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Ecological analysis of some Syllidae (Annelida, Polychaeta) from the central Tyrrhenian Sea (Ponza Island)

A. SOMASCHINI & M. F. GRAVINA

Dipartimento di Biologia Animale e dell'Uomo
Università "La Sapienza"
Viale dell'Università, 32 - 00185 Roma Italy

ABSTRACT

New data are given on the ecology of some syllids from soft bottom and an adjacent *Posidonia oceanica* seagrass bed in the Tyrrhenian Sea. Multivariate analysis discriminated five communities distributed along a coenocline based on granulometry of sediments, from fine to coarse sand, and from low to high shoot density within the *Posidonia* bed. Along the coenocline, replacements of some species belonging to the genera *Grubeosyllis*, *Sphaerosyllis*, *Brania*, *Exogone*, and *Syllis* were observed.

RÉSUMÉ

Écologie de quelques Syllidae (Annelida, Polychaeta) de la partie centrale de la mer Tyrrhénienne (île de Ponza)

On a étudié l'écologie des Syllidiens des fond meubles sableux et d'une prairie de *Posidonia oceanica* de l'Ile de Ponza (Italie-Latium). La discrimination de cinq groupements annélidiens en relation avec la structure du substrat (granulométrie des sédiments et densité des faisceaux foliaires) a permis de préciser les préférences écologiques des espèces les plus abondantes.

INTRODUCTION

Syllids are one of the most important polychaete families in littoral communities of the Mediterranean Sea. They are the richest taxon in both abundance and species composition in rocky bottoms and seagrass beds (ABBIATI, 1987; BELLAN, 1964; COLOGNOLA *et al.*, 1984; GAMBI *et al.*, 1989; GIANGRANDE, 1985; 1988; SAN MARTIN & VIEITEZ, 1984; SAN MARTIN *et al.*, 1990), whereas in the soft bottoms they are frequently represented by many interstitial species primarily belonging to the subfamilies Exogoninae and Eusyllinae (COGNETTI, 1962;

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SAN MARTIN, 1984a; 1984b; WESTHEIDE, 1974). Historical data on the ecology of this group are available in many works (e.g. BELLAN, 1964; COGNETTI, 1954; 1957; WESTHEIDE, 1974; SAN MARTIN, 1984a; GIANGRANDE, 1989-1990), but recent revisions of several genera and descriptions of many new taxa have changed the taxonomic position of many Mediterranean species (e.g. BANSE, 1971; PERKINS, 1981; SAN MARTIN, 1984a; 1984c; 1991). Furthermore, ecological information on Mediterranean syllid species is still largerly incomplete. This study presents new data based on current knowledge on the distribution and ecology of some species from soft bottoms and seagrass beds.

MATERIALS AND METHODS

Samples were collected at Ponza Island in the central Tyrrhenian Sea (Italy-Latium) (Fig. 1). The study area, Cala Feola, is a broad bay with a bed of *Posidonia oceanica* ranging in depths from 1 m to 40 m and surrounded by soft bottom areas ranging in depths from 5 m to 40 m. Patches of dead mats (dead rhyzomes without leaf stratum) are distributed within the *Posidonia* bed. The inner part of the bay is a sheltered area of shallow water (1-2 m depth).

