 30 | 13.50 |
| 11C | 31°8' | 30°19' | 31 | 17.24 |
| 11D | 31°8' | 03°40' | 36 | 19.21 |
| 11E | 30°8' | 33°22' | 38 | 13.30 |
| 11F | 30°8' | 33°00' | 36 | 11.00 |
| 11G | 30°8' | 30°22' | 40 | 13.10 |
| 11H | 30°8' | 16°42' | 39 | 13.14 |
| 100 | 30°8' | 03°40' | 30 | 12.30 |
| 106 | 32°3' | 23°15' | 00 | 06.10 |
| 101 | 32°3' | 53°00' | 30 | 20.13 |
| 100 | 32°8' | 30°48' | 30 | 13.10 |
| 102 | 32°3' | 18°30' | 30 | 20.10 |
| 105 | 30°8' | 31°11' | 30 | 13.10 |

Tab. 5: "Anton Dohrn", GATE expedition, 1974.

| stat.no. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks                              |
|----------|-------|-------|-----------|----------|--------|---------|--------|----------|--------------------------------------|
|          |       |       |           | N        | W      |         |        |          |                                      |
| 11       | 18.7. | 01.45 | 15        | 14°11'   | 18°28' | 2000    | -      | -        | stephaul                             |
| 25 I     | 19.7. | 02.30 | 15        | 11°04'   | 26°01' | 1000    | -      | -        | no XBT records from 0 to 450 m depth |
| 25 II    | 19.7. | 20.15 | 15        | 11°04'   | 26°04' | 140-150 | -      | 13.1     |                                      |
| 25 III   | 19.7. | 21.20 | 15        | 11°04'   | 26°07' | 352     | -      | 10.9     | temp. in 460 m depth                 |
| 32 I     | 20.7. | 22.40 | 15        | 11°01'   | 26°07' | 550     | -      | 9.8      |                                      |
| 32 II    | 20.7. | 20.20 | 15        | 09°32'   | 29°32' | 150     | -      | 12.3     |                                      |
| 32 III   | 20.7. | 21.15 | 15        | 09°31'   | 29°35' | 350     | -      | 10.1     |                                      |
| 39       | 21.7. | 22.30 | 15        | 09°29'   | 20°38' | 550     | -      | 9.2      | temp. in 460 m depth                 |
|          |       | 19.40 | 15        | 07°55'   | 32°41' | 2000    | -      | -        | stephaul                             |
|          |       | 20.20 | 15        |          |        | 1300    | -      | -        |                                      |
|          |       | 21.00 | 15        |          |        | 600     | -      | 8.4      | temp. in 455 m depth                 |
| 46 I     | 22.7. | 20.40 | 15        | 05°27'   | 35°25' | 150     | -      | 13.9     |                                      |
| 46 II    | 22.7. | 21.45 | 15        | 05°25'   | 35°26' | 350     | -      | 9.3      |                                      |
| 46 III   | 22.7. | 23.00 | 15        | 05°25'   | 35°28' | 550     | -      | 8.0      | temp. in 455 m depth                 |
| 53       | 23.7. | 21.00 | 15        | 03°33'   | 38°00' | 2000    | -      | -        | stephaul                             |
|          |       | 21.40 | 15        |          |        | 1300    | -      | -        |                                      |
|          |       | 22.15 | 15        |          |        | 600     | -      | 9.2      | temp. in 455 m depth                 |
| 61 I     | 24.7. | 20.40 | 15        | 02°28'   | 34°54' | 150     | -      | 14.8     |                                      |
| 61 II    | 24.7. | 21.45 | 15        | 02°27'   | 34°52' | 350     | -      | 10.0     |                                      |
| 61 III   | 24.7. | 22.50 | 15        | 02°26'   | 34°50' | 550     | -      | 8.5      | temp. in 455 m depth                 |

Table 6:

"Walther Herwig" (II) cruise no. 20: Antarctic Expedition 1975/76 of the Federal Republic of Germany.  
Section I: 18.11.1975 to 9.1.1976. (Figure 4).

Commander captain Th. Frerichs

Scientific crew:

|                                  |             |     |
|----------------------------------|-------------|-----|
| Kreffft, G., scientist in charge | ichthyology | ISH |
| Baker, A.                        | krill       | IOS |
| Hulley, A.P.                     | ichthyology | SAM |
| Kock, K.-H.                      | fish. biol. | ISH |
| Kühn, A.                         | techn. ing. | IfM |
| Pommeranz, T.                    | plancton    | IfM |
| Ritter, K.                       | krill       | IBT |
| Roschke, N.                      | krill       | IBT |
| Schillat, B.                     | hydrography | ISH |
| Seibert,                         | techn. ass. | IfM |
| Stehmann, M.                     | ichthyology | ISH |
| Wieczorrek, R.                   | techn. ass. | IBT |

Gear: MT 1000, MT 1216, RMT 8; MT 1600; depth control by TDR for MT.

Hydrography: water sampling with Nansen-bottles.

Diaries: 2 volumes, handwritten.

Section I of the expedition was started by a longitudinal transect of pelagic hauls along the 50°W latitude from 35°S to the Antarctic convergence at about 53°S (station 1 to 13). After a multiple biological research programme on the Burdwood Bank the transect to the south was continued along about 55°W (stations 20 to 23). For the next following weeks, research activities were led to the main purpose of the expedition: Antarctic krill and commercial fish species. Pelagic stations of this programme are included in tab. 6 as far as fishes were caught.

On the way back to the north there was a second pelagic transect carried out along the 40°W longitude, using the MT 1600 except for one station.

In order to have continuous station numbers for the whole Antarctic Expedition, counting was started with 1/76, though the transect began in November 1975.

Tab. 6: "Walther Herwig", cruise no. 20, Antarctic Expedition 1975/76, section I: 18.11.1975 - 9.1.1976.

| stat.no. | date   | hour  | time min. | S      | W      | position  | depth m | sal. ‰ | temp. °C | remarks           | MT      |
|----------|--------|-------|-----------|--------|--------|-----------|---------|--------|----------|-------------------|---------|
| 1        | 18.11. | 21.55 | 30        | 34°59' | 48°59' | 80        | -       | 18.5   |          |                   | MT 1600 |
| 2        | 18.11. | 10.30 | 30        | 36°19' | 49°35' | 800       | 34.22   | 3.8    |          | forenet destroyed | MT 1600 |
| 3        | 18.11. | 19.55 | 15        | 37°45' | 50°06' | 200-218   | 35.73   | 14.7   |          |                   | MT 1000 |
| 4 I      | 19.11. | 11.30 | 15        | 40°12' | 50°02' | 620-650   | 34.22   | 4.2    |          |                   | MT 1000 |
| 4 II     | 19.11. | 14.50 | 30        | 40°20' | 50°02' | 2000-2350 | 34.75   | 3.0    |          | net destroyed     | MT 1000 |
| 5        | 19.11. | 20.40 | 15        | 40°46' | 49°56' | 100       | 35.64   | 14.0   |          |                   | MT 1000 |
| 6 I      | 20.11. | 11.20 | 30        | 43°25' | 49°58' | 600-620   | 34.26   | 3.1    |          |                   | MT 1000 |
| 6 II     | 20.11. | 14.00 | 30        | 43°31' | 50°00' | 2000      | 34.75   | 2.6    |          |                   | MT 1000 |
| 8        | 21.11. | 11.25 | 30        | 46°44' | 49°59' | 980       | 34.40   | 3.1    |          |                   | MT 1000 |
| 9        | 21.11. | 19.55 | 15        | 48°04' | 50°05' | 145-140   | 34.27   | 5.4    |          |                   | MT 1000 |
| 10 I     | 22.11. | 11.30 | 30        | 50°40' | 50°01' | 800       | 34.47   | 2.5    |          |                   | MT 1000 |
| 10 II    | 22.11. | 14.45 | 30        | 50°47' | 50°01' | 2000-2050 | 34.75   | 1.7    |          |                   | MT 1000 |
| 12       | 23.11. | 11.15 | 30        | 53°18' | 49°57' | 700       | 34.25   | 2.5    |          |                   | MT 1000 |
| 13       | 23.11. | 19.42 | 15        | 54°04' | 51°23' | 100       | 34.15   | 3.0    |          |                   | MT 1000 |
| 20       | 28.11. | 21.47 | 15        | 55°12' | 56°33' | 200       | 34.18   | 3.7    |          |                   | MT 1000 |
| 21 I     | 28.11. | 11.10 | 30        | 56°55' | 55°00' | 800-650   | 34.70   | 2.3    |          |                   | MT 1000 |
| 21 II    | 28.11. | 14.10 | 30        | 56°57' | 54°58' | 2200      | 34.74   | 1.4    |          |                   | MT 1000 |
| 22       | 29.11. | 21.52 | 15        | 57°49' | 54°58' | 200       | 34.32   | 1.4    |          |                   | MT 1000 |
| 23       | 29.11. | 11.35 | 30        | 59°51' | 54°55' | 2000      | 34.67   | 0.3    |          |                   | MT 1000 |

Tab. 6: "Walther Herwig", cruise no. 20, 1975/76 continued.

