

## The role of suprabenthic and epibenthic communities in the diet of a deepsea fish assemblage (Le Danois Bank, Cantabrian Sea, N Spain)

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## INTRODUCTION

In 2003 and 2004 two multidisciplinary surveys (ECOMARG Project) were carried out between 400 and 1000 m depths to study the benthic-demersal ecosystem of the Le Danois Bank (Figure 1), as well as the fish and crustacean trophic ecology (Serran ot al., 2005). Two depth intervals were identified: 400-700 m and 701-1000 m. The nine fish species under study were selected on the basis of their relative abundance and the composition of the deep-water demersal fish assemblages in the study area. The aim of this work was to analyse the feeding habits of these species and to determine possible shifts on diet composition between the two denth determine possible shifts on diet composition between the two depth intervals studied. A detailed taxonomic study of the most characteristic prey groups has been conducted in order to estimate the degree of predation on different benthic compartments: suprabenthic and epibenthic assemblages



Figure 1.- Study area showing the Le Danois Bank

## RESULTS AND DISCUSSION

Stomach contents of 602 specimens belonging to 9 deep-sea fish species Stomach contents of 602 specimens belonging to 9 deep-sea fish species (Table 1) were examined. Alepocephalus rostratus preyed mainly on the suprabenthic mysid Gnathophausia zoea, together with plankton prey such as scyphozoans and salps (Figure 2), whereas Chlorophthalmus agassizi fed on smaller prey, like copepods, fish larvae, amphipods, euphausids, mysids and chaetognaths among others. The macrourid Coryphaenoides rupestris was the most specialised predator with the lowest taxonomic diversity feeding mainly on copepods and the mysid G. zoea. The shark Deania calcea consumed a high proportion of ostheichthyes (68 %), while other sharks such as Emonterur sories and Gelaus malastronus fed hoth other sharks such as Etmopterus spinax and Galeus melastomus fed both other sharks such as *Etmopterus spinax* and *Galeus melastomus* fed both on suprabenthic prey and fish. Interestingly, euphausiids were the dominant prey ingested by *G. melastomus*. The species *Hoplostethus mediterraneus* consumed a high variety of amphipods, euphausiids and mysids, with a high prey diversity ( $H^{+} = 3.8$ ). However, the macrourid *Nezumia sclerorhynchus* was the predator with the highest taxonomic diversity ( $H^{+} = 4.9$ ) with a diet composition based on a great variety of amphipods, and endobenthic preys such as polychaetes. Finally, in *Trachyscorpia cristulata*, the crab *Geryon trispinosus* made up almost the 50 % of the diet. 50 % of the diet







 Table 1.- Diet composition (% Number) of the nine selected fish species. Only preys with more than 2% are shown. Intervals of depth analysed: A = 400-700 m, B = 701-1000 m. Abbreviations: Ale ros = Alepocephalus constratus; ChI aga = Chlorophthalmus agaszicii; Cor rup = Coryphaenoides rupestris; Dea cal = Deania calcea; Etm spi = Etmopterus spinax; Gal mel = Galeus melastomus; Hop med = Hoplostethus mediterraneus; Nez sci = Nezumia sclerorhynchus; Tra cri = Trachyscorpia cristulata.

