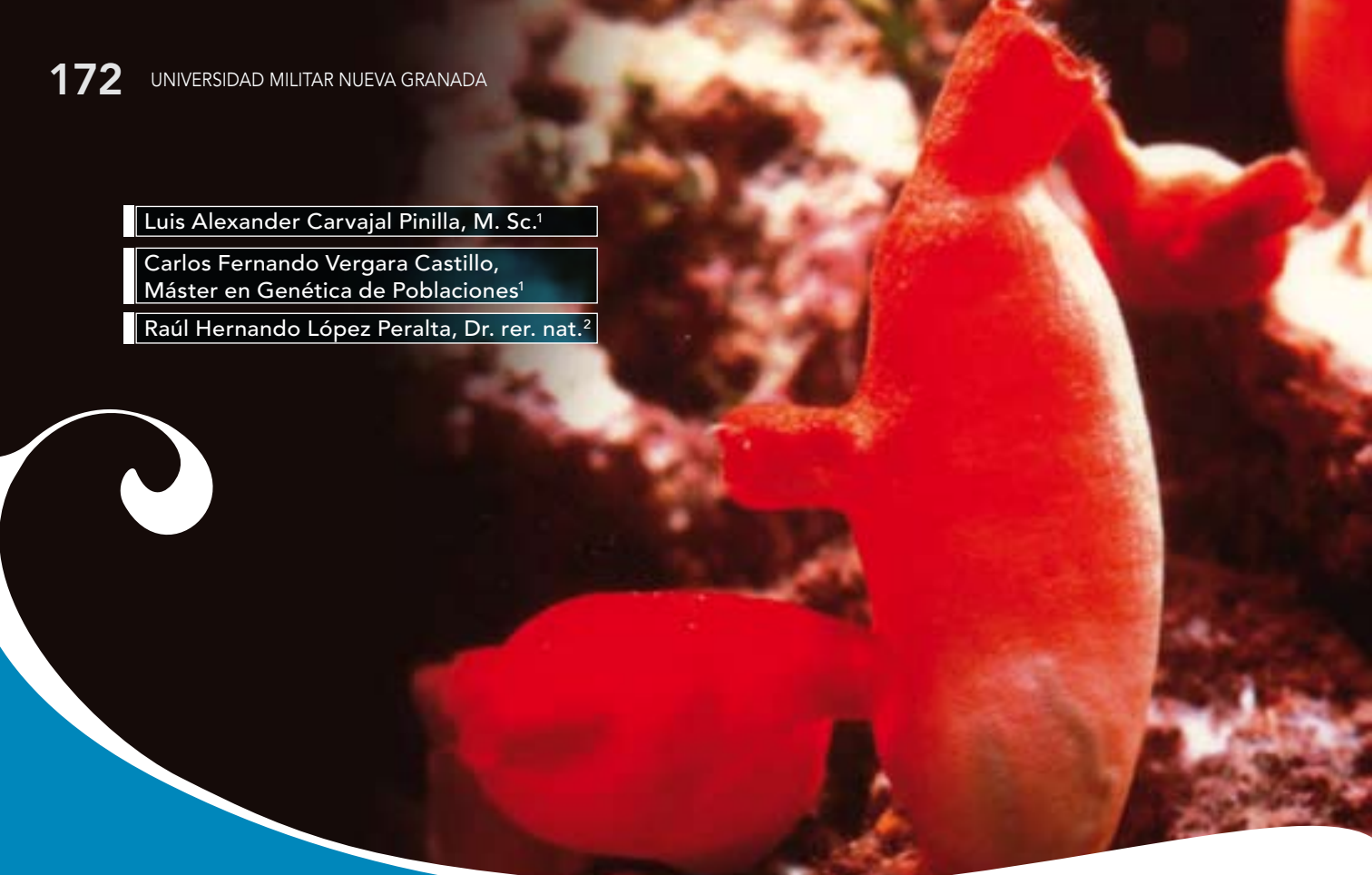


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# CHAETOGNATHA, THALIACEA, EUPHAUSIACEA AND PELAGIC POLYCHAETA IN THE COLOMBIAN PACIFIC OCEAN DURING TWO PERIODS IN 1996 (LA NIÑA) AND TWO PERIODS IN 1997 (EL NIÑO)

CHAETOGNATHA, THALIACEA, EUPHAUSIACEA Y POLYCHAETA PELÁGICOS  
EN EL OCÉANO PACÍFICO COLOMBIANO DURANTE DOS PERIODOS EN 1996  
(LA NIÑA) Y DOS PERIODOS EN 1997 (EL NIÑO)