| stat.no. | date   | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks |
|----------|--------|-------|--------------|----------|--------|------------|-----------|-------------|---------|
|          |        |       |              | S        | W      |            |           |             |         |
| 25 VII   | 1.12.  | 22.45 | 35           | 56°46'   | 51°54' | 55         | 34.12     | 0.8         | MT 1216 |
| 25 XI    | 2.12.  | 22.04 | 30           | 53°48'   | 48°30' | 200-0      | 34.54     | 0.8         | RMT 1+8 |
| 26 III   | 2.12.  | 15.00 | 60           | 55°03'   | 46°29' | 200-0      | 34.15     | 1.0         | RMT 1+8 |
| 26 IV    | 3.12.  | 21.08 | 80           | 55°59'   | 46°29' | 200-0      | 34.15     | 2.7         | RMT 1+8 |
| 26 V     | 3.12.  | 03.30 | 110          | 56°52'   | 46°29' | 215-0      | 34.23     | 2.0         | RMT 1+8 |
| 26 IX    | 4.12.  | 23.05 | 110          | 59°24'   | 46°30' | 240-0      | 34.78     | 1.9         | RMT 1+8 |
| 26 X     | 4.12.  | 03.25 | 110          | 60°00'   | 46°29' | 215-0      | 34.47     | - 1.0       | RMT 1+8 |
| 27 IV    | 5.12.  | 18.32 | 180          | 58°18'   | 40°00' | 210-0      | 34.51     | 1.2         | RMT 1+8 |
| 27 VI    | 6.12.  | 08.24 | 100          | 56°38'   | 40°00' | 215-0      | 34.29     | - 0.7       | RMT 1+8 |
| 27 VI    | 6.12.  | 10.15 | 60           | 56°39'   | 40°03' | 30-35      | 33.98     | - 0.3       | MT 1216 |
| 27 VIII  | 7.12.  | 21.40 | 240          | 54°56'   | 40°00' | 210-0      | 34.3      | 1.4         | RMT 1+8 |
| 27 XII   | 7.12.  | 18.05 | 230          | 52°30'   | 39°59' | 205-0      | 34.3      | 1.4         | RMT 1+8 |
| 49       | 21.12. | 16.55 | 30           | 56°04'   | 56°50' | 30         | -         | 4.5         | MT 1216 |
| 57       | 23.12. | 11.42 | 30           | 56°51'   | 41°05' | 100-80     | -         | 0.8         | MT 1216 |
| 63 I     | 26.12. | 08.00 | 100          | 54°53'   | 35°52' | 110-130    | -         | 0.5         | MT 1216 |
| 63 II    | 26.12. | 10.25 | 55           | 54°54'   | 35°50' | 10         | 33.62     | 1.9         | MT 1216 |
| 69       | 27.12. | 15.55 | 30           | 54°34'   | 37°12' | 110        | 34.09     | 0.9         | MT 1216 |
| 70       | 27.12. | 19.10 | 30           | 54°28'   | 36°51' | 30         | 33.74     | 2.3         | MT 1216 |
| 72       | 28.12. | 10.40 | 30           | 54°39'   | 38°58' | 100-110    | -         | 0.2         | MT 1216 |
| 75       | 30.12. | 10.40 | 60           | 53°59'   | 36°38' | 15-30      | 33.68     | 1.5         | MT 1216 |
| 78       | 30.12. | 19.15 | 30           | 53°57'   | 37°59' | 87-93      | -         | 0.8         | MT 1216 |
| 84       | 31.12. | 16.21 | 30           | 54°09'   | 36°48' | 25-30      | 33.59     | 1.0-0.3     | MT 1216 |

Tab. 6: "Walther Herwig", cruise no. 20, 1975/76, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks               |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|-----------------------|
|          |       |       |              | S        | W      |            |           |             |                       |
| 97 I     | 3.1.  | 09.00 | 30           | 54°07'   | 39°59' | 650        | 34.77     | 2.0         | MT 1600               |
| 97 II    | 3.1.  | 13.40 | 30           | 54°12'   | 40°02' | 2600       | -         | -           | MT 1600               |
| 98       | 3.1.  | 20.40 | 15           | 53°16'   | 40°00' | 260        | 34.52     | 1.7         | MT 1600               |
| 99 I     | 4.1.  | 08.40 | 30           | 51°14'   | 40°00' | 700-750    | 34.71     | 1.8         | MT 1600               |
| 99 II    | 4.1.  | 13.00 | 30           | 51°06'   | 39°57' | 2300       | 34.73     | 0.7         | MT 1600               |
| 100      | 5.1.  | 21.02 | 60           | 49°57'   | 40°01' | 150        | 34.10     | 0.6         | RMT 1+8, winch defect |
| 101 I    | 5.1.  | 08.35 | 30           | 47°51'   | 40°01' | 620-580    | 34.24     | 4.2         | MT 1600               |
| 101 II   | 5.1.  | 12.50 | 30           | 47°45'   | 40°05' | 2000       | 34.83     | 2.6         | MT 1600               |
| 102 I    | 6.1.  | 08.40 | 30           | 46°35'   | 39°59' | 650        | -         | -           | MT 1600               |
| 102 II   | 6.1.  | 13.25 | 30           | 46°27'   | 39°53' | 2000       | -         | -           | MT 1600               |
| 103      | 6.1.  | 20.32 | 15           | 45°17'   | 40°00' | 100        | 34.61     | 9.8         | MT 1600               |
| 104 I    | 7.1.  | 08.37 | 30           | 43°04'   | 39°57' | 550        | 34.19     | 3.5         | MT 1600               |
| 104 II   | 7.1.  | 12.50 | 30           | 42°58'   | 39°53' | 2200-2350  | 34.77     | 2.6         | MT 1600               |
| 105      | 7.1.  | 20.35 | 15           | 41°47'   | 39°58' | 210-200    | 34.27     | 5.9         | MT 1600               |
| 106 I    | 8.1.  | 09.00 | 30           | 39°39'   | 39°56' | 800        | 34.25     | 4.1         | MT 1600               |
| 106 II   | 8.1.  | 15.10 | 30           | 39°08'   | 40°00' | 1800-1850  | 34.70     | 2.7         | MT 1600               |
| 107      | 8.1.  | 20.33 | 15           | 38°35'   | 40°00' | 200-220    | 35.54     | 13.5        | MT 1600               |
| 108 I    | 9.1.  | 08.45 | 30           | 36°25'   | 40°00' | 650-700    | 34.35     | 4.7         | MT 1600               |
| 108 II   | 9.1.  | 12.40 | 30           | 36°18'   | 40°06' | 2000-2400  | -         | -           | MT 1600               |
| 109 I    | 9.1.  | 20.27 | 15           | 35°01'   | 40°01' | 195-205    | 35.75     | 15.5        | MT 1600               |
| 109 II   | 10.1. | 00.10 | 30           | 35°01'   | 40°04' | 700-600    | 34.57     | 4.5         | MT 1600               |

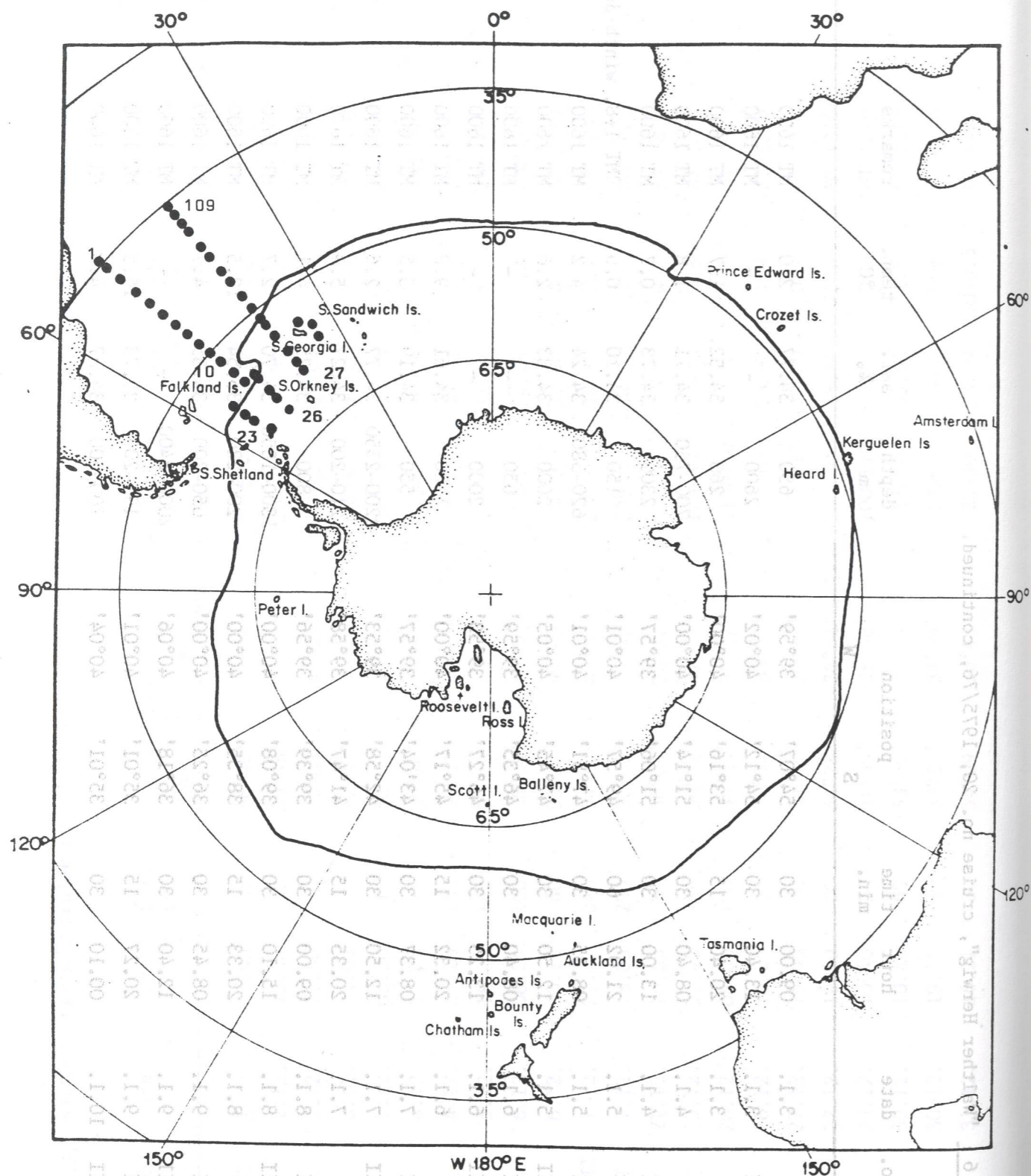


Fig. 4: "Walther Herwig", cruise no. 20, 1975/76, (stat. no. 1 - 109).

Table 7:

"Anton Dohrn" ("WH" I) cruise no. 210 (92), Sargasso Sea Expedition. 21.3. to 6.5.1979: part 2, section I + II. (Figure 5).

Section I: Bermuda Island - Sargasso Sea - Bermuda Island. 21.3. to 15.4.1979.

Commander captain H. Grimm.

Scientific crew:

|                                  |                 |      |
|----------------------------------|-----------------|------|
| Tesch, F.W., scientist in charge | eel-programme   | BAH  |
| Andres, H.G.                     | amphipodes      | BAH  |
| Appelbaum, S.                    | eel-programme   | BAH  |
| Boetius, J.                      | eel-programme   | DFHC |
| Comparini, A.                    | eel-programme   | IBAP |
| Gibbs, R.H.                      | ichthyology     | USNM |
| Gomon, J. (Mrs.)                 | tech. ass.      | USNM |
| John, H.Ch.                      | ichthyoplankton | BAH  |
| Karrer, Ch. (Mrs.)               | ichthyology     | ZMH  |
| Peters, G. (Mrs.)                | eel-programme   | IHFH |
| Schot, M. (Mrs.)                 | eel-programme   | BAH  |
| Smith, D.G.                      | eel-programme   | MBI  |
| Ulken, A. (Mrs.)                 | sargasso-algae  | IfMB |
| Wegner, G.                       | hydrography     | ISH  |

Section II: Bermuda - Sargasso Sea - northern Bay of Biskay. 19.4. to 6.5.1979.