Crustace         46.4         5.6         6.7         11.8         6.3.9         8.5.1         97.3         67.1         88.5           Geryon trippingeness         7.1         2.2         2.8         11.8         5.3         7.3         1.9           Acarthophyra pelagica         3.6         .         2.9         .         1.9           Pasiphaes multidenta         .         2.9         .         .         1.9           Sargia robusta         .         2.9         .	Prey taxon	Ale ros	Chl aga	Cor rup	Dea cal	Etm spi	Gal mel	Hop med	Nez scl	Tra cri	
Gervon triapinous         7.1         2.2         2.8         11.8         5.3         7.3         1.9           Acanthophyra pelapica         3.6         2.9         1.9         2.3         1.9           Pasiphaea multidentata         2.9         1.8         2.1         1.9           Systellasifies debilis         3.6         1.1         3.3         1.1         3.3           Systellasifies debilis         3.6         1.1         3.3         1.1         3.3           Exphausiacea         5.0         5.0         7.19         30.1         1.8         1.5         1.8         1.5         1.8         1.6         1.6         1.6         1.6         1.6         1.6         1.6         1.6         1.6         1.6         1.8         1.7         1.6         1.6         1.6         1.7         2.0         1.8         1.7         1.8         1.5         1.8         1.7         1.8         1.5         1.8         1.7         1.8         1.5         1.8         1.7         1.8         1.5         1.8         1.7         1.8         1.6         1.2         2.8         1.8         1.9         1.8         1.9         1.9         1.9         1.9	Crustacea	46.4	58.6	97.2	11.8	63.9	85.1	97.3	67.1	58.5	
Naturitia         7.1         2.2         2.8         11.8         5.3         7.3         1.9           Acarthapty pabligica         3.5         2.9         1.9           Pasiphaes multidentian         2.9         1.4         1.9           Sargia robusta         2.9         1.4         1.9           Sargia robusta         2.9         1.0         1.0           Systellispis debitis         3.6         1.1         3.3         1.1         3.3           Euphausiaces         6.5         3.5         1.5         1.7         4.55           Amphipos po         6.6         3.5         1.5         1.7         4.55           Amphipos po         1.6         3.2         1.6         3.2         1.6           Amphipos po         1.2         2.3         1.6         3.2         1.6           Paradiatica unid.         2.4         1.6         3.0         3.8         5.5         3.8           Borcomysis arcica         3.7         1.1         4.57         1.6         2.4         5.9         1.9           Mydiadeea unid.         5.5         1.4         5.6         1.9         3.1         3.1         3.1         3.1 <td< td=""><td>Geryon trispinosus</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>47.2</td></td<>	Geryon trispinosus									47.2	
Acamthaphyra pelagica         3.5         2.9         1.9           Natania unid.         2.9         2.3         1.9           Pasiphaea supp.         2.9         1.8         1.9           Systellarsi debilis         3.6         1.1         3.3           Euphausiscea         5.0         5.9.0         7.1.9         30.1           Euphausiscea         5.0         5.9.0         7.1.9         30.1         1.8           Euphausiscea unid.         7.7.9         5.9.7         27.4         1.8         1.5         1.9 <td< td=""><td>Natantia</td><td>7.1</td><td>2.2</td><td>2.8</td><td>11.8</td><td></td><td>5.3</td><td>7.3</td><td></td><td>1.9</td></td<>	Natantia	7.1	2.2	2.8	11.8		5.3	7.3		1.9	
Natinità unid.         2.9         -         1.9           Pasiphaea spittà debitis         3.6         1.1         - </td <td>Acanthephyra pelagica</td> <td>3.6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Acanthephyra pelagica	3.6									
Pasiphae anulifeanta         2.3         2.3           Pasiphae sopp.         5.9         1.8	Natantia unid.				2.9					1.9	
Psiphaesapp.         5.9         1.4           Syrglarbobsia         3.5         1.1         2.9         1.8           Euphausiscea         5.0         50.0         71.9         30.1           Euphausiscea         1.1         3.3         -         -           Meganyrüharse norvejce         1.7         24.6         1.5         17.8         45.5           Amphipoda         6.6         3.5         -         1.8         17.5         -           Amphipoda unid.         -         -         3.2         1.2         -         2.0         -           Paradilscidae unid.         -         -         3.2         1.6         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         -         2.0         -         2.0<	Pasiphaea multidentata							2.3			
Systellasis debilis         3.6         1.1	Pasiphaea spp.				5.9			1.4			
Sysellispis debits         3.6         1.1         5.0         50.0         50.0         15.0         7.19         30.1           Euphausisea         1.1         3.3         -         -         -         2.3         -	Sergia robusta				2.9		1.8				
Euphausiscea         5.0         5.0         7.13         30.1           Euphausiscea unid.	Systellaspis debilis	3.6	1.1								
implanetia sp.         1.1         3.3           Meganyrühanse norvejke         1.7         24.6         11.5         27.3         implanetiseea unid.           Ampeliposa         6.6         3.5         1.5         17.8         45.5           Ampeliposa         6.6         3.5         1.8         17.5         1.8         17.5           Amplipoda unid.         .         3.2         1.2         2.0         2.0           Paradisicidae unid.         .         3.2         1.2         2.0         2.0           Paradisicidae unid.         .         3.2         1.6         2.0         2.0         1.6         3.2         1.5         1.7.8         3.2         1.2         2.0         2.0         1.6         3.2         1.5	Euphausiacea		5.0			59.0	71.9	30.1			
Méganycifanes onvegica         1.7         24.6         11.5         2.3           Euphasissea unid.         27.9         57.7         27.4         57.7         27.4           Amphipoda         6.6         3.5         1.5         17.8         45.5         -           Amphipoda unid.         3.2         1.4         2.4         -         -         2.0           Paratiliscida unid.         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         2.0         -         1.0         2.0         -         1.0         2.0         -         1.0	Euphausia sp.		1.1			3.3					