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## RESUMEN

La distribución y abundancia de cuatro grupos zooplanctónicos fue evaluada durante los periodos junio & octubre de 1996 (La Niña: LN) y mayo & diciembre de 1997 (El Niño: EN). Su orden de abundancia fue: Chaetognatos, taliáceos, eufaúsidos y poliquetos planctónicos. Los géneros más importantes fueron: *Sagitta* (Chaetognatha), *Thalia* y *Weelia* (Thaliacea), *Euphausia* (Euphasiacea), y *Maupasias coeca*, *M. isochaeta*, *Plotohormis capitata* y *Vanadis crystallina* (Polychaeta). Dentro de los chaetognatos, *Eukrohnia* es el primer reporte para el Océano Pacífico Colombiano. La distribución espacial de los cuatro grupos muy probablemente estuvo asociada con la dinámica hidrológica, en especial en áreas donde ocurrieron procesos de fertilización. LN 1996 ofreció mejores condiciones para el desarrollo de los grupos estudiados, especialmente en octubre. Su marcada disminución en 1997 es explicada por el aumento de la temperatura ocasionado por EN.

**Palabras clave:** Zooplancton, El Niño, La Niña, Pacífico colombiano.

## ABSTRACT

The distribution and abundance of four zooplanktonic groups were evaluated over the periods June and October 1996 (La Niña: LN) and May and December 1997 (El Niño: EN). Their order of abundance was: chaetognaths, thaliaceans, euphausiids and planktonic polychaetes. The most important genera were: *Sagitta* (Chaetognatha), *Thalia* and *Weelia* (Thaliacea), *Euphausia* (Euphasiacea), and *Maupasias coeca*,

*M. isochaeta*, *Plotohormis capitata*, and *Vanadis crystallina* (Polychaeta). Within chaetognaths, *Eukrohnia* is the first report for the Colombian Pacific. The spatial distribution of the four groups most likely was associated with hydrological dynamics, especially in areas where fertilization processes took place. LN 1996 offered better conditions for the development of all groups especially in October. Their marked diminish in 1997 is explained by the increase of temperature caused by EN.

**Key words:** Zooplankton, El Niño, La Niña, Colombian Pacific.

## INTRODUCTION

Zooplankton is very important in all marine ecosystems because it acts as a connector between phytoplankton and higher trophic levels in the food web. Knowledge about plankton dynamics contributes significantly to the characterization of water masses, since many species are useful as indicators, and it is also an integral part of assessment and management of fisheries (Gajbhiye, 2002). Zooplankton also plays a very significant role in carbon cycle in the ocean (Makio, 2005).

This paper is based on Carvajal (1999) and Vergara (1999) and contributes to enlarging the scope of zooplankton research in Colombia. Moreover it gets even more relevant in that it considers part of the strongest El Niño event of the past century (McPhaden, 1999; Trasviña *et al.*, 1999; Morales y Brugnoli, 2001), with a very high impact in Colombia (Camacho, 1998; Medina, 1998; CCCP, 2002; IDEAM, 2002). The main objectives of this research are to give taxonomic information and

to evaluate some data related with the distribution and abundance of chaetognaths, thaliaceans, euphausiids and planktonic polychaetes, found in the Colombian Pacific Ocean. The importance of these organisms could be summarized as follows:

Chaetognaths (Phylum Chaetognatha, Orders Phragmophora and Apheragmophora) (Brusca y Brusca, 2003) are voracious predators of most zooplankters that make up the diet of numerous fish species and their eggs and larvae. At the same time, chaetognaths are food of a large amount of fishes and invertebrates (Boltovskoy, 1981; Bonilla, 1983; Alvariño, 1978, 1985; Pierrot and Chidgey, 1988), and are renown indicators around the world (Sund and Renner, 1959; Alvariño, 1969a, 1969b, 1978; Fagueti, 1972, Sandoval, 1987; Casanova, 1999).

Thaliaceans (Phylum Chordata, Subphylum Urochordata, Class Thaliacea) (Brusca y Brusca, 2003) are epipelagic that predominate in oceanic waters worldwide, but some taxa are found near the coast or are confined to tropical areas of the Indian and Pacific oceans (Van Soest, 1975; Tokioka, 1979). Knowledge about their ecology and taxonomy is reduced. The trophic role of these opportunistic creatures, important as indicators, has been underestimated, even though they have a high rate of micro particles filtration, they are mainly herbivorous (nanoplankton consumers) and their distribution is linked to high phytoplankton concentrations and/or absence of predators (Silver, 1975; Esnal, 1981; Lambert, 2005).

