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STRUCTURAL ANALYSIS OF THE MEIOBENTHOS COMMUNITIES OF THE SHELF BREAK AREA IN TWO STATIONS OF THE GULF OF BISCAY (N.E. ATLANTIC)

by

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SUMMARY

In a first attempt to obtain information in order to characterize the shelf break zone, the meiobenthos communities of two fine sandy stations of 190 m and 325 m depth in the Gulf of Biscay off the Spanish coast were investigated in relation to some environmental characteristics (sediment composition, chlorophyll a content, redox values). The nematodes, which are the dominant taxon, were studied in detail. Their communities are relatively poor in densities (840 and 779 individuals per 10 cm^2) and biomass (0.137 and 0.334 mg dwt/10 cm^2) compared to those of shallow coastal areas. The dominance of small species (mean individual biomass : 0.169 and 0.423 µg dwt) and a low total biomass can be related to the low chlorophyll a content (maximum of 1.14 µg/g). However, the number of nematode genera is much higher (46 and 62 genera per station) than on the continental shelves (often less than 40 species per 10 cm^2). *Sabatieria*, *Daptonema*, *Minolaimus*, *Richtersia* and *Halalaimus* are the dominant genera in the two stations. These are also characteristic genera for the abyssal zone. The composition of the nematode communities is more similar to deep-sea communities than to those from subtidal zones. The low food supply is considered as an important structuring factor.

Key words : Meiobenthos, nematodes, shelf break

INTRODUCTION

When compared to the continental shelves, the meiobenthos from the deep-sea is poorly investigated. However, the shallow parts of the continental slopes are often less known than the deeper areas. Only a few studies deal with the 200 to 500 m depth zone (Wigley and McIntyre, 1964 ; Thiel, 1971, 1972 ; Vitiello, 1976 ; Coull *et al.*, 1977 ; Vivier, 1978 ; Pfannkuche *et al.*, 1983 ; Pkannkuche and Thiel, 1987 ; Alongi and Pichon, 1988 ; Soetaert *et al.*, 1991). This paper is the first of a series of studies on the meiobenthos of the shelf break zone in the

Gulf of Biscay. For this area only three meiobenthic studies, two on the bathyal (2000-5000m ; DINET and VIVIER, 1977, 1979) and one on the intertidal zone (after the oil spill in La Coruna ; GIERE, 1979) are known to us.

The present study investigates the densities of the meiobenthos taxa, and the biomass and composition of the nematode communities of two stations in the shelf break area off the Spanish coast (Fig. 1). Also some environmental parameters (sediment composition, chlorophyll a content and redox profiles) are determined. The results are compared with those from shallow waters and from the deep-sea. A detailed vertical sampling approach provides information on chemical and biological characteristics within the sediment.

MATERIALS AND METHODS

During a cruise of the Belgian R/V « BELGICA » in September 1989, sediment samples were obtained from two stations along the Spanish coast, respectively 190 m (station 10) and 325 m (station 9) deep. The coordinates are N 43° 59.92 and W 008° 30.31 for station 9 and N 43° 45.02 and W 008° 30.14 for station 10. Each of the sediment samples, taken with a box-corer (0.07 m^2 sampling surface), was subsampled by cores of 10 cm^2. All cores were vertically subdivided in slices of one cm, to 10 cm in the sediment.

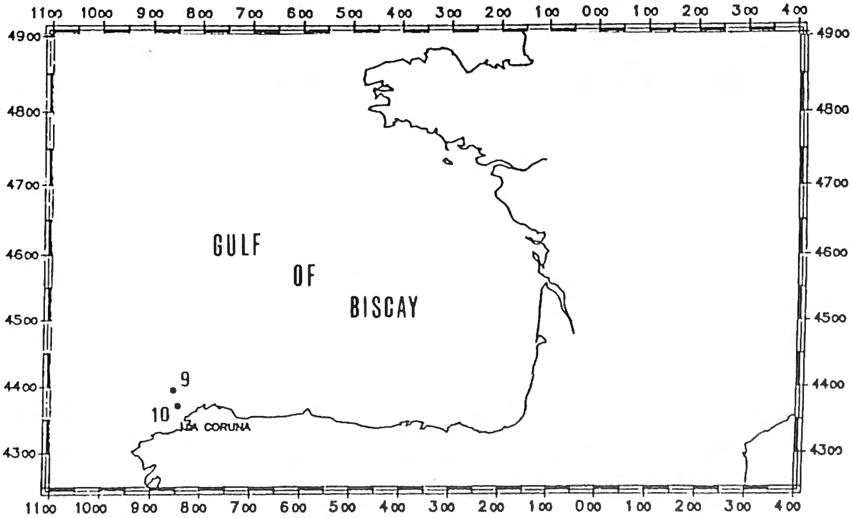

Fig. 1. — The Gulf of Biscay with indication of the two stations.