Euphausiacea unid.         27.9         59.7         27.4           Amplipoda         6.6         3.5         1.5         17.8         45.5           Amplipoda unid.         3.2         1.2         2.0         2.0           Paradilscidae unid.         3.2         1.2         2.0         2.0           Paradilscidae unid.         3.2         1.6         3.2         1.6         2.0           Paradilscidae unid.         2.8         1.2         2.0         2.0         2.0         2.0           Mysidacea         3.5.7         5.0         51.2         1.6         3.2         1.9           Bareonnysis arctica         2.4         3.0         3.8         5.5         3.8           Bareonnysis schica         3.3         2.0         2.1         2.1         5.7         1.4           Bareonysis schica         3.3         2.0         2.1         5.6         1.4         5.1         1.8         1.5           Bareonysis schica         3.3         2.0         1.4         5.6         1.7         1.1         5.1         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5 <td< td=""><td>Meganyctifanes norvegica</td><td></td><td>1.7</td><td></td><td></td><td>24.6</td><td>11.5</td><td>2.3</td><td></td><td></td></td<>	Meganyctifanes norvegica		1.7			24.6	11.5	2.3			
Amplipoda         6.6         3.5         1.5         17.8         45.5           Amplipoda ind,         1.8         1.4         2.4           Amplipoda ind,         3.2         1.2         2.0           Paratialiscida unid,         3.2         2.0         2.0           Paratialiscida unid,         1.6         3.2         1.5         2.0           Paratialiscida unid,         1.6         3.0         3.8.8         5.5         3.8           Boreomysis arctica         2.4         1.2         2.3         1.1           Boreomysis arctica         2.3         1.2         2.3         1.1           Eucopi hanseni         3.3         2.0         1.1         8.6         1.9           Eucopi hanseni         3.3         2.0         1.4         8.6         1.9           Mysidacea unid,         5.3         1.4         8.6         1.9         1.4         8.6           Coppado Calanolota         3.6         3.3         1.77         11.5         1.3         1.8         1.5           Caphalopoda         3.6         3.3         1.77         11.5         1.5         1.8         1.8         1.8         1.7           Ca	Euphausiacea unid.					27.9	59.7	27.4			
Ambjops sp         1.8         17.5           Ambjops sp         1.4         2.4           Ambjops sp         3.2         1.2           Laeransohlis uberzeitus         2.9         2.9           Parataliscidae unid.         2.8         3.2         1.6           Mysidacea         3.5.7         5.0         51.2         1.6         3.2         1.9           Baroconysis arcica         2.4         3.0         3.8         5.5         3.8           Baroconysis scie         2.4         3.2         1.9         3.2         1.9           Baroconysis scie         3.3         2.0         2.1         2.4         5.9         1.1           Eurocopa hanseni         3.3         2.0         2.1         5.9         1.4         5.6         1.8         5.7         1.6         3.6         3.7         3.7         1.5         1.8         5.7         1.6         3.8         3.7         3.7         1.1         5.7         1.4         3.1         5.0         5.7         1.4         3.1         5.6         5.7         3.6         3.7         3.7         1.1.8         3.9         5.7         3.6         5.7         3.6         5.7         3.6 <td>Amphipoda</td> <td></td> <td>6.6</td> <td>3.5</td> <td></td> <td></td> <td>1.5</td> <td>17.8</td> <td>45.5</td> <td></td>	Amphipoda		6.6	3.5			1.5	17.8	45.5		
Amplipos sp       1.4       2.4         Amplipoda unid.       3.2       1.2         Laternatophilus tuberculatus       2.9       2.9         Paradialscida unid.       1.6       3.2       2.8         Hyperidas       2.8       1.2       2.9         Mysidacea       3.5       5.0       51.2       1.6       3.0       38.8       5.5       3.8         Boreconrysis arctica       2.4       2.3       1.2       2.3       1.9         Eucopia hanseni       3.3       2.0       1.1       8.6       1.9         Boreconrysis arctica       3.3       2.0       1.1       8.6       1.9         Septomysis arctica       3.3       2.0       1.1       8.6       1.9         Boreconrysis arctica       3.3       2.0       1.4       8.6       1.9         Septoda       3.5       3.3       1.7       1.5       5.5       1.8       1.9         Carchalopoda       3.6       3.3       1.7.7       11.5       1.3       1.8       1.8         Carphalopoda       3.6       3.3       1.7.7       11.5       1.3       1.8       1.8       1.9         Carphalopoda unid.	Ampelisca sp							1.8	17.5		
Applipoda unid.         3.2         1.2           Laermatophiku tubarculatus         2.9         2.9           Paradaliscidas unid.         2.8         2.9           Paradaliscidas unid.         2.8         1.2           Mysidacea         3.5.7         5.0         5.12         1.6         5.8           Boreomysis actica         2.4         3.0         3.8.8         5.5         3.8           Boreomysis stop.         1.2         2.1         5.9         1.2         5.9         1.2           Europia hanseni         3.3         2.0         2.1         5.9         1.2         5.9         1.2         5.9         1.2         5.9         1.4         5.6         1.8         5.9         1.2         5.9         1.4         5.6         5.7         1.6         2.4         5.9         1.8         5.9         1.8         5.9         1.8         5.9         1.4         5.1         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8         1.5         1.8 <td>Amblyops sp</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1.4</td> <td>2.4</td> <td></td>	Amblyops sp							1.4	2.4		
Ladramic philus interculatus         20           Paradialiscida unid.         23         16         29           Hyperidale         28         12         16         32         35         38           Boreconvysis spr.         1.2         2.3         1.8         18         19           Boreconvysis spr.         1.2         2.3         1.9         1.9         1.9           Boreconvysis spr.         1.2         2.3         1.9         1	Amphipoda unid.							3.2	1.2		