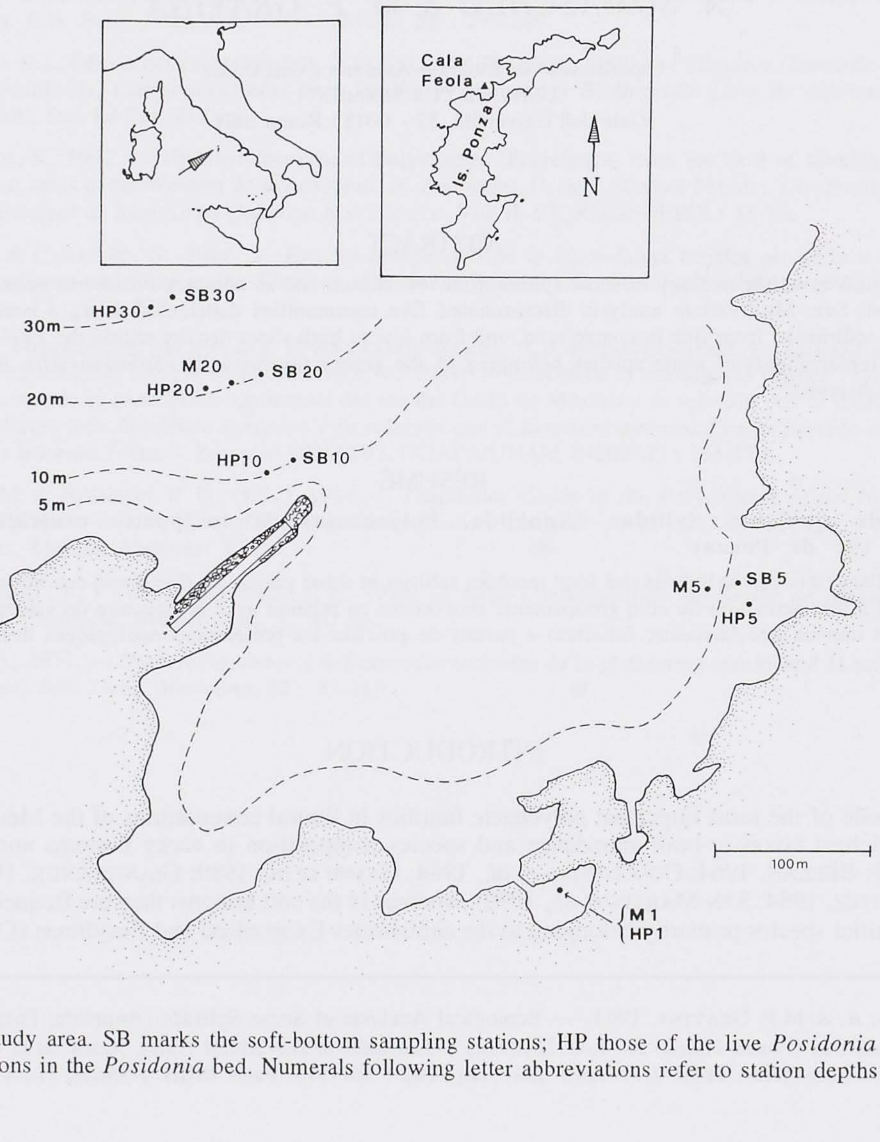

FIG. 1. — The study area. SB marks the soft-bottom sampling stations; HP those of the live *Posidonia* mat, and M the dead mat stations in the *Posidonia* bed. Numerals following letter abbreviations refer to station depths in meters.

Samples were collected in June 1988 in depths from 1 m to 30 m. Five samples were collected from a live *Posidonia* mat (HP); three samples were collected from the dead rhyzome mat (M); and four samples were collected from neighbouring soft bottom areas (SB) (Table 1). The shoot *Posidonia* density in a square meter was computed on live mat before collecting samples. The fauna of the *Posidonia* bed was collected by means of a hand net measuring 20 x 20 x 15 cm. In the live mat, fauna was collected after removing the blades of grass, whereas the dead mat fauna was collected directly. Fauna in soft bottom areas was collected with a Charcot dredge (volume: 50 l). Corers of sediment were collected in the soft bottom areas for grain size analysis (SOMASCHINI, 1992; SOMASCHINI *et al.*, in press).

TABLE 1. — Biotope features: granulometric composition of soft bottom stations (SB); shoot density values of *Posidonia* bed and exposure to water movement (HP indicates stations of live matte M indicates stations of dead mat).

soft-bottom stations		SB	SB	SB	SB
depths (m)		5	10	20	30
grain size (mm)					
> 4		00.00	07.08	00.00	00.00
2		00.16	17.29	00.00	00.00
1		00.50	52.70	00.50	01.32
0.5		00.55	22.76	01.36	03.21
0.25		51.17	00.12	30.39	25.59
0.12		36.00	00.02	48.12	48.80
0.063		10.45	00.01	19.63	21.08
sand type		fine	coarse	fine	fine
Posidonia stations	HP M	HP M	HP	HP M	HP
depth (m)	1 1	5 5	10	20 20	30
Shoot density (square meter)	710 0	780 0	750	518 0	304
Exposure to water movement	NO NO	YESYES	YES	NO NO	NO

Frequency data of the total polychaete fauna at each station were computed and logarithmically transformated. Principal Component Analysis (PCA) was employed on the correlation matrix to order the sampling stations (SOMASCHINI *et al.*, in press). In the obtained ordination model, Euclidean distances were computed between the sampling station points, to order them along the principal coenocline. This coenocline was used in order to study the distribution patterns of the most abundant syllids. Only syllids with a frequency higher than 1% of the total polychaete fauna were analyzed. The distribution patterns along the coenocline of the selected species were studied computing the weighted mean of three successive sets of data (CURTIS & MCINTOSH, 1951; GAUCH, 1982). Additional details on the mathematical methods used in this study can be found in SOMASCHINI (1992).