Euphausiids (Phylum Arthropoda, Order Euphausiacea) (Brusca y Brusca, 2003) are crustaceans distributed around the world (Antezana and Brinton, 1981; Omori and Ikeda, 1984)

and are generally oceanic, though some species may be found over certain parts of the continental slope (Tokioka, 1979). Most of them are epipelagic, although an important number belong to the mesopelagic species. Bathypelagic taxa are less common (Furneston, 1979; Van Soest, 1979). Next to copepods, euphausiids are the most important filter feeders in marine plankton communities. Some genera are carnivorous, while others are omnivorous and herbivorous (Conover, 1979; Satianarayana, 1979; Omori and Ikeda, 1984; Antezana and Brinton, 1981; Lalli and Parsons, 2006).

Planktonic polychaetes (Phylum Annelida, Class Polychaeta) (Brusca y Brusca, 2003) are found around the world in epi- and mesopelagic layers of the water column between 50°N and 50°S, while bathypelagic species are found in high latitudes only (Van Soest, 1979; Støp, 1981). These animals inhabit neritic (Furneston, 1979) and oceanic waters (Tokioka, 1979). About 110 species of holoplanktonic polychaetes, almost all carnivorous, have been reported (Omori and Ikeda, 1984; Rouse and Pleijel 2001).

In the Colombian Pacific only chaetognaths have been relatively well studied (Alvariño, 1978; Pineda, 1973, 1976, 1977, 1979; Arboleda, 1988; Cely and Chiquillo, 1993; Cabrera, 1995; López, 1997; Fonseca, 2000; Gómez and López, 2002; García, 2003; López, 2004; López *et al.* 2007; García *et al.*, 2008).

Euphausiids, thaliaceans and pelagic polychaetes have been poorly studied in Colombia. For the study area the previous works (Burríticá and Castro, 1984; Giraldo and Gutiérrez, 2007; Martínez *et al.*, 2007) only mention general abundances of these groups. Dales (1957)

illustrated in maps the presence of some species of planktonic polychaetes in the Colombian Pacific Ocean.

## MATERIALS AND METHODS

The study area comprises the Colombian Pacific Ocean (349.000 km<sup>2</sup>). Among their main characteristics the strong influence of the cold (La Niña, LN) and warm (El Niño, EN) phases of ENSO (El Niño Southern Oscillation) are especially relevant; moreover fertilization processes such as upwellings, fronts, convergences, gyres, and a very high continental runoff, related with the extreme rain regime (Lloró is considered the rainiest locality of the world) (Poveda and Mesa, 2000; CCCP, 2002; López and Arcila 2002).

Within the 'Estudio Regional del Fenómeno El Niño' (ERFEN), the 'Centro Control de Contaminación del Pacífico' (CCCP) carried out four cruises in the periods June and October 1996 (LN) and May and December 1997 (EN), respectively. Surface straight samplings of zooplankton were performed by means of a conic net (opening 51 cm, mesh 500 µm) at 28 oceanographic stations previously established (Fig. 1). A flowmeter was used for determining the amount of water filtered through the net. At each location temperature, salinity and dissolved oxygen values were recorded with a CTDO.

To determine nutrient concentrations (NO<sub>3</sub>, NO<sub>2</sub>, PO<sub>4</sub>, and SiO<sub>3</sub>) by means of standard methods (Eaton *et al.*, 2005), water samples were taken with 5 l Niskin bottles. Zooplankton was preserved in a 10% formaldehyde solution. Specimens were examined in the laboratory for taxonomic identification using the Alvarino (1969b), Orensanz and Ramírez, 1973), Esnal

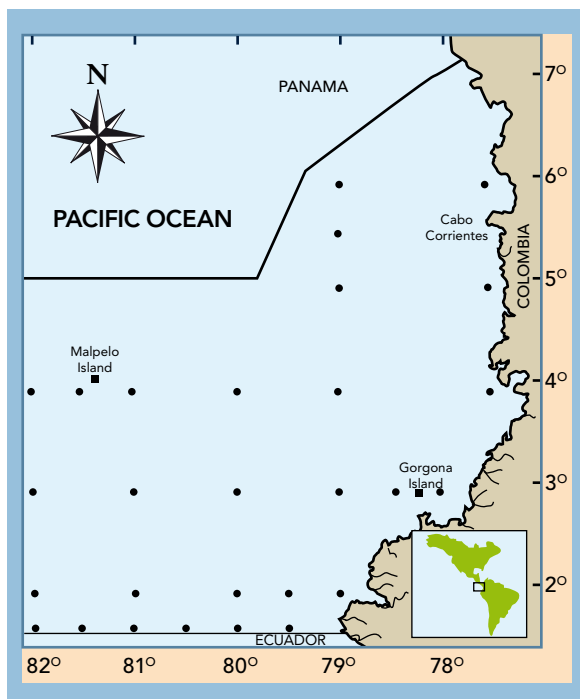


Fig. 1. Colombian Pacific and sampling stations (•) for zooplankton during LN 1996 and EN 1997.