Paralisicidae unid.         2.9           Pseudorino houvieri         1.6         3.2         1.6           Mysidaces         3.5.7         5.5         1.6         3.2         1.9           Boreomysis sectica         2.4         3.0         3.8.6         5.5         3.8           Boreomysis sectica         2.4         2.3         1.9         3.2         1.2         2.3         1.9           Europia hanseni         3.3         2.0         2.4         5.9         1.4         5.6         1.8         5.9         1.2         2.4         5.9         1.6         5.9         1.6         5.9         1.6         5.9         1.6         5.9         1.6         5.9         1.6         5.9         1.4         5.1         3.1         5.0         1.8         5.0         1.4         5.1         3.1         5.0	Laetmatophilus tuberculatus								2.0		
Pseudotion bouveri         1.6         3.2         1.6         3.2           Hyperidae         2.8         1.2         3.8         5.5         3.8           Boreomysis serica         2.4         3.2         3.2         3.8           Boreomysis serica         2.4         3.2         1.2         2.3         1.9           Bureomysis serica         3.7         1.1         457         1.6         2.4         5.9         1.9           Mysidacea unid.         5.9         1.4         5.6         1.9           Anthuridae         5.5         1.4         5.6         1.9           Coppoda Calonolea         3.8.7         3.2         7.7         11.5         1.5         1.8         1.5         1.4         3.6         1.9           Obtraceda Cypridmidie         3.6         3.3         17.7         11.5         1.5         1.8         1.5         1.5         1.8         1.5         1.5         1.8         1.5         1.6         1.6         1.6         1.6         1.6         1.8         1.6         1.5         1.5         1.8         1.5         1.5         1.5         1.8         1.5         1.5         1.5         1.6         1.6	Pardaliscidae unid.								2.9		
Hypericide         2.8         12           Mysidaces         35.7         55.0         51.2         1.6         3.0         38.8         5.5         3.8           Boreomysis step.         1.2         2.4         3.0         3.2         1.9           Boreomysis step.         1.2         2.3         1.9           Boreomysis step.         3.3         2.0         2.1         5.0         5.1         1.6         5.0         1.1         5.7         1.6         2.4         5.9         1.4         5.6         1.4         5.6         1.4         5.6         1.4         5.6         7.8         7.	Pseudotiron bouvieri			1.6				3.2	1.6		
Imposizing and the second se	Hyperiidae		2.8				1.2				
bronomysis arctica         2.4         3.2         19           Boronomysis spp.         1.2         2.3         19           Boronomysis spp.         3.3         2.0         12         2.3         19           Granshophusia zoa         35.7         1.1         45.7         1.6         2.4         5.9         1.9           Granshophusia zoa         35.7         1.1         45.7         1.6         2.4         5.9         1.4         5.6         1.4         5.6         2.5         1.4         5.6         2.7         2.6         3.7         2.6         3.7         2.6         3.7         2.6         3.7         2.6         3.7         2.6         3.7         2.6         3.7	Mysidacea	35.7	5.0	51.2		1.6	3.0	38.8	5.5	3.8	
Berronnysis spp.         1.2         2.3         1.7           Europia hanseni         3.3         2.0	Boreomysis arctica			2.4				3.2		1.9	
Europia hanseni         3.3         2.0	Boreomysis spp.			1.2				2.3			
Cambrabausia zona         35.7         1.1         45.7         1.6         2.4         5.8         1.9           Mysidaces unid.         5.9         1.4         9.6         1.9           Anthuridas         5.9         1.4         9.6         1.9           Cappoda Calanoides         3.8.7         2.7         2.9           Eurocop ar/maldii         5.5         1.4         3.1         5.0           Coppoda Calanoides         3.8         1.7.7         11.5         1.3         1.8         5.0           Ostracota Cypridinida         3.6         3.3         17.7         11.5         1.3         1.8         5.0           Sepicifida unid.         2.9         6.6         5.5         5.0         5.0         5.0           Caphalopoda unid.         11.8         4.9         5.0         5.0         5.0         5.0           Calanoice sagitatus         2.9         6.6         5.7         1.4         5.0         5.0           Caphalopoda unid.         11.8         4.9         5.0         5.0         5.0         5.0           Calanoice philicontris         3.6         1.7         1.6         2.9         1.4         5.0	Eucopia hanseni		3.3	2.0							
Mysidaces unid.         Lin.         Lin.         Lin.         Lin.         Zin.         Zin. <thzin.< th="">         Zin.         Zin.</thzin.<>	Gnathonhausia zoea	357	11	45.7		16	24	59		19	
Isopoda         5.9         I.4         9.6         1.9           Anthuridae         5.5         1.4         2.3         2.3           Eurocop ar/maldii         5.5         1.4         3.1         2.3           Ostracoda Cyridinidae         3.6         3.3         17.7         11.5         1.3         1.8         -           Obliusac Cephalopoda         3.6         3.3         17.7         11.5         1.3         1.8         -         -           Sepiolidae unid.         2.9         6.6         -	Mysidacea unid	00.1						25.1			
Anthuridae         Int         2.3         Int         2.3           Eurycope (mindiff         5.5         1.4         3.1         5           Coppopola Calancidea         3.8.7         32.7         1.4         3.1         5           Coppopola Calancidea         3.6         3.3         17.7         11.5         1.5         1.8         5           Mollusa Caphalopota         3.6         3.3         17.7         11.5         1.5         1.3         1.8         5           Caphalopoda unid.         2.8         2.9         6.6         5         7           Cophalopoda unid.         1.7         1.6         2.9         6.6         5.7           Caternorico pola unid.         1.7         1.6         2.9         2.6         5.7           Annelida Polychaeta         3.6         1.7         1.6         2.9         2.4         3.8           Anelida Polychaeta         3.6         1.7         1.6         2.9         2.4         3.5           Anelida Polychaeta         3.6         1.7         1.6         2.9         3.8         3.2         1.4         5.7           Laetemolico philiconica sop.         2.9         1.4         3.7	Isonoda			59				1.4	9.6	19	