Scientific crew:

|                                  |                 |      |
|----------------------------------|-----------------|------|
| Tesch, F.W., scientist in charge | eel-programme   | BAH  |
| Andres, H.G.                     | amphipodes      | BAH  |
| Appelbaum, S.                    | eel-programme   | BAH  |
| Bertelsen, E.                    | ichthyology     | ZMUC |
| Gibbs, R.H.                      | ichthyology     | USNM |
| Gomon, J. (Mrs.)                 | techn. ass.     | USNM |
| Hulley, A.P.                     | ichthyology     | SAM  |
| John, H.Ch.                      | ichthyoplankton | BAH  |
| Karrer, Ch. (Mrs.)               | ichthyology     | ZMH  |
| Kreff, G.                        | ichthyology     | ISH  |
| Minde, T. (Mrs.)                 | eel-programme   | BAH  |

|                    |               |      |
|--------------------|---------------|------|
| Nielsen, J.        | ichthyology   | ZMUC |
| Post, A.           | ichthyology   | ISH  |
| Schot, M.          | eel-programme | BAH  |
| Ullah, F. (Mrs.)   | techn. ass.   | ISH  |
| Viebach, U. (Mrs.) | techn. ass.   | ISH  |
| Wegner, G.         | hydrography   | ISH  |

Gear: MT 1600; IKMT.

Hydrography: water sampling with Nansen-bottles.

Diaries: 2 volumes, handwritten.

The major aim of the expedition was to study the life history of European and American eels (*Anguilla anguilla* and *A. rostrata*). Midwater trawling was carried out in the Sargasso Sea in order to possibly detect adult, spawning *Anguilla* specimens. Not a single one could be caught, but a broad spectrum of fish communities was studied and samples were taken for the ISH collection.

During the 1st section trawling was carried out in step hauls, usually beginning with the shallowest step down to a maximum depth of 1800 m (two hauls vice versa). During the 2nd section the net trawled only in one depth and was emptied before going to the next haul. The way back home was used to have a pelagic transect from the Sargasso Sea to the northern Bay of Biskay.

Unfortunately the numbering of stations was differently handled by different working groups on board, using total and annual station numbers respectively. Corresponding station numbers are given in column 1 of tab. 7.

Table 7a: pelagic trawl stations with MT 1600.

Table 7b: pelagic trawl stations with IKMT.

Tab. 7a: "Anton Dohrn", cruise no. 210 (92), part 2, Sargasso Sea Expedition, section I, 1979.

| tot. ann. stat. no. | ann. stat. no. | date  | hour  | time min. | position N | position W | depth m | sal. ‰ | temp. °C | remarks   |
|---------------------|----------------|-------|-------|-----------|------------|------------|---------|--------|----------|---|
| 5526                | 23             | 21.3. | 19.20 | 10        | 25°48'     | 62°10'     | 400     | 36.44  | 17.6     | no net sounder, depth estimated from wire/depth table |
|                     |                |       |       | 10        |            |            | 450     | 36.35  | 17.0     |   |
|                     |                |       |       | 10        |            |            | 500     | 36.21  | 16.1     |   |
|                     |                |       |       | 10        |            |            | 550     | 36.10  | 15.3     |   |
|                     |                |       |       | 10        |            |            | 600     | 35.93  | 14.2     |   |
|                     |                |       |       | 15        |            |            | 30      | 36.82  | 21.9     |   |
|                     |                |       |       | 15        |            |            | 60      | 36.83  | 21.9     |   |
|                     |                |       |       | 15        |            |            | 100     | 36.80  | 21.4     |   |
|                     |                |       |       | 15        |            |            | 150     | 36.71  | 20.2     |   |
|                     |                |       |       | 12        |            |            | 400     | 36.41  | 17.4     |   |
|                     |                |       |       | 12        |            |            | 450     | 36.32  | 16.7     |   |
|                     |                |       |       | 12        |            |            | 500     | 36.21  | 16.1     |   |
|                     |                |       |       | 12        |            |            | 550     | 36.07  | 15.2     |   |
|                     |                |       |       | 12        |            |            | 600     | 35.90  | 14.1     |   |
| 5561                | 57             | 24.3. | 21.23 | 20        | 26°42'     | 60°30'     | 30      | 36.86  | 20.9     |   |
|                     |                |       |       | 20        |            |            | 75      | 36.78  | 20.6     |   |
|                     |                |       |       | 20        |            |            | 150     | 36.70  | 19.6     |   |
| 5588                | 84 I           | 26.3. | 19.30 | 20        | 27°02'     | 58°58'     | 400     | 36.34  | 16.8     | no net sounder  |
|                     |                |       |       | 30        |            |            | 500     | 36.10  | 15.3     |   |
|                     |                |       |       | 30        |            |            | 600     | 35.84  | 13.5     |   |

Tab. 7a: "Anton Dohrn", cruise no. 210 (92), part 2, section I, 1979, continued.

| tot. stat. | ann. stat. | date  | hour   | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|------------|------------|-------|--------|-----------|----------|--------|---------|--------|----------|---------|
|            |            |       |        |           | N        | W      |         |        |          |         |
| 5594       | 90         | 27.3. | 14.22. | 15        | 25°45'   | 59°00' | 500     | 36.24  | 16.2     |         |
|            |            |       |        | 15        |          |        | 600     | 35.93  | 14.1     |         |
|            |            |       |        | 15        |          |        | 700     | 35.69  | 12.5     |         |
|            |            |       |        | 15        |          |        | 800     | -      | -        |         |
|            |            |       |        | 15        |          |        | 900     | -      | -        |         |
|            |            |       |        | 15        |          |        | 1000    | -      | -        |         |
|            |            |       |        | 15        |          |        | 1100    | -      | -        |         |
| 5596       | 92 I       | 27.3. | 19.09  | 20        | 25°32'   | 58°59' | 40      | 36.91  | 22.8     |         |
|            |            |       |        | 20        |          |        | 75      | 36.90  | 22.3     |         |
|            |            |       |        | 20        |          |        | 100     | 36.81  | 21.4     |         |
| 5602       | 98         | 28.3. | 15.42  | 15        | 23°46'   | 58°59' | 500     | -      | 16.6     | XBT     |
|            |            |       |        | 15        |          |        | 600     | -      | 12.6     |         |
|            |            |       |        | 15        |          |        | 700     | -      | 10.3     |         |
|            |            |       |        | 15        |          |        | 800     | -      | 8.2      |         |
|            |            |       |        | 15        |          |        | 900     | -      | 7.1      |         |
|            |            |       |        | 15        |          |        | 1000    | -      | -        |         |
|            |            |       |        | 15        |          |        | 1100    | -      | -        |         |
|            |            |       | 15     |           |          | 1200   | -       | -      |          |         |

Tab. 7a: "Anton Dohrn", cruise no. 210 (92), part 2, section I, 1979, continued.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks      |
|------------|------------|-------|-------|-----------|----------|--------|---------|--------|----------|--------------|
|            |            |       |       |           | N        | W      |         |        |          |              |
| 5627       | 123        | 31.3. | 04.15 | 15        | 23°16'   | 57°23' | 400     | -      | -        | XBT to 300 m |
|            |            |       |       | 15        |          |        | 500     | -      | -        |              |
|            |            |       |       | 15        |          |        | 600     | -      | -        |              |
|            |            |       |       | 15        |          |        | 700     | -      | -        |              |
|            |            |       |       | 15        |          |        | 800     | -      | -        |              |
|            |            |       |       | 15        |          |        | 900     | -      | -        |              |
|            |            |       |       | 15        |          |        | 1100    | -      | -        |              |
|            |            |       |       | 25        |          |        | 1800    | -      | -        |              |
| 5632       | 128 I      | 31.3. | 19.20 | 15        | 24°23'   | 57°20' | 35      | 37.02  | 23.0     |              |
|            |            |       |       | 15        |          |        | 75      | 37.00  | 22.7     |              |
|            |            |       |       | 25        |          |        | 100     | 36.98  | 22.4     |              |
| 5641       | 137        | 1.4.  | 14.45 | 25        | 26°44'   | 57°20' | 400     | -      | 16.8     |              |
|            |            |       |       | 25        |          |        | 500     | -      | 15.2     |              |
|            |            |       |       | 25        |          |        | 600     | -      | 13.3     |              |
| 5666       | 162 I      | 3.4.  | 17.10 | 15        | 25°12'   | 55°31' | 300     | 36.48  | 17.9     |              |
|            |            |       |       | 15        |          |        | 400     | 36.31  | 16.8     |              |
|            |            |       |       | 15        |          |        | 500     | 36.04  | 15.0     |              |
|            |            |       |       | 15        |          |        | 600     | 35.75  | 12.9     |              |
|            |            |       |       | 15        |          |        | 700     | 35.52  | 11.1     |              |
|            |            |       |       | 15        |          |        | 800     | -      | -        |              |



Tab. 7a: "Anton Dohrn", cruise no. 210 (92), part 2, section I, 1979, continued.

| tot. stat. | ann. stat. | date | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|------------|------------|------|-------|-----------|----------|--------|---------|--------|----------|---------|
|            |            |      |       |           | N        | W      |         |        |          |         |
| 5674       | 170 I      | 4.4. | 16.55 | 10        | 25°09'   | 58°07' | 1200    | -      | -        |         |
|            |            |      |       | 10        |          |        | 1100    | -      | -        |         |
|            |            |      |       | 10        |          |        | 1000    | -      | -        |         |
|            |            |      |       | 10        |          |        | 900     | -      | -        |         |
|            |            |      |       | 10        |          |        | 800     | -      | -        |         |
|            |            |      |       | 10        |          |        | 700     | 35.57  | 11.4     |         |
|            |            |      |       | 10        |          |        | 600     | 35.81  | 13.3     |         |
|            |            |      |       | 10        |          |        | 500     | 36.06  | 15.0     |         |
|            |            |      |       | 10        |          |        | 400     | 36.26  | 16.3     |         |
|            |            |      |       | 10        |          |        | 300     | 36.47  | 17.8     |         |
| 5687       | 183        | 6.4. | 04.10 | 25        | 25°31'   | 62°00' | 30      | -      | 22.8     | XBT     |
|            |            |      |       | 20        |          |        | 400     | -      | 17.5     |         |
|            |            |      |       | 20        |          |        | 600     | -      | 14.1     |         |
|            |            |      |       | 20        |          |        | 800     | -      | 9.5      |         |
|            |            |      |       | 20        |          |        | 1000    | -      | -        |         |
|            |            |      |       | 20        |          |        | 1200    | -      | -        |         |
|            |            |      |       | 20        |          |        | 1400    | -      | -        |         |
| 20         | 1600       | -    | -     |           |          |        |         |        |          |         |
| 20         | 1800       | -    | -     |           |          |        |         |        |          |         |