For two cores, all meiobenthic animals were counted and classified per taxon. From each sediment slice all or minimally 100 nematodes were randomly picked out and determined to the genus level (for a detailed description of the extraction procedure of the nematodes see HEIP *et al.*, 1985). The mean individual biomass of

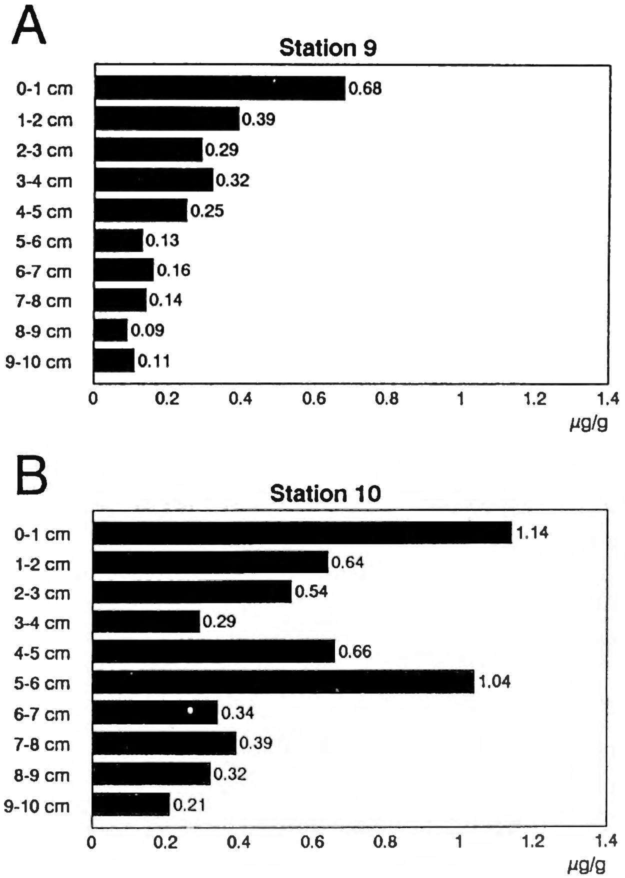

Fig. 2. — Vertical profile in the sediment of the chlorophyll a content in (A) station 9 and (B) station 10.

the nematodes of the upper five cm per station was determined according to the procedure of ANDRASSY (1956). Dry weight was calculated by taking 25 % of the wet weight (HEIP *et al.*, 1985). From a third core a sedimentological analysis (median grain size (mm), silt fraction (%), gravel fraction (%) and sorting (Φ)) was carried out. The chlorophyll a content was determined fluorimetrically on extractions of dry sediments of a fourth core with 90 % acetone (STRICKLAND and PARSONS, 1972), and calculated by the equation of HOLM-HANSEN *et al.* (1965) and LORENZEN (1966). The relative redox values were measured in millivolts by means of a micro-electrode on a fifth core.

RESULTS

The environmental factors

Both stations are characterized by a well sorted (sorting = 0.44 Φ in station 9 and 0.65 Φ in station 10), fine sandy sediment (the median grain size of the sand fraction is 0.140 mm at station 9 and 0.178 mm at station 10). The silt fraction is 8.5-13 % at station 10 , and 12.5-19 % at station 9. There is no gravel fraction.