RESULTS AND CONCLUSIONS

A total of 15,232 individuals belonging to 218 species of polychaetes was found (SOMASCHINI, 1992). Syllidae were the richest family in both abundance and species richness (7,381 individuals and 76 species). Three new species of Syllids were described and a new report for the Mediterranean Sea was carried out (SOMASCHINI, 1992). Exogoninae and Syllinae were very abundant and diverse in the *Posidonia* bed, whereas from the soft bottom only Eusyllinae and Exogoninae were collected.

Multivariate analysis on the total fauna discriminated five communities related to sediment type, *Posidonia* shoot density, and the exposure to water movement (SOMASCHINI *et al.*, in press). Communities of fine sand (5 + 20 + 30 m) and of coarse sand (10 m) were identified in the soft bottom areas. A community was found in the deeper *Posidonia* samples with a low shoot density (20 + 30 m), whereas two communities were found in the

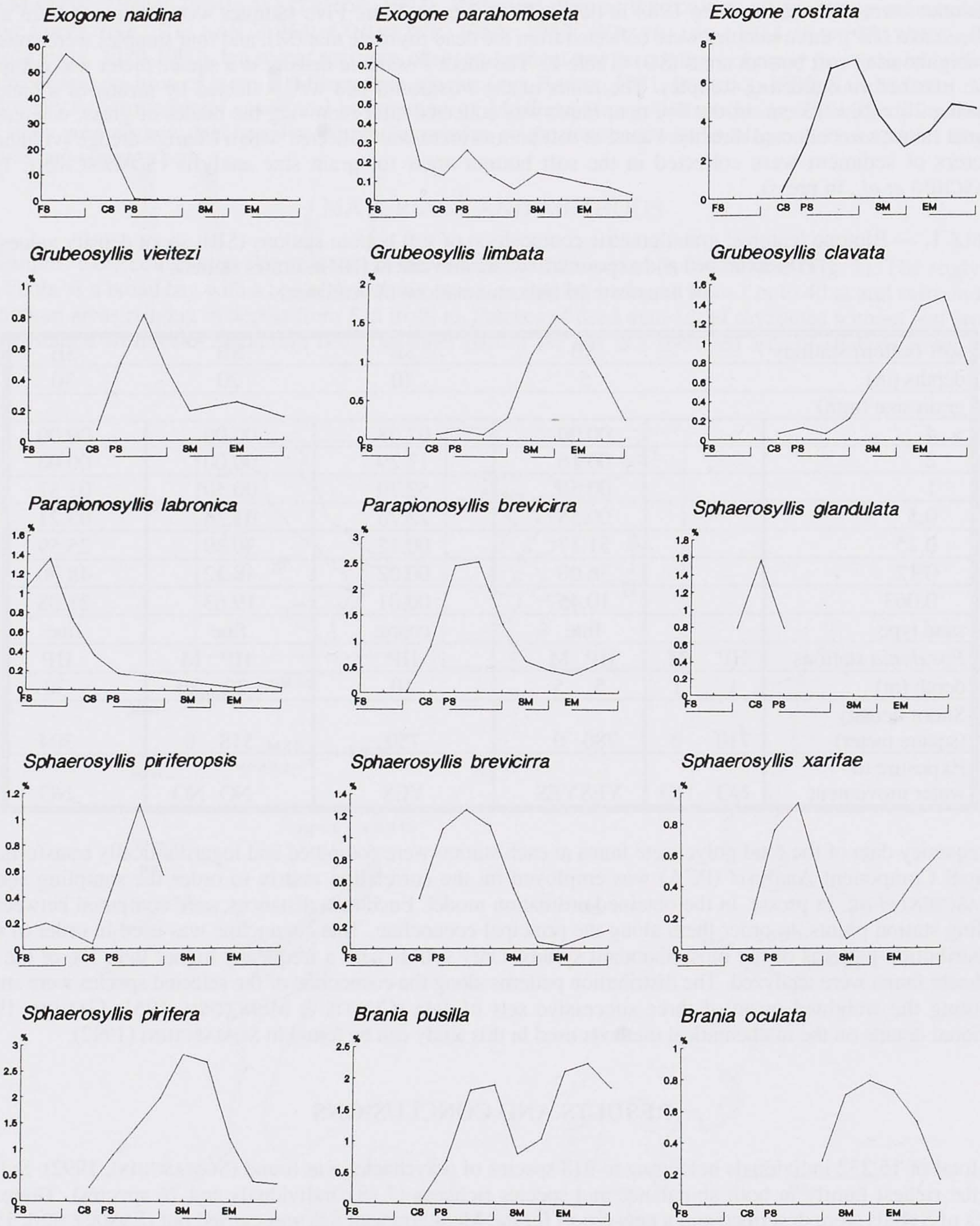

FIG. 2. — Percent distribution of the most abundant syllid species (frequency on total polychaete fauna > 1%) along the ecological gradient observed. On the horizontal axis: FS = fine sand (SB20; SB30; SB5); CS = coarse sand (SB10); PS = deep *Posidonia* bed (HP20; HP30; M20); SM = sheltered shallow *Posidonia* mat (1PS; 1M); EM = exposed *Posidonia* mat (5PS; 5M; 10PS).

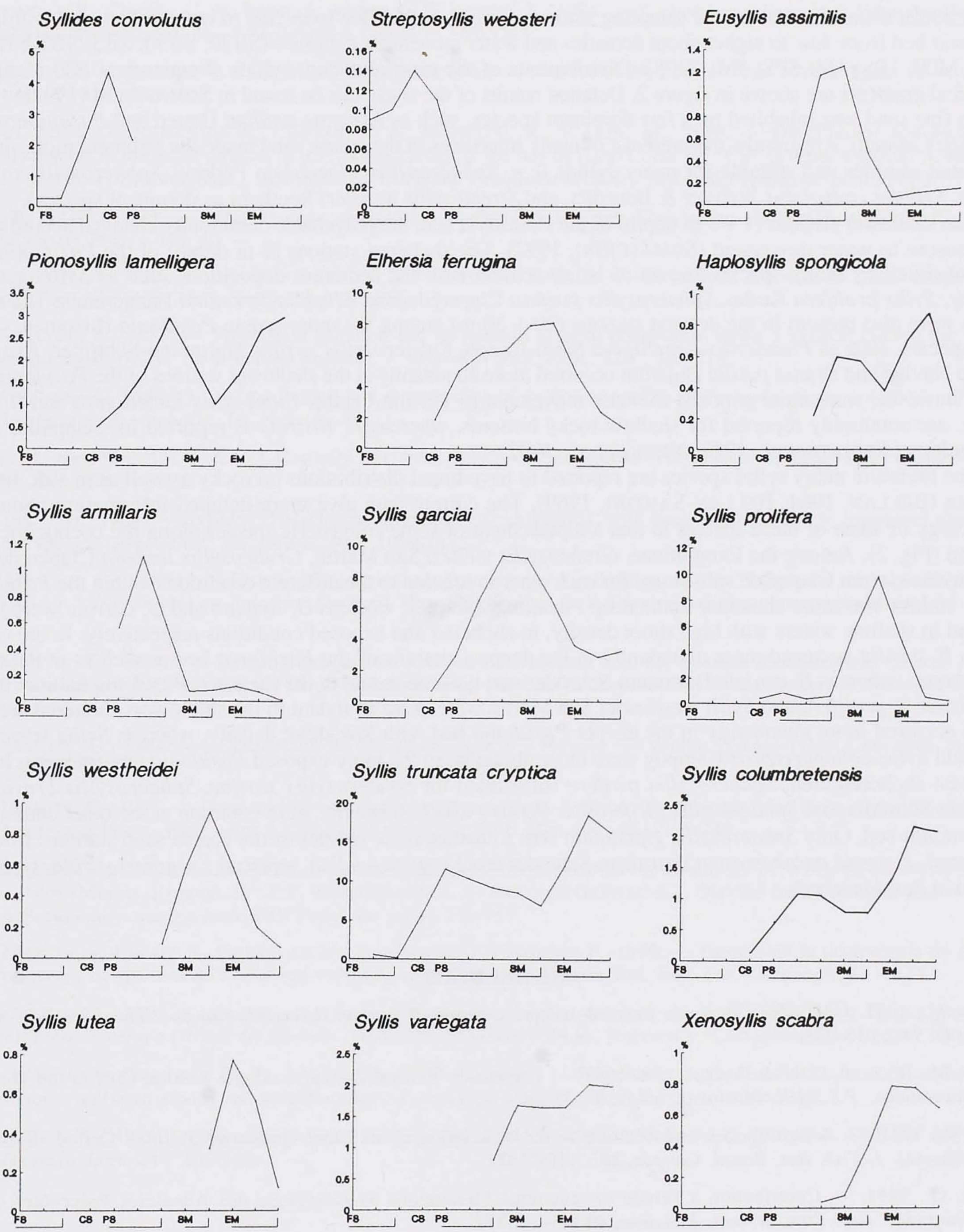

FIG. 2 (continued). — Percent distribution of the most abundant syllid species (frequency on total polychaete fauna > 1%) along the ecological gradient observed. On the horizontal axis: FS = fine sand (SB20; SB30; SB5); CS = coarse sand (SB10); PS = deep *Posidonia* bed (HP20; HP30; M20); SM = sheltered shallow *Posidonia* mat (1PS; 1M); EM = exposed *Posidonia* mat (5PS; 5M; 10PS).

shallow *Posidonia* bed with high shoot density (1 + 5 + 10 m depth), respectively on sheltered (1 m) and exposed (5 + 10 m depth) habitats.