Eurocos grimatóli         5.5         1.4         3.1           Corpegota Calanolas         3.8         3.2.7         1.1.8         3.1           Ostracoda Opridinidae         3.6         3.3         17.7         11.5         1.3         1.8         -           Ostracoda Opridinidae         3.6         3.3         17.7         11.5         1.3         1.8         -         -           Sepiolidae unid.         2.8         -         1.5         1.3         1.8         - <td< td=""><td>Anthuridae</td><td></td><td></td><td>0.0</td><td></td><td></td><td></td><td></td><td>2.0</td><td></td></td<>	Anthuridae			0.0					2.0		
Coppyoint Calamoides         38.7         32.7         1.4         3.1           Ostraccd Cypindingeo         3.6         3.3         17.7         11.5         1.5         1.8         -         -           Caphalopoda         3.6         3.3         17.7         11.5         1.5         1.3         1.8         -         -           Caphalopoda         3.6         3.3         17.7         11.5         1.3         1.8         -	Eurocopo grimaldii			5.5				1.4	2.0		
Oprificition         3.6         3.1         1.1         1.3         1.1           Molluss Oprificition         3.6         3.3         17.7         11.5         1.5         1.8         -           Molluss Oprificition         3.6         3.3         17.7         11.5         1.5         1.8         -         -           Sepiolida unid.         2.8         2.9         - <td< td=""><td>Cononoda Calanoidoa</td><td></td><td>29.7</td><td>22.7</td><td></td><td></td><td></td><td>1.4</td><td>2.1</td><td></td></td<>	Cononoda Calanoidoa		29.7	22.7				1.4	2.1		
Mollass Caphalapoda         3.6         3.3         17.7         11.5         1.5         1.8           Caphalapoda         3.6         3.3         17.7         11.5         1.3         1.8           Caphalapoda         3.6         3.3         17.7         11.5         1.3         1.8           Caphalapoda unid.         2.8         -         -         1.8         4.9         -           Caphalapoda unid.         1.8         4.9         -         -         2.6         -         -         2.6         -         -         2.6         -         -         -         2.6         -         -         2.6         -         -         2.6         5.7         -         -         2.6         5.7         -         -         2.6         5.7         -         -         2.8         -         -         3.8         -         -         3.8         -         -         3.8         -         -         3.8         -         -         3.8         -         -         -         3.8         -         1.9         -         -         -         -         3.8         -         -         -         -         -         1.1         <	Oetracoda Cupridinidao	26	30.7	32.1					3.1		
Montack Separatopola         3.8         3.3         1.7         1.13         1.3         1.3         1.3           Cephalopoda         3.6         3.5         1.7         11.5         1.3         1.8	Mollurca Conhalonoda	3.0			47.7	44.5	4.5	4.0			
Besploitas unid.         3.5         1.13	Conhalopoda	3.0	3.3		17.7	11.5	1.3	1.0			
Anoderodes supjitatus         2.9           Histionoutinis process         2.9         6.6	Soniolidao unid	5.0	2.0			11.5	1.5	1.0			
Interface         2.3         6.6           Histificativits reversa         2.9         6.6           Caphalopoda unid.         11.8         4.9           Changhopoda unid.         17.9         2           Camphopota         3.6         3           Aphrodibles unid.         1.7         2.6           Aphrodibles unid.         1.7         2.4           Nephrys so.         3.8         3.8           Hydinoceis pphilloromis         3.6         2.9         3.8           Hydinoceis pphilloromis         3.7         3.9         3.8           Hydinoceis pphilloromis         1.7         3.9         3.1           Tanicata Salpide         14.3         5.7         3.8           Hydinoceis pphilloromis pphilloromis pphilloromis pphilloromis during the state of t	Todarodos sadittatus		2.0		20						
Caphalapoda unid.         La         La         La           Canophangoda unid.         17.9	Vistiotouthic rovorca				2.0	6.6					
Chaptanghota         17.9         17.0         15.0	Conholopoda unid				2.9	4.0					
Champing Inclusion         1.3           Anneliza Porticinational S. S.         3.5         2.9         2.6.6         5.7           Anneliza Porticinational S. S.         3.6         2.9         1.4         5.7           Approxibiliza unid.         3.6         7.7         2.9         3.8           Approxibiliza unid.         1.7         5.7         3.8         3.8           Mainto Sapp.         1.7         5.7         3.8         3.8           Multical Sappilotica Sapp.         3.6         7.1         2.4         3.8           Tunicata Salpida         1.3.7         5.0         7.1         2.1         5.21           Pisoso         7.1         2.54         6.7.7         2.3.0         12.1         5.21           Pisoso         7.1         2.54         6.7.7         2.3.0         12.1         5.21           Pisoso         7.1         2.5         6.7.7         2.3.0         12.1         5.21           Pisoso         7.1         2.2         5.9         5.5         5.5         5.5           Gonostomaspp.         2.2         5.9         5.6         5.5         5.5           Stemoptychidae         3.6         1.7         <	Cephalopoda unid.	17.0			11.0	4.9					
Campons         3.3	Ctenenhora	2.0									
Animital rolycitalistical         3.3         1.7         1.3         2.3         2.4         5.7           Latermonic pullicorulis         3.6         1.7         1.3         2.3         3.8           Animital rolycitalistic unid.         1.7         2.4         5.7         3.8           Mydiolisop         1.7         1.7         2.4         5.7           Echinodermata         1.7         1.8         3.8           Tunicata Salpidae         14.3         1.7         1.7         3.8           Tunicata Salpidae         14.3         1.7         1.7         3.8           Tunicata Salpidae         14.3         1.7         1.2.1         2.2.1           Chastographia         5.0         12.1         2.2.1         1.9           Piscos         7.1         2.5         4.67.7         2.3.0         12.1         2.2.1           Alepocephalidae unid.         3.9         2.9         1.9         4.3         1.9         1.9           Gonostomaspp.         2.2         5.9         5.6         1.1         1.9           Stemotypychidae         3.6         1.7         2.9         3.5         1.9           Stemotypychidae         3.6	Annelide Rehebests	3.0	4.7		2.0				26.6	57	