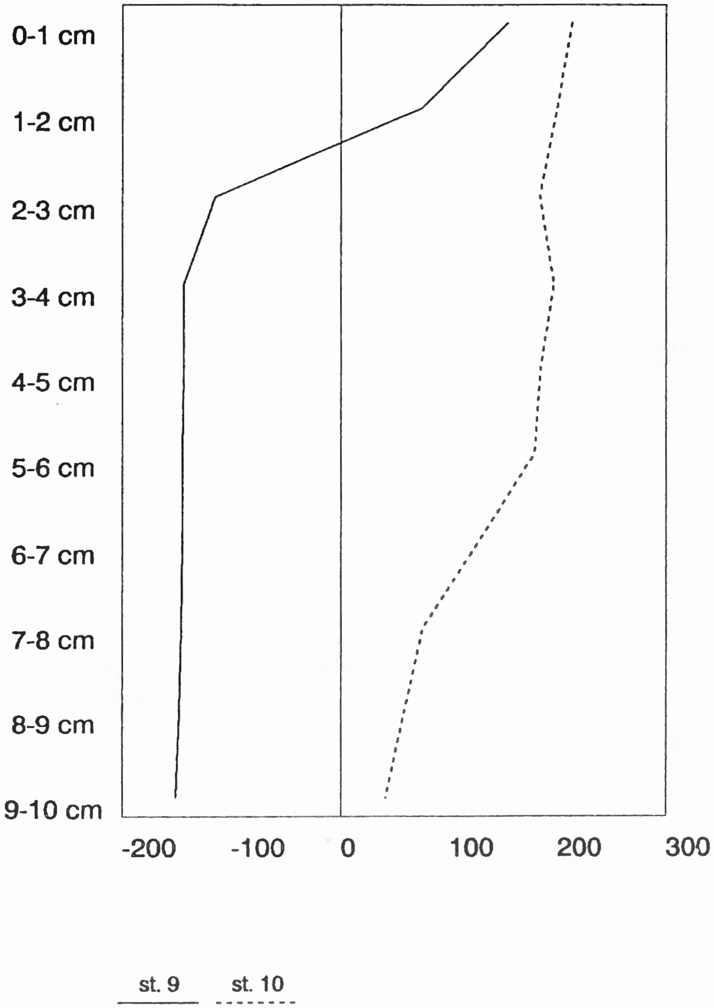

Fig. 3. — Vertical profile in the sediment of the redox potential in station 9 and station 10.

TABLE 1A

Vertical profile of the densities (per 10 cm^2) of the meiofauna taxa for two cores per station (a and b) and the mean of station 9.

		0-1 cm	1-2 cm	2-3 cm	3-4 cm	4-5 cm	5-6 cm	6-7 cm	7-8 cm	8-9 cm	9-10 cm	Sum
Nematodes	a	461	292	100	17	3	1	2	3	1	1	881
	b	337	216	131	56	26	4	5	11	8	5	799
	mean	399.5	254.0	115.5	36.5	14.5	2.5	3.5	7.0	4.5	3.0	840.5
Harpacticoids	a	47	4									51
	b	36										36
	mean	41.5	2.0									43.5
Turbellarians	a	7	2									9
	b	6	2			1		2				11
	mean	6.5	2.0			0.5		1				10.0
Polychaetes	a	11										11
	b	9	3	2	1	3						18
	mean	10.0	1.5	1.0	0.5	1.5						14.5
Oligochaetes	a	3	2	1								6
	b	1				1						2
	mean	2.0	1.0	0.5		0.5						4.0
Kinorhynchs	a											
	b	1										1
	mean	0.5										0.5
Gastrotrichs	a	1										1
	b	1										1
	mean	1										1.0
Ostracods	a	2										2
	b	1										1
	mean	1.5										1.5
Sum	a	532	300	101	17	3	1	2	3	1	1	961
	b	392	22	33	57	31	4	7	11	8	5	869
	mean	462.0	260.5	117.0	37.0	17.0	2.5	4.5	7.0	4.5	3.0	915.0

TABLE 1B

Vertical profile of the densities (per 10 cm^2) of the meiofauna taxa for two cores per station (a and b) and the mean of station 10.

		0-1 cm	1-2 cm	2-3 cm	3-4 cm	4-5 cm	5-6 cm	6-7 cm	7-8 cm	8-9 cm	9-10 cm	Sum
Nematodes	a	376	65	12	18	5	4	4	2	1		487
	b	532	261	129	64	36	19	16	11	3	1	1072
	mean	454.0	163	70.5	41	20.5	11.5	10	6.5	2	0.5	779.5
Harpacticoids	a	33	2									35
	b	48	1									49
	mean	40.5	1.5									42.0
Turbellarians	a	7		3								10
	b	1										1
	mean	4.0		1.5								5.5
Polychaetes	a	31	1	3	1							36
	b	22	6		2					3		33
	mean	26.5	3.5	1.5	1.5					1.5		34.5
Oligochaetes	a		1	2	1							4
	b	3										3
	mean	1.5	0.5	1.0	0.5							3.5
Kinorhynchs	a	8										8
	b	9		1		1		1				12
	mean	8.5		0.5		0.5		0.5				10.0
Gastrotrichs	a			2								2
	b											
	mean			1.0								1.0
Ostracods	a	3			1							4
	b											
	mean	1.5			0.5							2.0
Sum	a	430	69	22	21	5	4	4	2	1		558
	b	615	268	130	66	37	19	17	11	6	1	1170
	mean	522.5	168.5	76.0	43.5	21.0	11.5	10.5	6.5	3.5	0.5	864.0

Chlorophyll a (chl a) is highest in the upper sediment layer at station 9 (0.68 µg/g) (Fig. 2A). In the second cm the chl a content is almost halved (0.39 µg/g). The same reduction is observed at station 10 (1.14->0.64 µg/g), but a second peak (1.04 µg/g) is present between 4 and 6 cm in the sediment (Fig. 2B).