(1979, 1981), Antezana y Brinton (1981), Boltovskoy (1981), Støp (1981), Bonilla (1983), Pierrot and Chidgey (1988), Keast and Lawrence (1990), and Orensanz and Ramírez, 1973) keys. In order to establish the abundances, sub samples of 5 ml were obtained from the original samples and afterwards extrapolated to number of individuals per 100 m<sup>3</sup>.

The number of individuals was standardized to 100 m<sup>3</sup> (Smith and Richardson, 1979). Physicochemical information was provided by the CCCP and appears in Reyna *et al.* (1996a, 1996b), Camacho *et al.* (1997), Pineda *et al.* (1997), Carvajal (1999) and Vergara (1999). Due to the high volume of information, all data have been summarized by using averages for each period. To test the degree of relationship

among the biological and physicochemical variables, the Pearson product-moment correlation coefficient ( $P = 0.05$ ) was used on the averages after normalizing by log-transformation ( $x + 1$ ) (Leyer and Wesche, 2007). This alternative was considered since significant correlations were not obtained in a preliminary statistical approach (Principal Component Analysis and factorial analysis) including all data.

Period	T	S	O <sub>2</sub>	NO <sub>3</sub>	NO <sub>2</sub>	PO <sub>4</sub>	SiO <sub>3</sub>
	°C		ml/L	mg-at/L			
<b>La Niña 1996</b>							
June	27.3	30.6	4.9	0.3	0.04	0.6	8.1
October	26.8	30.1	5.1	0.9	0.1	1.4	0.6
<b>El Niño 1997</b>							
May	28.3	32.3	5.2	0.5	0.2	2.9	2.8
December	28.9	30.5	4.6	0.2	0.04	0.2	2.7

**Table 1.** Variation of physicochemical variables (average values) in the Colombian Pacific Ocean in the four studied periods.

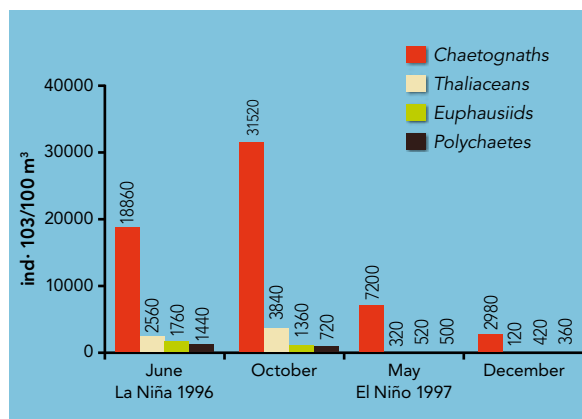
## RESULTS

The average values of the physicochemical variables fluctuated in the four sampling periods, with a noticeable temperature increase: from 26.8°C in October 1996 (LN) to 28.9°C in December 1997 (EN). Instead, salinity, oxygen and nutrient concentrations did not show such marked changes, with the exception of SiO<sub>3</sub>, which showed a very high concentration (8.1 mg-at/l) in June 1996 (LN) (Table 1).

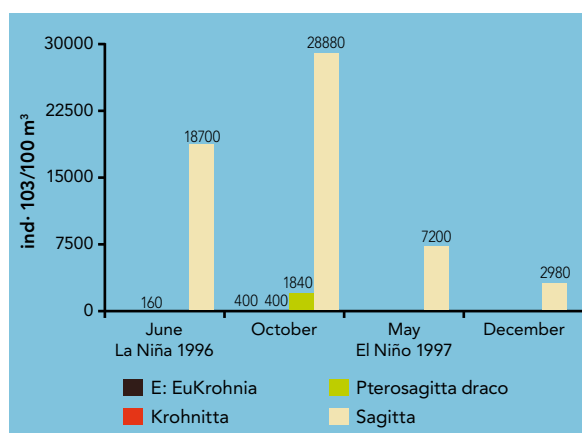
In general, the abundance order was: chaetognaths, thaliaceans, euphausiids, and polychaetes. A drastic decrease of all groups from LN 1996 to EN 1997 was observed. Compared to the other organisms, chaetognaths showed

a very high abundance especially in October 1996 (LN) ( $3840 \cdot 10^3$  ind/100 m<sup>3</sup>) (Fig. 2).

*Sagitta* was the most representative genus of chaetognaths (reaching  $28880 \cdot 10^3$  ind/100 m<sup>3</sup> in October 96, LN), and it was the only taxon caught in 1997 (EN). *Krohnitta*, *Eukrohnita*, and *Pterosagitta draco* were also found, the two last restricted to October 96 (LN), the only period in which the four taxa of chaetognaths occurred simultaneously (Fig. 3).