Learnomic pumicroms         3.0         2.9         1.4         5.7           Aphrodible wind,         1.7	Annenda Polychaeta	3.0	1.7	1.0	2.9				20.0	5.7	
Approbabilize unit         1,7         2.4         3.8           Methrys s         19.7         3.9         3.9           Echic as spp.         14.3         1.7         3.9           Tunicata Salitation         5.0         7.1         2.1         3.2           Pisces         7.1         2.5.4         67.7         23.0         12.1         32.1           Chartographia         5.0         7.1         2.5.4         67.7         23.0         12.1         32.1           Pisces         7.1         2.5.4         67.7         2.3.0         12.1         32.1           Micromesistius portassou         17.7         9.8         4.3         1.9           Micromesistius portassou         17.7         9.8         4.3         1.9           Micromosistius portassou         2.2         5.9         5         5           Gonostomaspo,         2.2.9         2.9         5         5         5           Stemotypychidae         3.6         1.7         2.9         33         119         34         5         5.5           Stemotypychidae         3.6         1.7         2.9         33         119         34         5         5.5 </td <td>Laeunonice princornis</td> <td>3.0</td> <td></td> <td></td> <td>2.9</td> <td></td> <td></td> <td></td> <td>1.4</td> <td>5.7</td>	Laeunonice princornis	3.0			2.9				1.4	5.7	
Magnity's BD.         3.8           Hyalinoscia Spp.         3.9           Echinodermata         3.9           Tunicata Subjidie         14.3         1.7           Chaetographita         5.0           Pisces         7.1         25.4         67.7         23.0         12.1         3.2           Alepocephalidae unid.         5.0         8.8	Aphroditidae unid.		1.7						2.4		
nyannoecia spp.         13.7           Tanicata Sapida         14.3         1.7         3.9           Tanicata Sapida         14.3         1.7         3.9           Chardognatha         5.0         12.1         3.2           Pisces         7.1         25.4         67.7         23.0         12.1         3.2           Pisces         7.1         25.4         67.7         23.0         12.1         3.2           Algocophalidas unid.         3.6         8.8	Nephtys sp.									3.8	
Decimical solution         3.9           Charlographia         14.3         1.7           Charlographia         5.0           Pisces         7.1         25.4         67.7         23.0         12.1         32.1           Argrocephalidiae unid.         5.0         8.8	Hyalinoecia spp.								19.7		
Linicata Salpida         1.7           Chardognaha         5.0           Pisces         7.1         25.4         67.7         23.0         12.1         32.1           Argyrophicots spin.         3.6         8         8         1.9           Miscopothicots quint.         8.8         1.9         1.1         9.8         1.9           Miscopothicots quint.         2.2         5.9         1.1         9.8         1.9           Miscopothicots point.         2.2         5.9         1.1         1.9         1.9           Miscopothicatio pointssou         2.1         1.1         9.8         1.9         1.9           Miscopothicatio pointssou         2.9         2.9         1.0         1.0         1.0         1.0           Scombors sopn.         2.2.9         2.9         5.0         9.4         1.0 <td< td=""><td>Echinodermata</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3.9</td><td></td></td<>	Echinodermata								3.9		
Chaetographina         5.0           Pisces         7.1         254         67.7         23.0         12.1         32.1           Alepcochpalidiae unid.         8.8         -         -         -         -           Micromeistitus portassou         17.7         9.8         4.3         -         1.9           Micromotoidei         6.1         11.8         -         -         -         -           Diaphus spp.         2.2         5.9         -	Tunicata Saipidae	14.3	1.7								
Press         1.1         25.4         0 / / / 2.0         1.2.1         3.2.1           Argyropheticus spp.         3.6         8.8	Disess		5.0		67 7		40.4			22.6	
Algocophilida unil.         3.6           Algocophilida unil.         8.8         1.19           Micromeistius portassou         17.7         9.8         4.3         1.9           Micromeistius portassou         6.1         11.8         1.9         1.9           Diaphus spp.         2.2         5.9         5         5         5           Gonostoms spp.         2.9         5         5         5         9.4           Sternoptychilde         3.6         1.7         5         9.4         5           Sternoptychilde         3.6         1.7         5         9.4         5         5           Stomabs with food         16.0         10         17         25         29         33         119         34         35         15           Empty stomachs         44         0         2         52         32         26         27         8         53           Depth         B         B         B         A         B         A         B         A         A         A         39         66         15           Tomach with food         11         35         22         15         13         54         39<	FISCES	7.1	25.4		67.7	23.0	12.1			32.1	
Mepocepriatrate runo.         8.8           Micromesistius portassou         17.7         9.8         4.3         1.9           Micromesistius portassou         6.1         11.8         1.9         1.9           Diaphus spp.         2.2         5.9         5         5         5         5           Gonostoma spp.         2.9         2.9         5 <td>Argyropeiecus spp.</td> <td>3.6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Argyropeiecus spp.	3.6									
micromessuus pourassou         17.7         9.8         4.3         1.9           Micropholdei         6.1         11.8         1.9         1.0	Alepocephalidae unid.				8.8						