The redox potential layer is situated between 2 and 3 cm depth into the sediment at station 9, and between 6 and 8 cm depth at station 10 (Fig. 3). At station 9 the redox values are negative from the third cm in the sediment. At station 10 the redox potential is positive over the 10 centimeters.

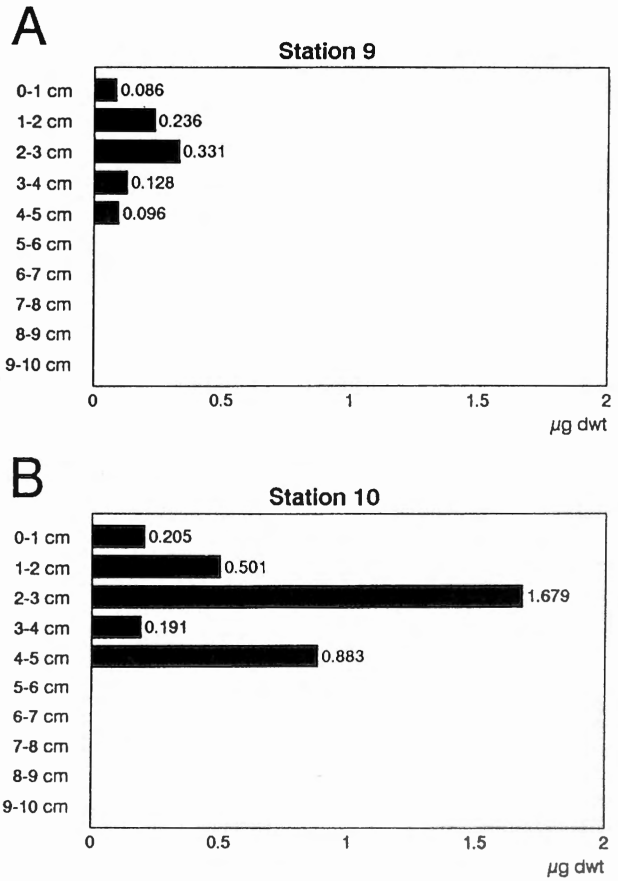

Fig. 4. — Vertical profile in the sediment of the mean individual biomass of the nematodes in (A) station 9 and (B) station 10.

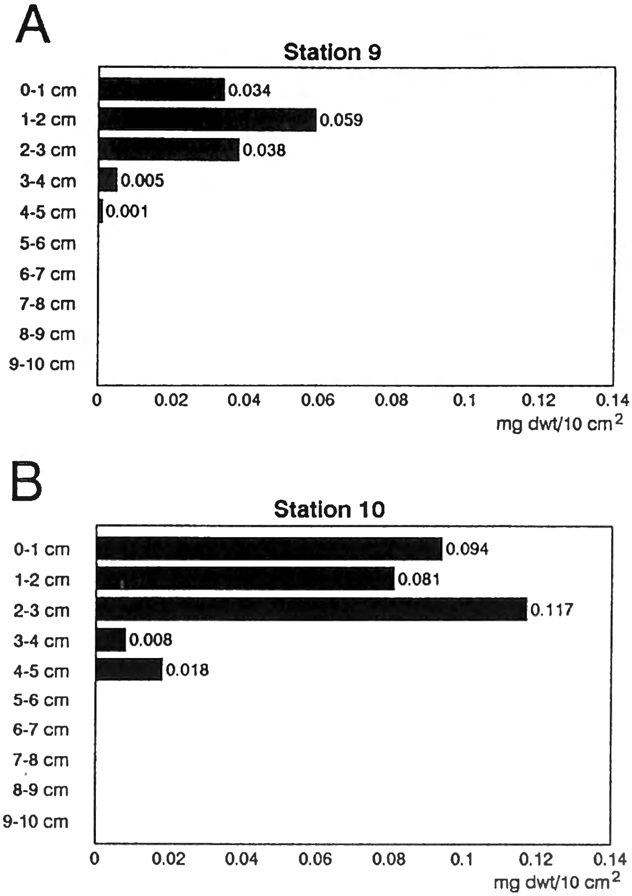

Fig. 5. — Vertical profile in the sediment of the total biomass of the nematodes in (A) station 9 and (B) station 10.