Tab. 7a : "Anton Dohrn", cruise no. 210 (92), part 2, section I, 1979, continued.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|------------|------------|-------|-------|-----------|----------|--------|---------|--------|----------|---------|
|            |            |       |       |           | N        | W      |         |        |          |         |
| 5702       | 198        | 8.4.  | 04.10 | 20        | 23°55'   | 63°58' | 30      | -      | 24.1.    | XBT     |
|            |            |       |       | 20        |          |        | 400     | -      | 16.8     |         |
|            |            |       |       | 20        |          |        | 600     | -      | 13.3     |         |
|            |            |       |       | 20        |          |        | 800     | -      | 9.2      |         |
|            |            |       |       | 20        |          |        | 1000    | -      | -        |         |
|            |            |       |       | 20        |          |        | 1200    | -      | -        |         |
| 5720       | 216        | 10.4. | 04.13 | 20        | 24°41'   | 66°20' | 30      | 36.68  | 23.5     |         |
|            |            |       |       | 20        |          |        | 400     | 36.43  | 17.6     |         |
|            |            |       |       | 20        |          |        | 600     | 35.91  | 14.2     |         |
|            |            |       |       | 20        |          |        | 800     | -      | -        |         |
|            |            |       |       | 20        |          |        | 1000    | -      | -        |         |
|            |            |       |       | 20        |          |        | 1200    | -      | -        |         |
| 5722       | 216        | 10.4. | 04.13 | 20        | 24°41'   | 66°20' | 1400    | -      | -        |         |
|            |            |       |       | 20        |          |        | 1600    | -      | -        |         |
|            |            |       |       | 20        |          |        | 1800    | -      | -        |         |
|            |            |       |       | 20        |          |        | 1800    | -      | -        |         |

Tab. 7a: "Anton Dohrn", cruise no. 210 (92), part 2, section I, 1979, continued.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks  |
|------------|------------|-------|-------|-----------|----------|--------|---------|--------|----------|--|
|            |            |       |       |           | N        | W      |         |        |          |  |
| 5725       | 221 I      | 10.4. | 17.07 | 15        | 25°02'   | 67°38' | 1800    | -      | -        |  |
|            |            |       |       | 15        |          |        | 1600    | -      | -        |  |
|            |            |       |       | 15        |          |        | 1400    | -      | -        |  |
|            |            |       |       | 15        |          |        | 1200    | -      | -        |  |
|            |            |       |       | 15        |          |        | 1000    | -      | -        |  |
|            |            |       |       | 15        |          |        | 800     | -      | -        |  |
|            |            |       |       | 15        |          |        | 600     | 36.00  | 17.8     |  |
|            |            |       |       | 15        |          |        | 400     | 36.49  | 17.9     |  |
|            |            |       |       | 15        |          |        | 200     | 36.62  | 23.7     |  |
| 5738       | 234 II     | 12.4. | 04.16 | 20        | 25°08'   | 67°39' | 1500    | 36.62  | 24.2     |  |
|            |            |       |       | 20        |          |        | 400     | 36.47  | 17.8     |  |
|            |            |       |       | 20        |          |        | 600     | 35.99  | 14.8     |  |
|            |            |       |       | 20        |          |        | 800     | -      | -        |  |
|            |            |       |       | 20        |          |        | 1000    | -      | -        |  |
|            |            |       |       | 20        |          |        | 1200    | -      | -        |  |
|            |            |       |       | 20        |          |        | 1400    | -      | -        |  |
|            |            |       |       | 20        |          |        | 1600    | -      | -        |  |
|            |            |       |       | 20        |          |        | 1800    | -      | -        |  |
| 5738       | 234 IV     | 12.4. | 17.00 | -         | 25°08'   | 67°50' | 1800/-  | -      | -        | this haul was not registered specifically for time and depth-steps |

Tab. 7a: "Anton Dohrn", cruise no. 210 (92), part 2, section II, 1979.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks  |
|------------|------------|-------|-------|-----------|----------|--------|---------|--------|----------|--|
|            |            |       |       |           | N        | W      |         |        |          |  |
| 5760       | 256        | 15.4. | 04.05 | 60        | 30°27'   | 66°08' | 1800    | -      | -        |  |
| 5772       | 268        | 19.4. | 14.30 | 45        | 31°11'   | 63°32' | 1650    | 35.09  | 4.5      |  |
| 5773       | 269        | 19.4. | 19.44 | 15        | 31°15'   | 63°23' | 170     | 36.59  | 18.9     |  |
| 5774       | 270        | 19.4. | 20.55 | 15        | 31°01'   | 63°15' | 250     | 36.52  | 18.4     |  |
| 5780       | 276        | 20.4. | 15.10 | 50        | 28°41'   | 60°59' | 1800    | 35.08  | 4.1      |  |
| 5788       | 284        | 21.4. | 15.00 | 60        | 26°11'   | 58°26' | 1800    | 35.08  | 4.1      |  |
| 5797       | 293        | 22.4. | 15.05 | 55        | 25°49'   | 54°48' | 2000    | 35.05  | 3.7      |  |
| 5805       | 301        | 23.4. | 14.55 | 50        | 27°38'   | 52°22' | 2000    | 35.07  | 3.9      |  |
| 5806       | 302 I      | 23.4. | 19.13 | 15        | 27°49'   | 52°13' | 300     | 36.42  | 17.7     |  |
| 5812       | 308        | 24.4. | 15.35 | 55        | 29°40'   | 49°38' | 2000    | 35.07  | 4.2      | sal. + temp. in 1800 m depth   |
| 5813       | 309 I      | 24.4. | 19.17 | 45        | 29°41'   | 49°27' | 110     | 36.55  | 18.3     |  |
| 5817       | 314 I      | 25.4. | 16.37 | 58        | 30°43'   | 46°16' | 2000    | 35.07  | 4.0      |  |
| 5818       | 314 II     | 25.4. | 20.15 | 15        | 30°45'   | 46°08' | 155-195 | -      | -        | in 155 m: sal.36.48 ‰, temp.18.3°C<br>in 195 m: sal.36.48 ‰, temp.18.0°C |
| 5819       | 315        | 25.4. | 21.10 | 15        | 30°47'   | 46°04' | 306     | 36.38  | 17.3     |  |
| 5825       | 321        | 26.4. | 16.30 | 55        | 31°51'   | 42°55' | 1950    | 35.04  | 3.8      |  |
| 5826       | 322        | 26.4. | 20.02 | 15        | 31°53'   | 42°48' | 190     | 36.38  | 17.1     |  |
| 5827       | 323        | 26.4. | 20.57 | 15        | 31°55'   | 42°46' | 380     | 35.99  | 14.8     |  |
| 5833       | 329        | 27.4. | 15.35 | 55        | 32°59'   | 39°49' | 1950    | 35.08  | 4.1      |  |
| 5834       | 330        | 27.4. | 19.55 | 15        | 33°01'   | 39°34' | 185     | 36.41  | 17.3     |  |
| 5835       | 331        | 27.4. | 20.50 | 20        | 33°04'   | 39°29' | 345     | 36.24  | 16.3     |  |
| 5842       | 338        | 28.4. | 17.00 | 60        | 34°21'   | 35°22' | 1300    | 35.32  | 6.2      |  |

Tab. 7a : "Anton Dohrn", cruise no. 210 (92), part 2, section II, 1979, continued.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m   | sal. ‰ | temp. °C | remarks  |
|------------|------------|-------|-------|-----------|----------|--------|-----------|--------|----------|--|
|            |            |       |       |           | N        | W      |           |        |          |  |
| 5843       | 339        | 28.4. | 20.40 | 15        | 34°20'   | 35°24' | 170       | 36.20  | 16.1     |  |
| 5844       | 340        | 28.4. | 21.33 | 15        | 34°21'   | 35°22' | 320       | 36.01  | 14.8     |  |
| 5849       | 345        | 29.4. | 17.00 | 50        | 35°24'   | 32°01' | 1800      | 35.08  | 4.3      |  |
| 5850       | 346 I      | 29.4. | 20.30 | 15        | 35°24'   | 31°53' | 350       | 35.71  | 12.8     |  |
| 5852       | 348        | 30.4. | 06.40 | 30        | 35°20'   | 30°16' | 1900      | -      | -        |  |
| 5865       | 361        | 2.5.  | 11.35 | 55        | 41°02'   | 23°52' | 2000      | -      | -        |  |
| 5868       | 364        | 2.5.  | 20.20 | 15        | 42°05'   | 23°30' | 155       | 35.68  | 12.4     |  |
| 5869       | 365        | 2.5.  | 21.10 | 15        | 42°07'   | 23°30' | 340       | 35.53  | 11.4     |  |
| 5875       | 371        | 3.5.  | 16.38 | 52        | 44°54'   | 22°16' | 2000-1800 | -      | -        | in 1800 m: sal.34.98 ‰,temp. 3.8°C<br>in 2000 m: sal.34.99 ‰,temp. 3.7°C |
| 5876       | 372        | 3.5.  | 20.22 | 15        | 44°56'   | 22°00' | 175       | 35.65  | 11.9     |  |
| 5877       | 373        | 3.5.  | 21.13 | 15        | 44°56'   | 21°57' | 340       | 35.56  | 11.4     |  |
| 5884       | 380        | 4.5.  | 17.20 | 60        | 44°55'   | 17°34' | 2000-1800 | -      | -        | in 1800 m: sal.35.04 ‰,temp. 4.1°C<br>in 2000 m: sal.35.02 ‰,temp. 3.8°C |
| 5885       | 381        | 4.5.  | 21.00 | 15        | 44°55'   | 17°22' | 205       | 35.61  | 11.8     |  |
| 5886       | 382        | 4.5.  | 22.04 | 15        | 44°56'   | 17°18' | 350       | 35.50  | 11.4     |  |
| 5893       | 389        | 5.5.  | 17.13 | 57        | 45°41'   | 13°42' | 2000      | 35.02  | 3.9      |  |
| 5894       | 390        | 5.5.  | 20.44 | 15        | 45°54'   | 13°30' | 205       | 35.60  | 11.7     |  |
| 5895       | 391        | 5.5.  | 21.36 | 15        | 45°55'   | 13°27' | 350       | 35.52  | 11.2     |  |
| 5901       | 398        | 6.5.  | 18.37 | 83        | 47°42'   | 09°98' | 2000-1800 | -      | -        | in 1800 m: sal.35.11 ‰,temp. 4.4°C<br>in 2000 m: sal.35.04 ‰,temp. 3.7°C |