mycoprovova         6.1         11.8           Diaphus spp.         2.2         5.9           Gonostoma spp.         2.9         5           Scomber scombrus         2.9         5           Symphobanchus kaupit         9         2.9           Stomiss boa         2.9         5           Ostheichthyse         3.6         1.7           Stomiss boa         2.9         5           Ostheichthyse unid.         3.6         1.1           Stomash with food         19         17         25         29         33         119         34         35         35           Empty stomachs         44         0         2         52         23         2.6         27         8         53           Depth         B         A         B         A, B	micromesistius poutassou		<i>c</i> .		17.7	9.8	4.3			1.9	
Deputus spp.         2.2         5.9           Gonostoms spp.         2.9	myctophoidei		6.1		11.8						
Constants spp.         2.9           Myctopholde unid.         3.9         2.9           Scomber scombrus         2.9	Diapnus spp.		2.2		5.9						
mycopnolosi unio.         3.9         2.9           Scomber scombrus         2.9         9.4           Sternoptychiade         3.6         1.7         9.4           Stomaks boa         2.9         5         9.4           Sternoptychiade         3.6         1.7         2.9           Fish larvo         2.9         3.3         119         3.4         35         35           Stomaks with food         19         17         25         2.9         33         119         34         35         35           Empty stomachs         44         0         2         52         32         26         27         8         53           Depth         B         A         B         A, B <td>Gonostoma spp.</td> <td></td> <td></td> <td></td> <td>2.9</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Gonostoma spp.				2.9						
Scontop scontors         2.9           Synaphobanchus kaupi	myctopnoidei unid.		3.9		2.9						
9.4           Sternoptychiade         3.6         1.7           Sternoptychiade         3.6         1.7           Sternoptychiade         16.0           Otherichtyse und.         3.6         1.1         2.9         3.3         119         3.6         5.5           Standark with food         19         17         25         2.9         33         19         3.6         5.5           Empty stomachs         44         0         2.9         33         19         3.6         5.5           Empty stomachs         44         0         2.6         2.6         2.6         3.6         3.6         5.6         5.5           Colspan="6">10         2.6         2.6         2.6         2.6         3.6         3.6         3.6 <th co<="" td=""><td>Scomber scombrus</td><td></td><td></td><td></td><td>2.9</td><td></td><td></td><td></td><td></td><td></td></th>	<td>Scomber scombrus</td> <td></td> <td></td> <td></td> <td>2.9</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Scomber scombrus				2.9					
Sternoptychidae         3.6         1.7           Stomias boa         2.9           Fish larvae         16.0           Ostheichthysunki         3.6         1.1         22.5         9.8         5.6         15.1           Stomashs with food         19         17         25         29         33         119         34         35         35           Empty stomachs         44         0         2         52         32         28         27         8         53           Depth         B         A         B         A, B	Synaphobranchus kaupii									9.4	
Stormas Doa         2.9           Fish larves         16.0           Otshichthyse unkl.         3.6           1.1         23.5           9.8         5.6           550machs with food         19           19         17         25           29         33         119         34           35         35           25         32         26         27           30         34         0         2         52           30         19         34         8         8           Depth         B         A         B         A           Number of taxa         11         35         25         15         33         54         39         66         15           Trophic diversity (H)         2.8         35         2.4         3.0         2.6         3.8         4.9         2.7	Sternoptychidae	3.6	1.7								
Isin larvage         16,0           Ostheichthyse sunid.         3.6         1.1         23.5         9.8         5.6         15.1           Stomachs with food         19         17         25         29         33         119         3.4         35           Empty stomachs         44         0         2         52         32         26         27         8         53           Depth         B         A         B         A, B	Stomias boa				2.9						
Optimicritityise unio.         3.6         1.1         23.5         8.8         5.6         15.1           Stomachs with food         19         17         25         29         33         119         34         35         35           Empty stomachs         44         0         2         52         32         26         27         8         53           Depth         B         A         B         B         B         A         B         B         B         A         B         S         S         S         S         S         S         S         S	rish larvae		16.0								
Stomachs with food         19         17         25         29         33         119         34         35           Empty stomachs         44         0         2         52         32         26         27         8         53           Depth         B         A         B         A,	Ostheichthyes unid.	3.6	1.1		23.5	9.8	5.6			15.1	
Empty stomachs         44         0         2         52         32         26         27         8         53           Depth         B         B         A         B         B         A         B         A         B         A         A         A         B         A         A         A         B         A         A         A         B         A <td>Stomachs with food</td> <td>19</td> <td>17</td> <td>25</td> <td>29</td> <td>33</td> <td>119</td> <td>34</td> <td>35</td> <td>35</td>	Stomachs with food	19	17	25	29	33	119	34	35	35	
Depth         B         A         B         A, B <td>Empty stomachs</td> <td>44</td> <td>0</td> <td>2</td> <td>52</td> <td>32</td> <td>26</td> <td>27</td> <td>8</td> <td>53</td>	Empty stomachs	44	0	2	52	32	26	27	8	53	
Number of taxa         11         35         25         15         13         54         39         86         15           Trophic diversity (H')         2.8         3.5         2.4         3.4         3.0         2.6         3.8         4.9         2.7	Depth	в	A	В	А, В	A	А, В	А, В	А, В	Α, Β	
Trophic diversity (H') 2.8 3.5 2.4 3.4 3.0 2.6 3.8 4.9 2.7	Number of taxa	11	35	25	15	13	54	39	86	15	
	Trophic diversity (H')	2.8	3.5	2.4	3.4	3.0	2.6	3.8	4.9	2.7	