The meiobenthos

The composition of the meiofauna is similar for both stations (Table 1A and B) : nematodes are dominant, harpacticoids are subdominant, turbellarians, polychaetes and kinorhynchs are found sporadically. Oligochaetes, gastrotrichs and ostracods are present with fewer than 10 individuals per 10 cm^2. At station 9, the total meiofauna is represented by 915 individuals per 10 cm^2. At station 10, the mean number of individuals is 864 per 10 cm^2.

All taxa have their highest abundance in the upper layer of the sediment (Table 1). In both stations, nematodes are dominant in all the sediment layers (up to 10 cm depth). Harpacticoids, always the second most abundant taxon in the first

TABLE 2

Relative abundances of the nematode genera at station 9 for each sediment layer (per cm) and over the first five centimeters.

Genera	0-1 cm	1-2 cm	2-3 cm	3-4 cm	4-5 cm	0-5 cm
Sabatieria	1.43	30.88	55.88			17.54
Daptonema	13.57	10.29				10.61
Minolaimus	1.43	10.29	5.88			4.90
Richtersia	2.14	5.88	11.76			4.45
Halalaimus	5.71	2.94				4.00
Prochromadorella	7.14					3.75
Metadesmolaimus	5.71					3.00
Setosabatieria	1.43	2.94	2.94	30.00		2.66
Diplopeltula	2.86	2.94				2.50
Viscosia	2.14	2.94	2.94			2.45
Pselionema	4.29					2.25
Actinonema	2.86	1.47				2.00
Paracyatholaimus	3.57					1.88
Desmoscolecidae gen.	3.57					1.88
Microlaimus	2.86			10.00		1.69
Filitonchus		1.47	2.94	30.00	66.67	1.64
Oxystomina	2.14	1.47				1.62
Acantholaimus	2.86					1.50
Desmodora	2.86					1.50
Southerniella	2.86					1.50
Marylinnia		4.41				1.49
Paralongicyatholaimus		4.41				1.49
Pierrickia		4.41				1.49
Synonchiella		1.47	5.88	10.00		1.36
Odontophora	0.71	1.47	2.94			1.21
Bathylaimus	2.14					1.13
Ceramonema	2.14					1.13
Cyatholaimidae gen.		2.94				0.99
Desmolaimus		1.47	2.94			0.83
Bolbolaimus	1.43					0.75
Calomicrolaimus	1.43					0.75
Chromadora	1.43					0.75
Chromadorella	1.43					0.75
Rhips	1.43					0.75
Spilophorella	1.43					0.75
Cheironchus	1.43					0.75
Paramesonchium	0.71			10.00		0.57
Trefusia	0.71			10.00		0.57
Leptolaimus		1.47				0.50
Metachromadora		1.47				0.50
Desmodoridae gen.		1.47				0.50
Xyalidae gen.		1.47				0.50
Ammotheristus	0.71					0.38
Amphimonhystrella	0.71					0.38
Choanolaimus	0.71					0.38
Chromadorita	0.71					0.38

Genera	0-1 cm	1-2 cm	2-3 cm	3-4 cm	4-5 cm	0-5 cm
Dichromadora	0.71					0.38
Disconema	0.71					0.38
Gomphionema	0.71					0.38
Linhomoeus	0.71					0.38
Linhystera	0.71					0.38
Metacyatholaimus	0.71					0.38
Metalinhomoeus	0.71					0.38
Nemanema	0.71					0.38
Neochromadora	0.71					0.38
Neotonchus	0.71					0.38
Pomponema	0.71					0.38
Rhabdocoma	0.71					0.38
Microlaimidae gen.	0.71					0.38
Megadesmolaimus			2.94			0.33
Mesacanthion			2.94			0.33
Eubostrichus					33.33	0.11

centimeter, are no longer present from the third centimeter downward in the sediment. Turbellarians, polychaetes and oligochaetes disappear from the fifth to seventh cm down at station 9 (Table 1A) and from the third to fourth cm down at station 10 (Table 1B). Kinorhynchs are present at station 10 up to the seventh cm in the sediment. At station 9 they are limited to the upper sediment layer with one specimen.

The nematodes

Biomass

The mean individual biomass amounts to 0.169 µg dwt at station 9 and 0.423 µg dwt at station 10. Both stations are characterized by an increase of the individual biomass with depth into the sediment in the upper three cm (Fig. 4). At station 10, however, the maximal biomass per individual is five times higher (1.679 µg dwt : Fig. 4B) than at station 9 (0.331 µg dwt : Fig. 4A). In this station also the fifth cm of the sediment is characterized by a higher value for the individual biomass (0.883 µg dwt : Fig. 4B). As a result, the total biomass is more than twice as high at station 10 (0.334 mg dwt/ 10 cm^2) than at station 9 (0.137 mg dwt/10 cm^2). Due to the highest nematode densities in the first two centimeters and the highest individual biomass in the third cm, the upper three sediment layers of both stations are characterized by the highest total biomass values (Fig. 5A and B).