Tab. 7b : "Anton Dohrn", cruise no. 210 (92), 1979, IKMT-stations.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|------------|------------|-------|-------|-----------|----------|--------|---------|--------|----------|---------|
|            |            |       |       |           | N        | W      |         |        |          |         |
| 5527       | 24         | 21.3. | 01.03 | 15        | 25°37'   | 61°56' | 30      | -      | -        |         |
|            |            |       |       | 15        |          |        | 60      | -      | -        |         |
|            |            |       |       | 15        |          |        | 100     | -      | -        |         |
| 5538       | 34         | 22.3. | 22.10 | 15        | 22°21'   | 61°42' | 200     | 36.66  | 19.5     |         |
|            |            |       |       | 15        |          |        | 100     | 36.88  | 23.3     |         |
|            |            |       |       | 30        |          |        | 50      | 36.79  | 23.8     |         |
| 5550       | 46 II      | 23.3. | 21.00 | 30        | 24°42'   | 60°30' | 40      | 36.83  | 21.9     |         |
|            |            |       |       | 15        |          |        | 75      | 36.83  | 21.9     |         |
|            |            |       |       | 15        |          |        | 150     | 36.71  | 20.2     |         |
| 5562       | 58         | 24.3. | 22.52 | 20        | 26°51'   | 60°30' | 50      | -      | -        |         |
|            |            |       |       | 20        |          |        | 100     | -      | -        |         |
|            |            |       |       | 20        |          |        | 150     | -      | -        |         |
|            |            |       |       | 20        |          |        | 200     | -      | -        |         |
| 5576       | 72         | 25.3. | 21.08 | 30        | 29°53'   | 59°45' | 75      | 36.64  | 19.0     |         |
|            |            |       |       | 20        |          |        | 150     | 36.64  | 18.9     |         |
|            |            |       |       | 20        |          |        | 225     | 36.62  | 18.8     |         |
| 5588       | 84 II      | 26.3. | 20.48 | 30        | 27°02'   | 58°58' | 50      | 36.86  | 20.7     |         |
|            |            |       |       | 20        |          |        | 125     | 36.75  | 19.9     |         |
|            | 84 III     |       |       | 20        |          |        | 200     | 36.61  | 18.9     |         |
| 5596       | 92 II      | 27.3. | 20.39 | 20        | 25°32'   | 58°59' | 75      | 36.90  | 22.3     |         |
|            |            |       |       | 20        |          |        | 150     | 36.89  | 20.9     |         |
|            |            |       |       | 20        |          |        | 225     | 36.66  | 19.7     |         |

Tab. 7b : "Anton Dohrn", cruise no. 210 (92), 1979, IKMT-stations, continued.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|------------|------------|-------|-------|-----------|----------|--------|---------|--------|----------|---------|
|            |            |       |       |           | N        | W      |         |        |          |         |
| 5603       | 99         | 28.3. | 19.55 | 30        | 23°37'   | 58°59' | 75      | 37.06  | 23.3     |         |
|            |            |       |       | 20        |          |        | 125     | 36.88  | 21.5     |         |
|            |            |       |       | 20        |          |        | 200     | 36.68  | 19.3     |         |
| 5610       | 106        | 29.3. | 9.37  | 20        | 21°50'   | 58°10' | 425     | 36.02  | 14.7     |         |
|            |            |       |       | 20        |          |        | 325     | 36.36  | 16.9     |         |
|            |            |       |       | 20        |          |        | 225     | 36.60  | 18.7     |         |
|            |            |       |       | 20        |          |        | 150     | 36.90  | 21.7     |         |
| 5615       | 111        | 29.3. | 22.16 | 20        | 19°51'   | 58°10' | 75      | 37.02  | 24.2     |         |
|            |            |       |       | 15        |          |        | 250     | 36.65  | 18.9     |         |
|            |            |       |       | 15        |          |        | 150     | 37.05  | 22.4     |         |
|            |            |       |       | 30        |          |        | 75      | 36.65  | 25.3     |         |
| 5623       | 119        | 30.3. | 19.28 | 30        | 22°12'   | 57°35' | 75      | 37.10  | 24.1     |         |
|            |            |       |       | 20        |          |        | 150     | 36.86  | 21.2     |         |
|            |            |       |       | 20        |          |        | 250     | 36.52  | 18.3     |         |
| 5628       | 124        | 31.3  | 10.10 | 20        | 23°31'   | 57°20' | 425     | 36.30  | 16.6     |         |
|            |            |       |       | 20        |          |        | 300     | 36.51  | 18.0     |         |
|            |            |       |       | 20        |          |        | 200     | 36.62  | 19.4     |         |
|            |            |       |       | 20        |          |        | 100     | 37.03  | 22.9     |         |
| 5632       | 128 I      | 31.3  | 20.35 | 15        | 24°23'   | 57°20' | 200     | 36.57  | 18.7     |         |
|            |            |       |       | 15        |          |        | 150     | 36.73  | 20.1     |         |
|            |            |       |       | 30        |          |        | 75      | 37.00  | 22.7     |         |

Tab. 7b : Anton Dohrn, cruise no. 210 (92), 1979, IKMT-stations, continued.

| tot. stat. | ann. stat. | date   | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|------------|------------|--------|-------|-----------|----------|--------|---------|--------|----------|---------|
|            |            |        |       |           | N        | W      |         |        |          |         |
| 5643       | 139        | 01.04. | 19.16 | 20        | 27°01'   | 57°20' | 200     | 36.53  | 18.5     |         |
|            |            |        |       | 20        |          |        | 150     | 36.62  | 19.3     |         |
|            |            |        |       | 30        |          |        | 75      | 36.88  | 20.8     |         |
| 5653       | 149        | 02.04. | 19.38 | 15        | 28°31'   | 55°30' | 200     | 36.65  | 18.9     |         |
|            |            |        |       | 15        |          |        | 125     | 36.82  | 19.8     |         |
|            |            |        |       | 30        |          |        | 75      | 36.83  | 20.0     |         |
| 5661       | 157        | 03.04. | 9.44  | 20        | 26°23'   | 55°31' | 425     | 36.35  | 17.0     |         |
|            |            |        |       | 20        |          |        | 300     | 36.50  | 18.1     |         |
|            |            |        |       | 20        |          |        | 200     | 36.59  | 19.1     |         |
|            |            |        |       | 20        |          |        | 100     | 36.89  | 21.4     |         |
| 5666       | 162 I      | 03.04. | 20.36 | 20        | 25°12'   | 55°31' | 225     | 36.52  | 18.3     |         |
|            |            |        |       | 20        |          |        | 125     | 36.71  | 20.1     |         |
|            |            |        |       | 30        |          |        | 75      | 36.86  | 21.2     |         |
| 5674a      | 170 II     | 04.04. | 20.00 | 20        | 25°08'   | 58°16' | 225     | 36.53  | 18.4     |         |
|            |            |        |       | 25        |          |        | 150     | 36.66  | 19.7     |         |
|            |            |        |       | 25        |          |        | 75      | 36.96  | 22.2     |         |
| 5688       | 184 I      | 06.04. | 10.15 | 20        | 25°38'   | 62°15' | 425     | 36.43  | 17.5     |         |
|            |            |        |       | 20        |          |        | 225     | 36.62  | 19.4     |         |
|            |            |        |       | 20        |          |        | 150     | 36.88  | 22.8     |         |
|            |            |        |       | 20        |          |        | 100     | 36.84  | 22.9     |         |

Tab. 7b : "Anton Dohrn", cruise no. 210 (92), 1979, IKMT-stations, continued.

| tot. stat. | ann. stat. | date   | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks |
|------------|------------|--------|-------|-----------|----------|--------|---------|--------|----------|---------|
|            |            |        |       |           | N        | W      |         |        |          |         |
| 5698       | 194        | 07.04. | 19.54 | 15        | 25°13'   | 64°00' | 250     | 36.55  | 18.6     |         |
|            |            |        |       | 25        |          |        | 175     | 36.66  | 20.0     |         |
|            |            |        |       | 15        |          |        | 125     | 36.76  | 21.6     |         |
|            |            |        |       | 15        |          |        | 75      | 36.86  | 22.9     |         |
| 5728       | 221 II     | 10.04. | 21.25 | 15        | 25°10'   | 67°40' | 200     | 36.77  | 20.8     |         |
|            |            |        |       | 15        |          |        | 175     | 36.72  | 21.4     |         |
|            |            |        |       | 25        |          |        | 150     | 36.75  | 21.8     |         |
|            |            |        |       | 15        |          |        | 100     | 36.68  | 23.1     |         |
| 5738       | 234 I      | 12.04. | 01.50 | 25        | 25°08'   | 67°39' | 200     | 36.66  | 20.3     |         |
|            |            |        |       | 25        |          |        | 175     | 36.76  | 20.8     |         |
|            |            |        |       | 40        |          |        | 150     | 36.69  | 21.2     |         |
|            |            |        |       | 25        |          |        | 100     | 36.73  | 23.3     |         |
| 5756       | 252        | 14.04. | 21.45 | -         | 29°09'   | 66°10' | 60      | 36.65  | 19.6     |         |
| 5781       | 277        | 20.04. | -     | -         | 28°20'   | 60°33' | ?       | -      | -        |         |
| 5790       | 286        | 21.04. | -     | -         | 25°52'   | 58°12' | ?       | -      | -        |         |
| 5786       | 282        | 21.04. | -     | -         | 26°46'   | 59°02' | ?       | -      | -        |         |
| 5798       | 294        | 22.04. | 20.05 | 15        | 25°49'   | 54°31' | 100     | -      | -        |         |
|            |            |        |       | 20        |          |        | 80      | -      | -        |         |
|            |            |        |       | 20        |          |        | 75      | -      | -        |         |
|            |            |        |       | 15        |          |        | 50      | -      | -        |         |

- 54 -

Tab. 7b : "Anton Dohrn, cruise no. 210 (92), 1979, IKMT-stations, continued.

| tot. stat. | ann. stat. | date  | hour  | time min. | position |        | depth m | sal. ‰ | temp. °C | remarks                         |
|------------|------------|-------|-------|-----------|----------|--------|---------|--------|----------|---------------------------------|
|            |            |       |       |           | N        | W      |         |        |          |                                 |
| 5813       | 309 I      | 24.4. | 20.00 | 15        | 29°41'   | 49°27' | 85      | 36.52  | 18.5     |                                 |
|            |            |       |       | 15        |          |        | 75      | 36.53  | 18.6     |                                 |
|            |            |       |       | 20        |          |        | 60      | 36.54  | 18.8     |                                 |
|            |            |       |       | 20        |          |        | 50      | 36.57  | 19.0     |                                 |
| 5850       | 346 II     | 29.4. | 19.55 | 15        | 27°51'   | 52°11' | 100     | 36.06  | 15.4     | 5 sm away from trawling station |
|            |            |       |       | 20        |          |        | 80      | 36.08  | 15.8     |                                 |
|            |            |       |       | 20        |          |        | 75      | 36.10  | 15.9     |                                 |
|            |            |       |       | 15        |          |        | 50      | 36.12  | 16.9     |                                 |
| 5820       | 316        | 25.4. | 22.00 | 60        | 30°48'   | 46°02' | 50      | 36.69  | 19.0     | 5 sm away from trawling station |
| 5828       | 324        | 26.4. | 21.50 | 60        | 31°56'   | 42°43' | 60      | 36.43  | 18.2     | 6 sm away from trawling station |
| 5836       | 332        | 27.4. | 21.34 | 70        | 33°04'   | 39°29' | 50      | 36.46  | 18.1     | 5 sm away from trawling station |
| 5847       | 343        | 29.4. | 11.00 | -         | 35°06'   | 33°09' | 280     | 35.85  | 14.2     |                                 |
| 5887       | 383        | 4.5.  | 22.47 | 46        | 44°56'   | 17°17' | 50      | 35.62  | 12.6     | 5 sm away from trawling station |
| 5904       | 401        | 7.5.  | 02.00 | 75        | 47°58'   | 08°16' | 50      | -      | 10.8     | XBT                             |