Euphausiacea and Mysidacea appeared to be the only positively selected prey, whereas the rest of the taxa were negatively selected (Figure 4). Regarding epibenthic communities, the Ivlev index was positive for Polychaeta, Crustacea, Echinodermata and Pisces and negative for Porifera, Mollusca and Brachiopoda (Figure 5). The main reason is due to the high densities in the environment of the sponge *Pheronema grayi*, the bivalve *Limopsis aurita* and the brachiopod *Gryphus* vitreus. The predators selected did not use all these prey as a food resource. selected prev, whereas the rest of the taxa were negatively

When analyse the relationships between the abundance in the stomachs and in the environment, we found a negative correlation (p< 0.05) for the Amphipoda (Figure 6). No significant correlations were found for the rest of suprabenthic taxa. However, concerning epibenthic communities, significant correlations were found for polychaetes, crustaceans and fishes, the first two being positively correlated and the latter negatively correlated (Figure 7). The main discrepancies found were due to the methodology used, because the beam trawl appeared to be a good sampler for some taxa (polychaetes and crustaceans), but not for fish

MATERIALS AND METHODS

A total of 602 stomach contents of 9 demersal deep fish species were analysed. Quantitative diet estimation was A total of 602 stomach contents of 9 demensial deep rish species were analysed. Quantitative diet estimation was obtained for the main fish species present in the bank, sampled using a Porcupine baca trawl. A suprabenthic sledge and a beam trawl were used to study suprabenthic and and a beam traw were executed study supracentine and epibenthic communities, respectively. In the present study the stomach content analysis was based on prey number, as percentage abundance (%M). Suprabenthos abundance is given in individuals/100m<sup>2</sup> and epibenthos in individuals/haul. Only stomachs with food have been taken into account. Prey were separated and identified to species level whenever percentage. between the fish-depth groups. SIMPER analysis was used to identify the previous the state in th between the groups resulting from the hierarchical analysis.

The relevance of the suprabenthic and epibenthic communities in the diet of demersal fish species was examined by comparing stomach content data with their abundance in the environment. To evaluate the degree to which the suprabenthic and epibenthic communities were selected in favour of other prey we used the lvlev index.



Figure 3.- Dendrogram of fish-depth groups based on Bray-Curtis similarity of prey number. Taxa below contain species that contribute most to the similarity of two groups according to the SIMPER analysis. Abbreviations and depth intervals are given in Table 1.

The cluster analysis of prey affinities between fish-depth groups (Figure 3) depicted two major blocks: one consisting of fish species mainly feeding on suprabenthic prey (group I: *C. agassizii, C. rupestris, H. mediterraneus, N. sclerorhynchus*); the other consisting of fish preving on ostheichthyes, cephalopoda and a variety of decapod crustaceans (group II: *D. calcea, E. spinax, G. melastomus, T. cristulata*). SIMPER analysis revealed that Calanoid copepods, *Pseudotiron bouvieri*, *Nicippe tumida* and *Boreomysis arctica* contributed most to the similarity of group I. By contrast, unidentified ostheichthyes, *Micromesistius* poutassou, cephalopods and unidentified Natantia were prey (on average larger in size to those characterizing group I) most contributing to the similarity of group II.



Figure 7.- Relationships between % N of the m epibenthic groups in the stomachs and in the environmen = Spearman rank correlation). Points represent each haul

Figure 5- Comparison between advincance of the main epibenthic groups in the stomachs and in the environment. Numbers show the lvlev index. POR = Porifera, CNI = Cnidaria, POL = Polychaeta, MOL = Mollusca, CRU = Crustacea, BRA = Brachiopoda, ECH = Echinodermata, FISH = Piccoc Pisces

Figure 5.- Comparison between abundance

Mysidacea TAN

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Cumacea

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MADURELL, T. and J.E. CARTES (2004) Temporal changes in feeding habits and daily rations of Hoplostethus mediterraneus in the bathyal Ionian Sea (eastern Mediterranean). Mar. Biol. 146, 951-962. - SERRANO, A. et al. (2003). Macrobenthic crustaceans in the diet of demersal fish in the Bay of Biscay in relation to abundance in the environment. Sarsia 88, 36-48. - SERRANO, A. et al. (2005) ECOMARG Project: A multidisciplinary study of Le Danois Bank (Cantabrian Sea, N Spain). ICES CM 2005/P:11.