Faunal composition

Tables 2 and 3 show the relative abundances of the genera per cm and for the first 5 cm at stations 9 and 10 respectively. Station 9 is dominated by *Sabatieria*, which is most abundant in the deeper sediment layers. *Daptonema* is the dominant

TABLE 3

Relative abundances of the nematode genera at station 10 for each sediment layer (per cm) and over the first five centimeters.

Genera	0-1 cm	1-2 cm	2-3 cm	3-4 cm	4-5 cm	0-5 cm
Richtersia	6.29	18.42				7.51
Sabatieria	1.40	18.42	33.33	41.67	100.00	7.05
Trichotheristus	6.99	5.26	11.11			6.52
Desmodora	7.69	2.63				6.44
Daptonema	6.99	5.26				6.25
Halalaimus	6.99	5.26				6.25
Actinonema	6.29	2.63				5.33
Desmoscolecidae gen.	6.29	2.63				5.33
Pselionema	5.59					4.42
Prochromadorella	4.90					3.87
Setosabatieria	2.10	2.63	22.22	25.00		3.50
Calomicrolaimus	4.20					3.31
Bolbolaimus	2.80	5.26				2.94
Diplopeltula	3.50					2.76
Ptycholaimellus	2.80					2.21
Enoploides	2.10	2.63				2.02
Viscosia	2.10			8.33		1.97
Diplopeltoides	2.10					1.66
Minolaimus	2.10					1.66
Rhips	2.10					1.66
Paralongicyatholaimus	0.70			25.00		1.48
Chromadora	1.40					1.10
Leptolaimus	1.40					1.10
Marylinnia	1.40					1.10
Pomponema	1.40					1.10
Synonchiella		7.89				1.09
Chromadorita	0.70	2.63				0.92
Sphaerolaimus	0.70		11.11			0.83
Odontophora		2.63	11.11			0.64
Aponema	0.70					0.55
Ceramonema	0.70					0.55
Cheironchus	0.70					0.55
Mesacanthion	0.70					0.55
Neochromadora	0.70					0.55
Pandolaimus	0.70					0.55
Polygastrophora	0.70					0.55
Southerniella	0.70					0.55
Chromadoridae gen.	0.70					0.55
Cyatholaimidae gen.	0.70					0.55
Aegialoalaimus		2.63				0.36
Axonolaimus		2.63				0.36
Bathylaimus		2.63				0.36
Dorylaimopsis		2.63				0.36
Halichoanolaimus		2.63				0.36
Spirinia		2.63				0.36
Odontanticoma			11.11			0.27

TABLE 4

Relative abundances of the nematode families at the stations 9 and 10.

Families		*Families*	
Comesomatidae	22.26	Chromadoridae	16.19
Xyalidae	15.25	Xyalidae	12.77
Chromadoridae	11.89	Comesomatidae	10.91
Cyatholaimidae	11.51	Selachinematidae	9.51
Selachinematidae	6.94	Microlaimidae	6.80
Oxystominidae	6.00	Desmodoridae	6.80
Diplopeltidae	4.00	Oxystominidae	6.25
Microlaimidae	3.57	Cyatholaimidae	5.89
Ceramonematidae	3.38	Desmoscolecidae	5.33
Oncholaimidae	2.45	Ceramonematidae	4.97
Linhomoeidae	2.30	Diplopeltidae	3.31
Desmodoridae	2.11	Thoracostomopsidae	2.57
Desmoscolecidae	1.88	Aegialoalaimidae	2.02
Ethmolaimidae	1.64	Oncholaimidae	1.97
Axonolaimidae	1.21	Leptolaimidae	1.10
Tripyloididae	1.13	Axonolaimidae	1.05
Trefusiidae	0.95	Sphaerolaimidae	0.83
Neotonchidae	0.70	Pandolaimidae	0.55
Leptolaimidae	0.50	Encheliidae	0.55
Thoracostomopsidae	0.33	Tripyloididae	0.36
		Anticomidae	0.27

genus in the surface layers. Subdominant genera in station 9 are *Minolaimus*, *Richtersia*, *Halalaimus* and *Prochromadorella*. At station 10 several genera are present with the same abundance : *Richtersia*, *Sabatieria*, *Trichotheristus*, *Desmodora*, *Daptonema*, *Halalaimus* and *Actinonema*. Table 4 shows the dominant families at both stations. These are the Comesomatidae, and to a lesser extent the Xyalidae, the Chromadoridae and the Cyatholaimidae at station 9. The Chromadoridae are dominant at station 10, with the Xyalidae, the Comesomatidae and the Selachinematidae as subdominant families.