- 55 -

- 55 -

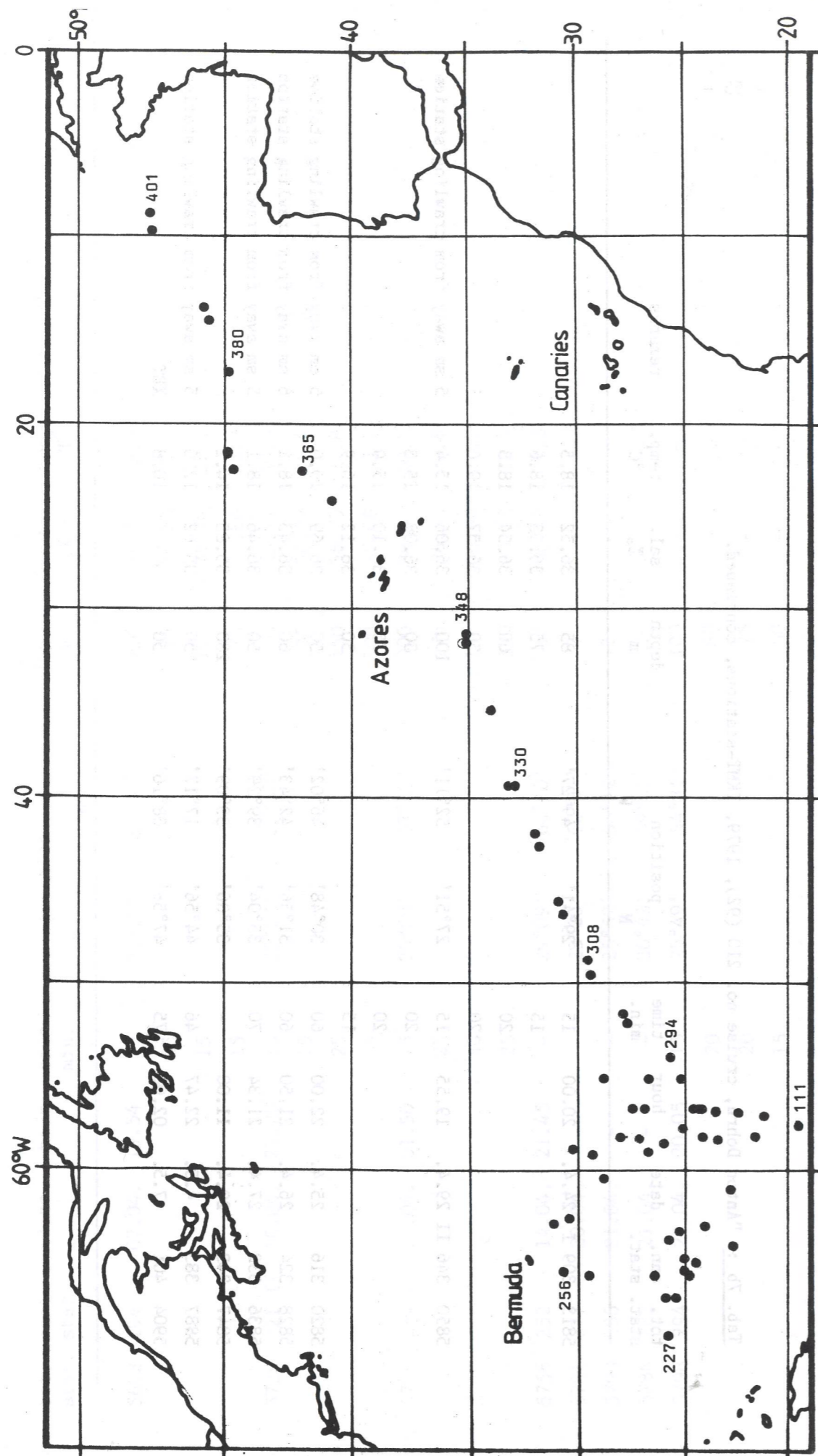


Fig. 5: "Anton Dohrn", cruise no. 210 (92), 1979; (stat. no. 23-401).

Table 8:

"Walther Herwig" (II) cruise no. 52, part 2, Middle Atlantic Ridge, 3.6. 1982 to 23.6.1982. (Figure 6).

Commander captain E. Littkemann.

Scientific crew:

|                               |             |      |
|-------------------------------|-------------|------|
| Post, A., scientist in charge | ichthyology | ISH  |
| Bertelsen, E.                 | ichthyology | ZMUC |
| Bürkel, D.                    | evertbrates | ZMH  |
| Ehrich, S.                    | fish. biol. | ISH  |
| Hulley, A.P.                  | ichthyology | SAM  |
| Karrer, Ch. (Mrs.)            | techn. ass. | ISH  |
| Kreffft, G.                   | ichthyology | ISH  |
| Lübben, Ch. (Mrs.)            | techn. ass. | ISH  |
| Nielsen, J.                   | ichthyology | ZMUC |
| Ochs, N.                      | hydrography | IfM  |
| Warnecke, C. (Mrs.)           | evertbrates | ZMH  |

Gear: MF 1600; BT 140', TDR

Hydrography: Multisonde, XBT

Diaries: 2 volumes, handwritten.

It was the main purpose of the cruise to study the bathy- and the benthopelagic fishes along the Biskay-Azore Ridge and the Middle-Atlantic-Ridge north to the Azore Islands respectively. There are only few banks shallower than 2000 m, which is the maximum depth for bottom trawling to be attained with "Walther Herwig". Moreover we found the bottom to be very unsuitable for trawling, thus only 7 bottom-trawls were successful in the end. Station data of these hauls are given in the appendix of tab. 8.

Most of the pelagic hauls went deeper than 800 m attaining the scattered echo layer of daylight time or going beyond this layer. The deepest haul was carried out with all available warps out (4.200 m), and was indicated as about 3.200 m trawling depth by the TDR.

The way home from the Atlantic Ridge was used for a transect along the 50°N latitude to the European slope.

Table 8a: pelagic trawls; table 8b: bottom trawls.

Tab. 8a : "Walther Herwig", cruise no. 52, part 2, Middle Atlantic Ridge, 1982, pelagic trawls, MT 1600.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C  | remarks                |
|----------|-------|-------|--------------|----------|--------|------------|-----------|--------------|------------------------|
|          |       |       |              | N        | W      |            |           |              |                        |
| 331      | 5.6.  | 15.45 | 60           | 45°12'   | 13°26' | 1800       |           |              | no inlet in the codend |
| 335      | 6.6.  | 7.20  | 60           | 45°09'   | 15°36' | 2250       |           |              |                        |
| 336      | 6.6.  | 13.30 | 60           | 45°03'   | 16°07' | 3200       |           |              |                        |
| 343      | 7.6.  | 7.00  | 60           | 44°15'   | 19°44' | 3200       |           |              |                        |
| 344      | 7.6.  | 13.07 | 30           | 44°12'   | 20°05' | 1100       |           | no           |                        |
| 345      | 7.6.  | 15.15 | 30           | 44°09'   | 20°14' | 800        |           |              |                        |
| 359      | 9.6.  | 8.40  | 60           | 43°22'   | 25°59' | 1230       |           |              |                        |
| 360      | 9.6.  | 13.25 | 30           | 43°15'   | 26°15' | 2600       |           | hydrographic |                        |
| 369      | 10.6. | 14.45 | 60           | 43°36'   | 28°35' | 700        |           |              |                        |
| 370      | 10.6. | 16.45 | 40           | 43°42'   | 28°27' | 1550       |           |              |                        |
| 375      | 11.6. | 8.50  | 30           | 45°24'   | 27°41' | 900        |           | data         |                        |
| 377      | 11.6. | 14.27 | 60           | 45°40'   | 27°48' | 3200       |           |              |                        |
| 378      | 12.6. | 5.25  | 30           | 46°29'   | 27°14' | 250        |           |              |                        |
| 380      | 12.6. | 15.40 | 30           | 47°03'   | 27°20' | 2600       |           | available    |                        |
| 381      | 13.6. | 5.15  | 35           | 47°25'   | 27°20' | 250        |           |              |                        |
| 383      | 13.6. | 15.40 | 40           | 47°52'   | 27°08' | 1370       |           |              |                        |
| 384      | 14.6. | 7.15  | 30           | 48°09'   | 27°48' | 3200       |           |              |                        |
| 385      | 14.6. | 15.10 | 30           | 48°36'   | 27°40' | 1000       |           |              |                        |
| 387      | 15.6. | 7.25  | 30           | 49°48'   | 28°47' | 3200       |           |              |                        |
| 388      | 15.6. | 15.10 | 30           | 49°59'   | 28°50' | 900        |           |              |                        |
| 390      | 16.6. | 5.20  | 30           | 49°48'   | 26°33' | 500        |           |              |                        |

Tab. 8a : "Walther Herwig", cruise no. 52, part 2, 1982, continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C  | remarks |
|----------|-------|-------|--------------|----------|--------|------------|-----------|--------------|---------|
|          |       |       |              | N        | W      |            |           |              |         |
| 391      | 16.6. | 8.30  | 30           | 49°50'   | 26°28' | 3200       |           |              |         |
| 392      | 16.6. | 14.10 | 30           | 49°48'   | 25°55' | 1000       |           |              |         |
| 393      | 17.6. | 4.30  | 15           | 49°47'   | 23°30' | 460        |           | no           |         |
| 394      | 17.6. | 7.25  | 30           | 49°49'   | 23°19' | 3200       |           |              |         |
| 396      | 17.6. | 13.10 | 15           | 49°42'   | 22°59' | 870        |           |              |         |
| 397      | 18.6. | 7.20  | 20           | 49°52'   | 20°22' | 3200       |           | hydrographic |         |
| 399      | 18.6. | 13.10 | 15           | 49°59'   | 20°06' | 800        |           |              |         |
| 400      | 19.6. | 4.30  | 15           | 49°50'   | 16°58' | 480        |           | data         |         |
| 401      | 19.6. | 7.20  | 30           | 49°52'   | 16°52' | 3200       |           |              |         |
| 402      | 19.6. | 13.10 | 15           | 49°56'   | 16°29' | 950        |           |              |         |
| 403      | 20.6. | 3.30  | 15           | 49°47'   | 13°52' | 500        |           | available    |         |
| 404      | 20.6. | 5.25  | 60           | 49°50'   | 13°41' | 2700       |           |              |         |