**Fig. 2.** Abundances (ind·10<sup>3</sup>/100 m<sup>3</sup>) of the selected zooplankton groups in the Colombian Pacific Ocean in the four studied periods.



**Fig. 3.** Chaetognaths abundance (ind·10<sup>3</sup>/100 m<sup>3</sup>) per genus in the Colombian Pacific Ocean in the four studied periods. E: Eukrohnita.

The genera *Ihlea*, *Salpa*, *Thalia* and *Weelia* composed the group of thaliaceans. *Weelia* is monospecific with the species *W. cylindrica* (Van der Land and Van Soest, 2001). The first two occurred only in 1996 (LN) with higher abundance in June (400 and  $720 \cdot 10^3$  ind/100 m<sup>3</sup>, respectively). *Thalia* and *Weelia* were caught in the four periods, but *Thalia* was more abundant (Fig. 4).

Only three genera of euphausiids were found. *Euphausia* appeared in all the study periods, always with the most important abundances (1040, 640, 360 and  $420 \cdot 10^3$  ind./100 m<sup>3</sup>), followed by *Thysanopoda*, which occurred in the three first months of study with lower abundances ( $720$ ,  $560$  and  $160 \cdot 10^3$  ind./100 m<sup>3</sup>), and *Nematobrachion* with scarcely  $160 \cdot 10^3$  ind/100 m<sup>3</sup> in October 1996 (Fig. 5).

14 species of planktonic polychaetes were identified: *Alciopa reynaudii* (Ar), *Alciopina parassitica* (Ap), *Prolopadorrhynchus appendiculatus* (Pra), *P. brevis* (Prb), *Maupasias coeca* (Mc), *M. gracilis* (Mg), *M. isochaeta* (Mi), *Naiades cantraini* (Nc), *Phalacrophorus pictus* (Pp), *P. uniformis* (Pu), *Plotohelmis alata* (Pla),

*P. capitata* (Pc), *P. tenuis* (Pt), and *Vanadis crystallina* (Vc).

The highest number of species (nine) was observed in October 1996 (LN), but the highest level of abundance ( $720 \cdot 10^3$  ind/100 m<sup>3</sup>) corresponded to *V. crystallina* in June of the same year. This species, just as *M. coeca*, *M. isochaeta* and *P. capitata* appeared in three of the four study periods. The other ones occurred only in one or two months and their abundances never were beyond  $240 \cdot 10^3$  ind/100 m<sup>3</sup> (Fig. 6).

## DISCUSSION

The variation of temperature averages in the four sampling periods corroborated the occurrence of LN 1996 and EN 1997 in the Colombian Pacific Ocean, as other authors have also pointed out (Camacho, 1998; Medina, 1998; Gómez and López, 2002; López and Arcila, 2002; CCCP, 2002). The negative influence of extreme temperatures on most marine organisms, including plankton, limits their abundance and affects the trophic web (Boltovskoy, 1981; Van

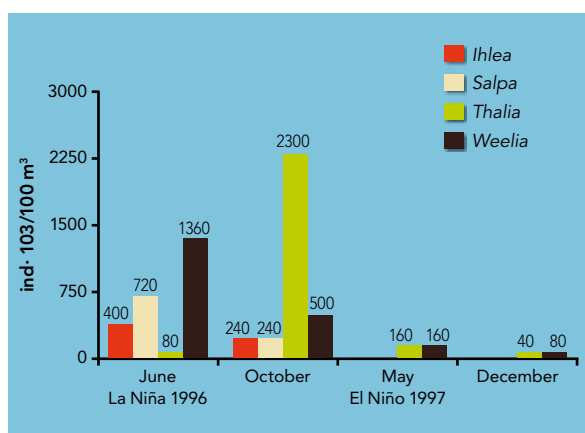


Fig. 4. Thaliaceans abundance (ind·10<sup>3</sup>/100 m<sup>3</sup>) per genus in the Colombian Pacific Ocean in the four studied periods.