Diversity

In total, 79 genera are found of which 29 are present at both stations. Station 9 contains 62 genera, and at station 10, 46 genera are found. With the exception of two, all genera are represented by less than 5 % dominance at station 9. The two dominant genera have a relative abundance of respectively 10.61 % and 17.54 %. In station 10 all genera have a relative abundance of less than 10 % (Tables 2 and 3).

DISCUSSION

The environmental factors

The chl a content of both stations off the Spanish coast is very low when compared to other, even deeper areas. For instance, a slope transect of 300 to 900 meter depth in the deep Western Coral Sea (Australia) is characterized by chl a values of 9 µg/g ; and even on the abyssal plain (900-1000 m) the chl a amounts to 3.9 µg/g (ALONGI and PICHON, 1988). In coastal areas the chl a content is even more high : 1.50-22.06 µg/g along the coast of Brittany (RIAUX-GOBIN *et al.*, 1989), and 10-20 µg/g along the Belgian coast (unpublished own results).

Low values of the redox potential (Eh) are often explained by a larger input of organic matter, related to a greater number of aerobic bacteria which degrade the organic matter, using oxygen. The negative Eh values in station 9 on the other hand can not be explained by a high organic input. In this case the sediment composition might influence the oxygen supply to the deeper sediment layers. The oxygenation into the sediment can be hampered because of the finer and more silty sediment at station 9, compared to station 10. However, the differences in sediment composition are small.

The meiobenthos

The nematode densities in both stations along the Spanish coast are higher than the values found in some other areas with a comparable depth (ALONGI and PICHON, 1988 ; COULL *et al.*, 1977 ; SOETAERT *et al.*, 1991 ; VIVIER, 1978 ; WIGLEY and MCINTYRE, 1964 : Table 5). Some areas, which are characterized by an high detritus input (see their chloroplastic pigment equivalents or CPE in Table 5), have higher meiofauna densities (PFANNKUCHE and THIEL, 1987 ; PFANNKUCHE *et al.*, 1983 ; SOETAERT *et al.*, 1991 : Table 5). Whereas in subtidal areas, the sediment composition determines the nematode densities, the food supply is an important factor controlling densities in deeper areas (COULL *et al.*, 1977 ; DINET, 1979 ; RENAUD-MORNAND and GOURBAULT, 1990 ; THIEL, 1979 ; TIETJEN *et al.*, 1989 ; SOETAERT *et al.*, 1991).

The dominance of the nematodes (70-95 %) and the increase in their dominance with increasing water depth are also in accordance with the results in other areas (DINET, 1973 ; DINET and VIVIER, 1977 ; RUTGERS VANDERLOEFF and LAVALEYE, 1986 ; SOETAERT *et al.*, 1991).

Besides harpacticoids, also polychaetes, kinorhynchs, gastrotrichs and tardigrades are frequently found in deeper areas. With the exception of the tardigrades, these taxa are also present in the two stations off the Spanish coast. The higher abundance of the kinorhynchs and the polychaetes at station 10 might be due to the higher redox values, compared to station 9. HIGGINGS and KRISTENSEN (1988) found that kinorhynchs are present with higher densities in the upper oxygenated sediment layers, while they are missing in anoxic sediments.

TABLE 5

Mean nematode densities per 10 cm² recorded for several areas and depths, with indication of the available values of Chloroplastic pigments equivalents (CPE).

Author	Area	depth (m)	ind/10cm²	CPE (µg/cm²)
ALONGI and PICHON, 1988	Western Coral sea	300-645	55-279	
WIGLEY and MCINTYRE, 1964	West Atlantic	40-567	50-924	
COULL *et al.*, 1977	West Atlantic	400	51-353	
VIVIER, 1978	Mediterranean	168-580	72-441	
SOETAERT *et al.*, 1991	Mediterranean	160-530	447-724	0.5-1.5
PFANNKUCHE *et al.*, 1983	N.E. Atlantic	130-400	1778-2656	17-24
PFANNKUCHE and THIEL, 1987	N. Greenland sea	200-400	545-3400	7-23
SOETAERT *et al.*, 1991	Mediterranean	155-370	1426-2157	4-8