Tab. 8b : "Walther Herwig", cruise no. 52, part 2, bottom trawling, BT 140'.

| stat.no. | date  | hour  | time min. | position      | depth m   | sal. ‰ | temp. °C | remarks                 |
|----------|-------|-------|-----------|---------------|-----------|--------|----------|-------------------------|
| 329      | 5.6.  | 7.00  | 60        | 45°05' 13°15' | 2440-2500 |        |          | net not at the bottom   |
| 330      | 5.6.  | 13.05 | 10        | 45°06' 13°17' | 2450-2350 |        |          | net hooked up, no catch |
| 350      | 8.6.  | 7.15  | 34        | 43°37' 22°33' | 1880      |        |          | net hooked up           |
| 352      | 8.6.  | 15.05 | 60        | 43°39' 22°38' | 2100-2500 |        |          |                         |
| 366      | 10.6. | 7.50  | 25        | 43°00' 28°39' | 2250-2300 |        |          | net hooked up           |
| 379      | 12.6. | -     | -         | 46°33' 27°03' | 2000-1800 |        |          | net hooked up           |
| 382      | 13.6. | 11.45 | 40        | 47°50' 27°09' | 1900      |        |          | net hooked up           |

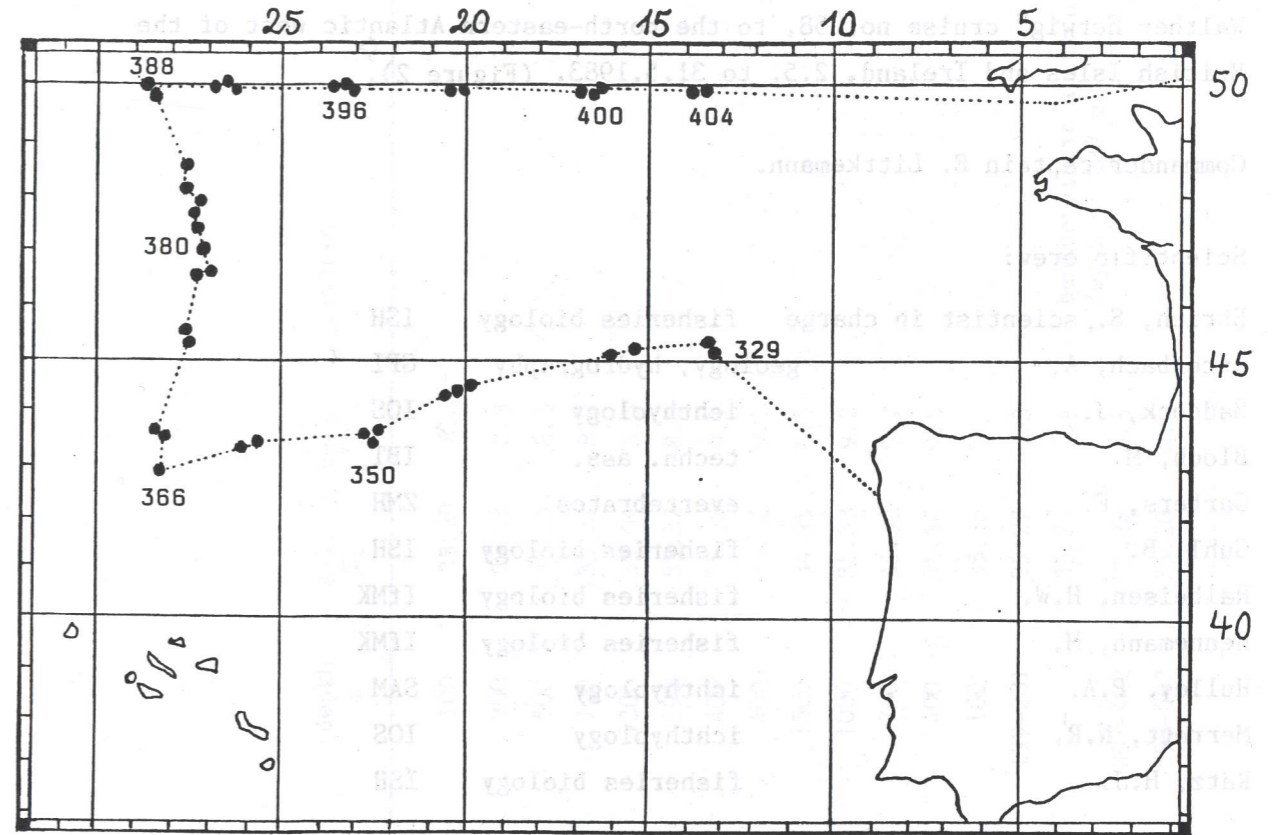


Fig. 6: "Walther Herwig", cruise no. 52, 1982, (stat. no. 329 - 404).



Table 9:

Walther Herwig" cruise no. 58, to the north-eastern Atlantic west of the British Isles and Ireland, 2.5. to 31.5.1983. (Figure 2).

Commander captain E. Littkemann.

Scientific crew:

|                                 |                      |      |
|---------------------------------|----------------------|------|
| Ehrich, S., scientist in charge | fisheries biology    | ISH  |
| Attenbach, A.                   | geology, hydrography | GPI  |
| Badcock, J.                     | ichthyology          | IOS  |
| Bloch, M.                       | techn. ass.          | IBT  |
| Garbers, F.                     | evertbrates          | ZMH  |
| Guhl, B.                        | fisheries biology    | ISH  |
| Halbeisen, H.W.                 | fisheries biology    | IfMK |
| Hennemann, M.                   | fisheries biology    | IfMK |
| Hulley, P.A.                    | ichthyology          | SAM  |
| Merrett, N.R.                   | ichthyology          | IOS  |
| Rätz, H.J.                      | fisheries biology    | ISH  |

Gear: MT 1600.

Hydrography: Multisonde

Diaries: 2 volumes, handwritten.

The main purpose of the cruise was the investigation of Blue Whiting and Blueling. Additional pelagic transects were carried out along the Rockall Canion and above the northern slope of the Hebrides shelf in order to study the distribution and abundance of the commercial species mentioned above. From the fish catches, including a total of about 200 species, samples were preserved for the ISH collection.

Tab. 9 : "Walther Herwig", cruise no. 58, 1983.

| stat.no. | date  | hour  | time min. | position N | position W | depth m | sal. ‰ | temp. °C | remarks                                      |
|----------|-------|-------|-----------|------------|------------|---------|--------|----------|--|
| 271      | 9.5.  | 6.30  | 90        | 59°29'     | 11°58'     | 100     | 35.29  | 8.8      |  |
| 272      | 9.5   | 9.11  | 60        | 59°24'     | 11°54'     | 300     | 35.23  | 8.3      |  |
| 273      | 9.5.  | 11.31 | 60        | 59°27'     | 12°04'     | 500     | 35.25  | 8.3      |  |
| 275      | 9.5.  | 15.46 | 60        | 59°30'     | 11°37'     | 700     | 35.21  | 8.0      |  |
| 276      | 9.5.  | 18.02 | 60        | 59°28'     | 11°23'     | 1300    | 35.04  | 5.5      |  |
| 277      | 10.5. | 6.45  | 75        | 58°41'     | 8°25'      | 590     | 35.32  | 8.8      |  |
| 278      | 10.5. | 9.20  | 60        | 58°45'     | 8°04'      | 400     | 35.33  | 9.1      |  |
| 279      | 10.5. | 11.35 | 60        | 58°48'     | 7°45'      | 400     | 35.32  | 9.1      |  |
| 291      | 13.5. | 7.00  | 60        | 57°46'     | 11°05'     | 1500    | 34.95  | 4.5      |  |
| 292      | 13.5. | 1.30  | 30        | 57°46'     | 11°05'     | 1000    | 35.33  | 9.2      |  |
| 293      | 13.5. | 14.45 | 20        | 57°45'     | 11°07'     | 700     | 35.33  | 9.2      |  |
| 294      | 13.5. | 15.45 | 30        | 57°43'     | 10°58'     | 400     | 35.34  | 9.5      |  |
| 295      | 13.5. | 17.05 | 60        | 57°39'     | 11°05'     | 100     | 35.36  | 9.7      |  |
| 314      | 17.5. | 6.23  | 30        | 56°31'     | 14°28'     | 199-201 | 35.27  | 8.3      | benthopelagic above bottom<br>depth of 288 m |
| 315      | 17.5. | 8.32  | 30        | 56°28'     | 14°22'     | -       | 35.26  | 8.4      |  |
| 317      | 17.5. | 13.04 |           | 56°32'     | 14°14'     | 397-402 | 35.28  | 8.3      |  |
| 318      | 17.5. | 15.08 | 30        | 56°27'     | 14°14'     | 598-607 | 35.28  | 8.4      |  |

Tab. 9 : "Walther Herwig", cruise no. 58, 1983, continued.

| stat.no. | date  | hour  | time min. | N      | W      | position | depth m | sal. ‰ | temp. °C | remarks |
|----------|-------|-------|-----------|--------|--------|----------|---------|--------|----------|---------|
| 319      | 17.5. | 17.13 | 47        | 56°27' | 14°23' | 296-301  | 35.26   | 8.4    |          |         |
| 312      | 18.5. | 6.45  | 75        | 56°22' | 11°55' | 1500     | 34.94   | 4.7    |          |         |
| 322      | 18.5. | 9.50  | 30        | 56°19' | 11°56' | 1000     | 35.19   | 7.7    |          |         |
| 323      | 18.5. | 11.55 | 30        | 56°20' | 12°20' | 700      | 35.30   | 9.1    |          |         |
| 324      | 18.5. | 13.40 | 30        | 56°23' | 12°01' | 400      | 35.34   | 9.4    |          |         |
| 325      | 18.5. | 15.10 | 30        | 56°24' | 12°05' | 100      | 35.37   | 9.7    |          |         |
| 326      | 19.5. | 6.45  | 45        | 56°35' | 9°14'  | 800-840  | 35.20   | 8.1    |          |         |
| 327      | 19.5. | 10.50 | 30        | 56°34' | 9°01'  | 610-620  | 35.40   | 9.5    |          |         |
| 328      | 19.5. | 12.58 | 30        | 56°34' | 9°06'  | 400-410  | 35.42   | 9.6    |          |         |
| 329      | 19.5. | 14.55 | 30        | 56°31' | 9°04'  | 280-304  | 35.40   | 9.6    |          |         |
| 330      | 19.5. | 16.30 | 30        | 56°29' | 9°02'  | 190-212  | 35.39   | 9.6    |          |         |
| 358      | 25.5. | 6.50  | 30        | 52°46' | 15°00' | 900      | 35.26   | 8.0    |          |         |
| 359      | 25.5. | 9.05  | 30        | 52°44' | 14°59' | 600      | 35.40   | 9.7    |          |         |
| 360      | 25.5. | 11.30 | 60        | 52°43' | 14°49' | 620-630  | 35.47   | 9.7    |          |         |

Table 10:

"Walther Herwig" (II) cruise no. 76, part. 2, Hatton Bank. 23.6. to 11.7.1986. (Figure 2).