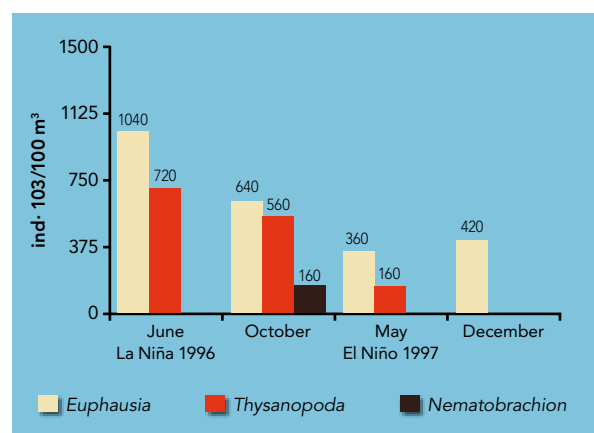


Fig. 5. Euphausiids abundance (ind·10<sup>3</sup>/100 m<sup>3</sup>) per genus in the Colombian Pacific Ocean in the four studied periods.



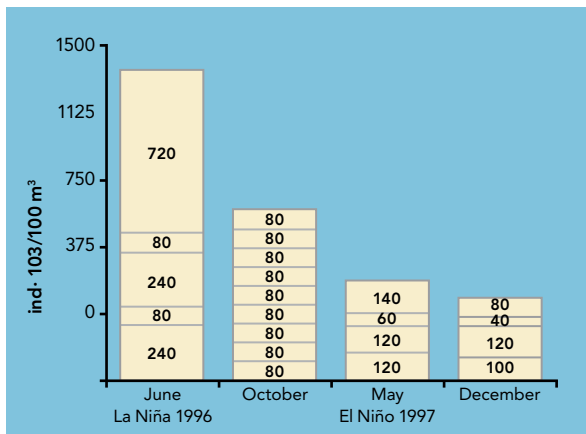


Fig. 6. Polychaetes abundance (ind·103/100 m<sup>3</sup>) per species in the Colombian Pacific Ocean in the four studied periods. Letters are the abbreviations for each species (see text above).

der Spoel, and Pierrot, 1979; Morales and Brugnoli, 2001). This is more evident during EN episodes worldwide (Morales y Brugnoli, 2001; Richardson and Schoean, 2004; Calbert, 2008) including the Colombian Pacific (e. g., López, 1984, 1997; Peña and Mosquera, 1992; Camacho, 1998; López et al., 1998, 2002).

The extremely high inverse correlation among temperature and chaetognaths, thaliaceans, euphausiids, and polychaetes (-1, -1, -0.93, and -0.77, respectively) could confirm the negative influence of this parameter (accentuated during EN) on them. Something similar has been observed with chaetognaths and ichthyoplankton in the Colombian Pacific Ocean (e. g., López, 1984; 1997; Gómez and López, 2002; López et al., 2007). However, some thaliaceans could be extraordinarily prolific in warm waters (Kott, 2005, 2008). Moreover, several chaetognaths species such as *Sagitta enflata*, *S. crassa*, *S. hispida* and *S. tenuis* can stand up to until 33.5 °C (Tokioka, 1979; Reeve and Walter, 1972). Only the first one appears within the 22 species

registered for the Colombian Pacific Ocean (Gómez and López, 2002; López et al., 2007; García et al., 2008).

A negative association among salinity and euphausiids, thaliaceans, chaetognaths, and polychaetes was observed as well (-0.48, -0.44, -0.35, and -0.25, respectively). In the case of chaetognaths, negative relationships must not be constant, given that, e. g. Arboleda (1986) reported their maximal abundances in central and northern neritic waters of the Colombian Pacific with salinity higher than 34.5. Also in the study area Pineda (1979) determined direct and inverse correlations between this parameter, depth, *Krohnitta pacifica* and *K. subtilis*.

The Tropical Eastern Pacific is characterized by a dissolved oxygen concentration of ca. 4 mg/L at the surface (Cline and Richards, 1972; Van der Spoel and Pierrot, 1979; Matear, 2006). As per Alvarino (1969b) this factor can affect the zooplankton distribution, in general. In the present work, it was most significant for chaetognaths ( $r=0.67$ ), of medium importance for thaliaceans ( $r=0.56$ ), and in minor degree for euphausiids (0.38) and polychaetes ( $r=0.31$ ). Notwithstanding, Alvarino (1969a) reports a general negative effect of the low oxygen concentration on chaetognaths.

In the Colombian Pacific Sund and Renner (1959) found individuals of *K. pacifica* in well-oxygenated waters, but Pineda (1979) refers to very low correlations (-0.27 to 0.06) with this species and higher ones (0.40 to 0.54) with *K. subtilis*, in both cases associated with depth. Then, it is clear that such differences are not only inherent to the species, but also to the study period and sampling depth. Brinton (1978) pointed out that in upwelling zones

of the Tropical Eastern Pacific the euphausiids *E. diomedea* and *E. distinguenda* (or their sibling species) seem to be adapted to existence within oxygen minimum layers.