Euclidean distances ordered the sampling stations along a coenocline from fine to coarse sand, and within the *Posidonia* bed from low to higher shoot densities and water movement exposure (SB20; SB30; SB5; SB10; HP20; HP30; M20; 1PS; 1M; 5PS; 5M; 10PS). Distributions of the most abundant syllids (frequency > 1%) along the ecological gradients are shown in figure 2. Detailed results of the study can be found in SOMASCHINI (1992).

The fine sand was inhabited by a few dominant species, such as *Exogone naidina* Örsted and *Parapionosyllis labronica* Cognetti. Apparently, the presence of many interstices in the coarse sand made the sediment more similar to the mat samples and suitable for many syllids (e.g. *Sphaerosyllis glandulata* Perkins, *Sphaerosyllis taylori* Perkins, *Syllides convolutus* Webster & Benedict, and *Streptosyllis websteri* Southern as dominant species).

In the shallower stations (1 + 5 m depth) of the *Posidonia* bed, the polychaete community changed according to the exposure to water movement (SOMASCHINI, 1992). The sheltered stations (1 m depth) of the *Posidonia* bed were inhabited by many species known to be associated with the sediment deposition, such as *Syllis garciai* Campoy, *Syllis prolifera* Krohn, *Sphaerosyllis pirifera* Claparède, and *Elhersia ferrugina* Langerhans. The same species were also present in the deepest stations (20 + 30 m) among the more sparse *Posidonia* rhizomes. Other syllid species, such as *Pionosyllis lamelligera* Saint-Joseph, *Sphaerosyllis xarifae* Hartmann-Schröder, *Exogone rostrata* Naville and *Brania pusilla* Dujardin occurred more abundantly at the shallower stations of the *Posidonia* bed which, however, were more exposed to water movement (5 + 10 m depth). *Pionosyllis lamelligera* and *Brania pusilla* are commonly reported for shallow rocky bottoms, whereas *E. rostrata* is reported for sciaphilic algal communities (ABBIATI *et al.*, 1987; NUNEZ *et al.*, 1992).

In the literature many syllid species are reported to have broad distributions on rocky as well as in soft, littoral substrata (BELLAN, 1964; BELLAN-SANTINI, 1969). The current data give more detailed information about the autoecology of some of these species in that a replacement of some congeneric species along the coenocline was observed (Fig. 2). Among the Exogoninae, *Grubeosyllis vieitezi* San Martin, *Grubeosyllis limbata* Claparède and *Grubeosyllis clavata* Claparède substituted for each other in relation to the different conditions within the *Posidonia* bed. *G. vieitezi* was more abundant in the deep *Posidonia* samples, whereas *G. limbata* and *G. clavata* were more abundant in shallow waters with high shoot density, in sheltered and exposed conditions respectively. In the genus *Brania*, *B. pusilla* occurred more abundantly in the deepest stations of the *Posidonia* bed as well as at the more exposed ones, whereas *B. oculata* Hartmann-Schröder was quite abundant in the sheltered *Posidonia* habitat. In the genus *Syllis*, *S. prolifera* and *Syllis westheidei* San Martin were more abundant in the shallowest sheltered area; *S. garciai* occurred more abundantly in the deeper *Posidonia* bed with low shoot density, whereas *Syllis variegata* Grube and *Syllis columbretensis* Campoy were more abundant in the more exposed *Posidonia* environment. In the shallowest sheltered area, *Sphaerosyllis pirifera* substituted for *Sphaerosyllis xarifae*, *Sphaerosyllis brevicirra* Hartmann-Schröder and *Sphaerosyllis piriferopsis* Perkins which, however, were common at the other stations of the *Posidonia* bed. Only *Sphaerosyllis glandulata* was a characteristic species of the coarse sand stations. Finally, in fine sand, *Exogone parahomoseta* Hartmann-Schröder and *Exogone naidina* replaced *Exogone rostrata*, typically recorded in *Posidonia* beds.

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