Commander captain U. Hohengarten

Scientific crew:

|                               |                  |     |
|-------------------------------|------------------|-----|
| Post, A., scientist in charge | ichthyology      | ISH |
| Andres, H.G.                  | evertbrates      | BAH |
| Candouna, M. (Mrs.)           | hydrography      | IFH |
| Dammer, M.                    | techn. ass.      | IfM |
| John, H.Ch.                   | plancton/neuston | BAH |
| John, M. (Mrs.)               | plancton/neuton  | BAH |
| Karrer, Ch. (Mrs.)            | techn. ass.      | ISH |
| Kloppmann, M.                 | techn. ass.      | BAH |
| Paxton, J.                    | ichthyology      | AMS |
| Stein, F.                     | techn. ass.      | IfM |
| Vorberg, R.                   | techn. ass.      | ISH |
| Zelck, C. (Mrs.)              | techn. ass.      | BAH |

Gear: MT 1600, BT 140'

Hydrography: Multisonde

Diaries: 2 volumes, handwritten.

The research programme included multiple faunistic and ecological studies inside of two boxes of about 30 sm<sup>2</sup> above 1000 m bottom depth. Multiple series of trawls during daylight and after sunset were carried out in 200, 400, 600, 800 m depth respectively and on the bottom.

On the way back home two deep hauls were added to the programme. Data of the bottom trawling is given in the appendix of tab. 10.

Table 10a: pelagic trawls; table 10b: bottom trawls.

Tab. 10a: "Walther Herwig", cruise no. 70, part 2, Hatton Bank, 1986, pelagic trawls.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks           |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|-------------------|
|          |       |       |              | N        | W      |            |           |             |                   |
| 344      | 26.6. | 21.30 | 20           | 57°43'   | 17°46' | 800        | 35.1      | 7.6         |                   |
| 345      | 27.6. | 0.02  | 20           | 57°37'   | 17°59' | 800        | 35.1      | 7.6         |                   |
| 346      | 27.6. | 1.41  | 20           | 57°38'   | 18°05' | 200        | 35.2      | 8.8         |                   |
| 347      | 27.6. | 2.58  | 20           | 57°42'   | 18°10' | 400        | 35.2      | 8.5         |                   |
| 348      | 27.6. | 4.30  | 255          | 57°46'   | 18°05' | 600        | 35.2      | 8.4         | echo cable broken |
| 354      | 27.6. | 22.35 | 20           | 57°43'   | 17°40' | 600        | 35.1      | 8.1         |                   |
| 355      | 28.6. | 0.13  | 88           | 57°40'   | 17°47' | 600        | 35.1      | 8.1         | winch defect      |
| 356      | 28.6. | 2.55  | 80           | 57°36'   | 18°02' | 400        | 35.2      | 8.5         |                   |
| 357      | 28.6. | 4.00  | 40           | 57°34'   | 18°12' | 800        | 35.1      | 7.7         |                   |
| 364      | 28.6. | 22.20 | 20           | 57°35'   | 18°10' | 800        | 35.1      | 7.6         |                   |
| 365      | 28.6. | 23.58 | 20           | 57°39'   | 18°05' | 600        | 35.2      | 8.4         |                   |
| 366      | 29.6. | 1.23  | 20           | 57°42'   | 18°04' | 200        | 35.1      | 8.6         |                   |
| 367      | 29.6. | 2.37  | 20           | 57°44'   | 18°08' | 400        | 35.1      | 8.5         |                   |
| 368      | 29.6. | 4.04  | 20           | 57°49'   | 18°13' | 400        | 35.1      | 8.5         |                   |
| 373      | 29.6. | 13.24 | 114          | 57°55'   | 18°16' | 200        | 35.1      | 8.6         | winch defect      |
| 374      | 29.6. | 16.14 | 20           | 57°49'   | 18°04' | 400        | 35.1      | 8.4         |                   |
| 375      | 29.6. | 17.45 | 20           | 57°47'   | 18°07' | 400        | 35.1      | 8.4         |                   |
| 381      | 30.6. | 8.18  | 20           | 57°49'   | 18°28' | 200        | 35.1      | 8.6         |                   |
| 382      | 30.6. | 9.40  | 20           | 57°47'   | 18°20' | 400        | 35.1      | 8.3         |                   |
| 383      | 30.6. | 11.00 | 20           | 57°44'   | 18°12' | 600        | 35.2      | 8.4         |                   |

Tab. 10a : "Walther Herwig", cruise no. 76, part 2, 1986 continued.

| stat.no. | date  | hour  | time<br>min. | position |        | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks |
|----------|-------|-------|--------------|----------|--------|------------|-----------|-------------|---------|
|          |       |       |              | N        | W      |            |           |             |         |
| 384      | 30.6. | 13.12 | 20           | 57°43'   | 18°06' | 600        | 35.2      | 8.4         |         |
| 385      | 30.6. | 14.45 | 20           | 57°39'   | 18°06' | 800        | 35.1      | 8.0         |         |
| 386      | 30.6. | 16.42 | 20           | 57°36'   | 18°13' | 800        | 35.1      | 8.0         |         |
| 406      | 2.7.  | 22.20 | 20           | 54°47'   | 18°10' | 800        | 35.1      | 7.9         |         |
| 407      | 3.7.  | 0.00  | 20           | 54°43'   | 18°12' | 800        | 35.1      | 7.9         |         |
| 408      | 3.7.  | 1.26  | 20           | 54°38'   | 18°14' | 200        | 35.3      | 10.2        |         |
| 409      | 3.7.  | 2.42  | 20           | 54°33'   | 18°17' | 400        | 35.2      | 9.5         |         |
| 410      | 3.7.  | 4.10  | 20           | 54°28'   | 18°17' | 600        | 35.2      | 8.8         |         |
| 416      | 3.7.  | 23.35 | 20           | 54°30'   | 18°12' | 600        | 35.1      | 8.6         |         |
| 417      | 4.7.  | 0.05  | 20           | 54°30'   | 18°11' | 600        | 35.1      | 8.6         |         |
| 418      | 4.7.  | 1.30  | 20           | 54°26'   | 18°04' | 400        | 35.2      | 9.3         |         |
| 419      | 4.7.  | 3.05  | 20           | 54°21'   | 17°59' | 800        | 34.9      | 5.8         |         |
| 426      | 4.7.  | 22.25 | 20           | 54°31'   | 18°26' | 800        | 35.1      | 7.1         |         |
| 427      | 5.7.  | 0.00  | 20           | 54°36'   | 18°28' | 600        | 35.0      | 8.0         |         |
| 428      | 5.7.  | 1.17  | 20           | 54°39'   | 18w25' | 200        | 35.3      | 9.9         |         |
| 429      | 5.7.  | 2.33  | 20           | 54°39'   | 18°16' | 400        | 35.2      | 9.4         |         |
| 430      | 5.7.  | 3.55  | 20           | 54°40'   | 18°08' | 400        | 35.2      | 9.4         |         |
| 433      | 5.7.  | 13.19 | 20           | 54°34'   | 18°07' | 200        | 35.2      | 10.0        |         |
| 434      | 5.7.  | 14.28 | 20           | 54°37'   | 18°10' | 400        | 35.2      | 9.3         |         |
| 435      | 5.7.  | 15.45 | 20           | 54°37'   | 18°09' | 400        | 35.2      | 9.4         |         |

Tab. 10a: "Walther Herwig", cruise no. 76, part 2, 1986 continued.

| stat.no. | date | hour  | time<br>min. | position<br>N W | depth<br>m | sal.<br>‰ | temp.<br>°C | remarks |
|----------|------|-------|--------------|-----------------|------------|-----------|-------------|---------|
| 441      | 6.7. | 8.15  | 20           | 54°26' 18°09'   | 200        | 35.3      | 9.9         |         |
| 442      | 6.7. | 9.20  | 20           | 54°29' 18°11'   | 400        | 35.2      | 9.4         |         |
| 443      | 6.7. | 10.40 | 20           | 54°33' 18°14'   | 600        | 34.9      | 6.9         |         |
| 444      | 6.7. | 13.20 | 20           | 54°40' 18°21'   | 600        | 35.3      | 9.4         |         |
| 445      | 6.7. | 14.45 | 20           | 54°44' 18°30'   | 800        | 35.0      | 6.4         |         |
| 446      | 6.7. | 16.20 | 20           | 54°44' 18°19'   | 800        | 35.1      | 8.3         |         |
| 451      | 7.7. | 8.55  | 20           | 54°46' 18°10'   | 600        | 35.2      | 9.0         |         |
| 452      | 7.7. | 11.00 | 20           | 54°45' 18°10'   | 800        | 35.1      | 8.0         |         |
| 463      | 9.7. | 8.45  | 60           | 53°04' 16°36'   | 1800       | 34.8      | 3.7         |         |
| 464      | 9.7. | 12.30 | 60           | 52°56' 16°18'   | 2200       | 35.0      | 3.0         |         |

Tab. 10b: "Walther Herwig", cruise no. 76, part 2, 1986, bottom trawls.

|     |      |       |    |               |           |      |     |  |
|-----|------|-------|----|---------------|-----------|------|-----|--|
| 394 | 1.7. | 8.25  | 30 | 57°39' 18°18' | 1000-1030 | 35.0 | 5.7 |  |
| 395 | 1.7. | 10.45 | 30 | 57°38' 18°13' | 1006-990  | 35.0 | 5.7 |  |
| 396 | 1.7. | 12.55 | 30 | 57°41' 18°04' | 1004      | 35.0 | 5.7 |  |
| 397 | 1.7. | 14.30 | 30 | 57°37' 18°13' | 1011-974  | 35.0 | 5.7 |  |
| 453 | 7.7. | 13.35 | 30 | 54°45' 18°07' | 1037-1072 | 35.0 | 6.6 |  |
| 454 | 7.7. | 15.15 | 30 | 54°47' 18°04' | 1025-1010 | 35.0 | 6.6 |  |
| 460 | 8.7. | 8.25  | 30 | 54°47' 18°03' | 1018-1040 | 35.0 | 5.8 |  |
| 461 | 8.7. | 10.00 | 30 | 54°48' 18°04' | 1014-1008 | 35.0 | 6.2 |  |

Typespecimens of Fishes

in the

Collections of the Institut für Seefischerei, Hamburg

part II

by

Gerhard Krefft

Aussenstelle Ichthyologie, Institut für Seefischerei  
Bundesforschungsanstalt für Fischerei, Hamburg