With respect to nutrients, just  $\text{NO}_3$  had a significant relationship with chaetognaths (0.76) and thaliaceans (0.66), somewhat important with euphausiids (0.43) and lower with polychaetes (0.17), which suggests the importance of this variable for the first three groups. The correlation between  $\text{SiO}_3$  and polychaetes (0.49) indicates the relative influence of this nutrient on these organisms, but there is not an explanation for this until now. To a species level, in the Colombian Pacific Ocean, Pineda (1979) obtained a high association (0.89) between *K. subtilis* (Chaetognatha) and surface  $\text{NO}_3$ . This species is known as upwelling indicator (Sandoval, 1987).

Though euphausiids are essentially oceanic, high abundances of some species may be found over the continental slope due to vertical migration, which is closely correlated to the food supply and water depth (Tokioka, 1979). Albeit most inhabit the surface (Furnestin, 1979; Van Soest, 1979), meso- and bathypelagic taxa could reach superficial layers via upwelling as well. The relatively significant association of euphausiids with  $\text{NO}_3$  mentioned above could be a sign of this.

In most locations where the four groups appeared surface gyres and/or upwelling areas were observed (Reyna *et al.*, 1996a, 1996b; Camacho *et al.*, 1997; Pineda *et al.*, 1997). Their occurrence was also noticeable near Cabo Corrientes and Gorgona Island; geographical formations like these cause water fertilization processes (Cape/Island Effect) (Kelletat, 1989; Lalli

and Parsons, 2006). This dynamics agrees with the evident influence of water masses on spatial distribution and abundances of these organisms already observed for these and other zooplankters in the Colombian Pacific Ocean (Cely and Chiquillo, 1993; López, 1984, 1997; Gómez and López 2002; Giraldo and Gutiérrez, 2007; Martínez *et al.*, 2007) and other regions (e. g., Van der Spoel and Pierrot, 1979; Alvaríño and Leira, 1986; Kingsford, 1995; Cowan, 1996; Gómez *et al.*, 2001).

Regarding the very wide upwelling areas determined by Reyna *et al.* (1996a, 1996b), Camacho *et al.* (1997) and Pineda *et al.* (1997) in 1996 (LN) and 1997 (EN), it is questionable that this process might take place all over such areas, because they embrace mainly oceanic waters. These authors did not take into account other fertilization processes such as fronts, convergences, gyres, and the continental runoff of the elevated number of tributary rivers of the Colombian Pacific, in particular southern Cabo Corrientes.

As usual (Van der Spoel and Pierrot, 1979; Boltovskoy, 1981), chaetognaths had the highest abundance, which in most stations, coincided with few individuals of the other groups, but this is not an evidence of their intense predation (Van Soest, 1975; Boltovskoy, 1981; Bonilla, 1983; Pierrot and Chidgey, 1988). The positive correlations among the four selected groups (0.76 to 0.99) were attributed to the influence of the same environmental conditions on them.

The four genera of chaetognaths coincided exclusively in October 1996, suggesting better environmental conditions for these organisms during LN. *Sagitta* had the highest number of



individuals, which is easily explained because this is the most characteristic genus and its species are epiplanktonic (Alvariño, 1963; Pineda, 1979; Alvariño and Leira, 1986), being more susceptible than other genera to be caught in surface samplings, as in this research.

*Krohnitta* appeared in areas with high concentration of oxygen and nutrients (see Reyna *et al.*, 1996a, 1996b). Some specimens could belong to *K. pacifica* and *K. subtilis*, reported in the Colombian Pacific Ocean (Cely and Chiquillo, 1993; Gómez and López, 2002; García 2003; López *et al.*, 2007; García *et al.*, 2008).

*Eukrohnia* is distributed through the Pacific Ocean (Alvariño, 1969a; Faguetti, 1972) but in the Eastern Tropical Pacific it is quoted only for Ecuador (including the Galapagos Islands) and the Gulf of Panama (Sund and Renner, 1959; Alvariño and Leira, 1986). This genus had not been registered in earlier or later studies in Colombian waters (Pineda, 1973, 1976, 1977, 1979; Arboleda, 1988; Cely and Chiquillo, 1993; Gómez and López 2002; López *et al.*, 2007; García *et al.*, 2008). Since their species, *E. bathypelagica*, *E. fowleri* and *E. hamata*, are mesopelagic and upwelling indicators (Alvariño, 1969a, 1969b; Faguetti, 1972; Alvariño and Leira, 1986; Sandoval, 1987), the presence of the genus in the Colombian Pacific Ocean in October 1996 (LN) would be explained by upwelling processes occurred in that month (Reyna *et al.*, 1996b).