The decrease of the meiofaunal densities with depth in the sediment is typical for all marine, fine sandy and silty sediments of a large depth. Most authors associate this with the accumulation of food in the surface layers of the sediment (DINET, 1973 ; DINET and VIVIER, 1977 ; SOETAERT *et al.*, 1991 ; THIEL, 1983 ; TIETJEN *et al.*, 1989). But also the sediment composition and the oxygen supply can change with the depth in the sediment and may have their impact on the vertical distribution of the taxa. A compact sediment in the deeper layers, for example, prevents larger nematodes from moving in the small interstitial spaces, while many species or even members of higher taxa (like the kinorhynchs and the harpacticoids) are bound to the oxic layers. In both stations along the Spanish coast the highest chl a values are found in the upper cm, while the RPD layer is situated at respectively 2 to 3 cm and 6 to 8 cm depth into the sediment. Although the oxygen supply to the deeper layers is better in station 10, there is no difference among both stations in the vertical distribution of the harpacticoids. The kinorhynchs, however, are present, although not abundant, in the deeper layers of station 10, while they are no longer found deeper than one cm in station 9.

The nematodes

The horizontal distribution of the mean individual biomass per station is often related to the sediment composition (MCINTYRE and MURISON, 1973 ; WARWICK, 1971 and WIESER, 1960) and the food supply (THIEL, 1979). According to WARWICK (1971) the mean nematode length is positively correlated with the median grain size within sandy sediments. The individual biomass of station 10 (0.191-1.679 µg dwt) lies within the range found in subtidal sediments (e.g. 0.085-2.46 µg dwt in the Voordelta (VANREUSEL, 1990)). In station 9, which is situated in a deeper area, the smaller biomass values (< 0.350 µg dwt) are more in accordance with the biomass values found in other areas of a similar depth (0.07-0.82 µg dwt on 40 to 580 m : in VIVIER, 1978 and WIGLEY and MCINTYRE, 1964), and even at larger depths (f.i. 0.48-0.94 µg dwt : in TIETJEN, 1984).

The vertical distribution of the individual biomass in both stations shows that especially the deeper sediment layers are characterized by higher biomass values. Based upon findings that nematodes are on the average three times smaller in the upper cm of a sandy bottom than in the next eight centimeters, JENSEN (1987) already suggested that the length/width ratio of thiobiotic species (= species associated with anoxic habitats) is significantly larger than those of oxybiotic species; this would be a functional adaptation of the thiobiotic species to the epidermal uptake of dissolved organic matter as an extra food source, and in relation to the minimal required oxygen uptake in such oxygen-poor habitats.

The total biomass in both stations along the Spanish coast (0.137-0.334 mg dwt/10 cm^2) is low in comparison to the biomass from most shallow subtidal areas (0.1-3.8 mg dwt/10 cm^2 : from HEIP *et al.*, 1985). Even compared to other deep-sea communities these values are not very high (0.01-0.32 mg dwt/10 cm^2 : from HEIP *et al.*, 1985). The low total biomass values are mainly due to the presence of small species, but also the densities are rather low in both stations.

Several of the dominant genera of the transition zone from the continental shelves to the deep-sea are also characteristic for the abyssal zone of the Gulf of Biscay (DINET and VIVIER, 1979). Here the genera *Minolaimus*, *Theristus*, *Halalaimus* and *Spiliphera* are dominant. SOETAERT (1983: in HEIP *et al.*, 1985) found that *Sabatieria*, *Halalaimus* and *Richtersia* are dominant genera in deeper areas of the Mediterranean. Other characteristic genera for the deep-sea such as *Acantholaimus*, *Leptolaimus* and *Sphaerolaimus* (DINET and VIVIER, 1979 ; TIETJEN, 1989) are present although not abundant along the Spanish coast.

In general the diversity in the deep-sea is significantly higher than the diversity in shallow waters. In most of the deeper areas (300 to 8000 m) 50 to 130 species are found per 10 cm^2 (DINET and VIVIER, 1979 ; TIETJEN, 1984, 1989 ; RUTGERS VANDERLOEFF and LAVALEYE, 1986 ; SOETAERT and HEIP, 1990). Diversity even seems to increase with depth (DINET and VIVIER, 1979). Thus the high diversity at the genus level along the Spanish coast is more in agreement with deep-sea situations than with the values found on the continental shelf. In shallow waters the species richness is rarely higher than 50 species per station (HEIP *et al.*, 1985).

Deep-sea nematode species also tend to be evenly distributed and only occasionally is a species dominant with more than 10 %. For the Spanish coast, and especially for station 10, the same tendency is observed already on the genus level, and can therefore be expected to be even more obvious on the species level.

CONCLUSIONS

A preliminary investigation of two stations in the shelf break area along the Spanish coast shows that the composition of the meiobenthos and especially the genus composition of the nematode communities is more similar to communities which are characteristic of the abyssal zones than to those from shallow areas. The low food supply is suggested as an important structuring factor, which discerns this area from the continental shelf.

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