Few thaliaceans species (in brackets) have been registered worldwide for *Salpa* (7), *Ihleia* (3), and *Thalia* (2) (Van Soest, 1975, 1979; Tokioka 1979). The negative influence of temperature on thaliaceans was more marked in the case of *Ihleia* and *Salpa*, since these genera

appeared just in 1996 (LN), when the temperature was more favorable. *Thalia* and *Weelia cylindrica* were caught in the four periods, reflecting a major tolerance to the climatic changes, but the abundance of *Thalia* was higher. This genus is catalogued as a colonizer group and some species have one of the highest individual and population growing rates among metazoans (Heron, 1972), which could help to their permanence in the four study periods. The specimens could belong to *Ihleia punctata*, *Salpa aspera*, *S. fusiformis*, *S. maxima*, *S. cylindrica*, and *T. democratica*, registered for the tropical Pacific (Van Soest, 1975, 1979; Tokioka, 1979).

Although ca. 85 euphausiids species have been reported around the world (Antezana and Brinton, 1981, Omori and Ikeda, 1984) only the genera *Euphausia*, *Thysanopoda* and *Nemato-brachion* were caught in the Colombian Pacific Ocean in the present study. The first was the most representative, as appeared in 1996 (LN) and 1997 (EN) always with the highest abundance. This genus is highly endemic in the South Pacific (Cornejo, 1976).

Only *E. gibboides* has been recorded for the Colombian Pacific (Brinton, 1978). This species plus *E. diomedae*, *E. distinguenda*, *E. eximia*, *E. lamelligera*, *E. mucronata*, and *E. tenera* inhabit waters of Ecuador (Brinton, 1962; Cornejo, 1976; Antezana and Cornejo, 1979) and Peru (Santander and Sandoval, 1969). Brinton (1962) noted that *E. diomedae* is sometimes dominant in the Tropical Eastern Pacific between 22°N and 18°S, from Baja California to the warm zone near the Peru Current, *i. e.*, including waters of Colombia. Brinton (1962) mentions also the occurrence of *E. lamelligera*

in the coastal zone northern to Callao during EN 1958. In fact, this event can trigger displacement or immigration of (sub) tropical species (Arntz and Fahrbach, 1996). According to this, within the examined material it is possible to have at least some individuals of the mentioned species and perhaps also of *E. mutica* reported in Peruvian waters (Santander and Sandoval, 1969).

Cornejo (1976) found lower abundances of *Thysanopoda* in December 1972 than in May 1973 (EN) in the Pacific of Ecuador, i.e. something similar to the present paper, since the abundance of this genus was lower during December 1997 (EN). Species such as *T. monacantha*, *T. tricuspitada*, *T. obtusiformis* and *T. pectinata* (Van Soest, 1979) have circumglobal tropical-subtropical distribution, so that some examined exemplars could belong to one or more of these taxa. Moreover, other specimens could be representatives of *Nematobranchion flexipes*, inasmuch as this species has been found near Ecuador, in the transition zone between the cold Peru Current and the warm South Equatorial Current (Brinton, 1962).

It has been already mentioned that displacement or immigrations of (sub) tropical species during the ENSO are common (Arntz and Fahrbach, 1996). *Nematobranchion* was restricted to October 1996 (LN) at one station, located in an area characterized by upwelling and a superficial current with course ocean-coast (Reyna *et al.*, 1996b). Maybe this genus appeared there thanks to one of those processes. In the available literature there is no information about its distribution in the water column or concerning its importance as an indicator.

Of the 14 polychaetes species identified in this study, Salazar and Londoño (2004) mention for the Tropical Eastern Pacific: *Alciopa reynaudii*, *Alciopina parassitica*, *Maupasia coeca*, *Naiades cantraini*, *Phalacrophorus pictus*, *P. uniformis*, *Plotohelmis alata*, *P. capitata*, *P. tenuis*, *Prolopadorrhynchus appendiculatus*, and *Vanadis crystallina*. This number is very low considering that ca. 110 species of holoplanktonic polychaetes have been reported worldwide (Omori and Ikeda, 1984), but it could increase in future surveys, because these organisms are studied in the Colombian Pacific Ocean for the first time (present study). Dales (1957) registered in this region only *A. parassitica*, *Pelagobia longicirrata*, *P. pictus*, *Prolopadorrhynchus nationalis*, *P. brevis*, *Sagitella kowalevskii*, and *Vanadis minuta*.

*M. coeca*, *M. isochoeta*, *P. capitata*, and *V. crystallina* occurred in three study periods, indicating to be more resistant to climatic changes. In contrast, *A. parassitica* and *P. tenuis* appeared only in June 1996 (LN), and *P. uniformis* and *A. reynaudii* only in December 1997 (EN), revealing a better adaptation to the environmental conditions during those months.

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