

Some observations on the possible synonymy of *Eunice vittata* (Delle Chiaje, 1825) and *E. indica* Kinberg, 1865 (Annelida, Polychaeta.)

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Abstract : The study of numerous polychaete individuals collected from several habitats in the Aegean Sea, some of which had the characteristic morphological features of *Eunice vittata* (Delle Chiaje) and others those of *E. indica* Kinberg, showed that they possibly belong to one single species. The main morphological characteristics of these animals are examined and correlated.

Résumé : L'étude de nombreux individus de Polychètes recueillis dans divers biotopes de la mer Egée, certains de ces individus ayant les caractéristiques morphologiques de *E. vittata* et d'autres celles de *E. indica*, a montré que ces individus appartiennent à une seule espèce. Les caractères morphologiques les plus importants de ces animaux sont examinés et corrélés.

INTRODUCTION

Some authors (Izuca 1912, Fauvel 1936, Fauvel & Rullier 1957, Campoy 1982) have suggested in the past that *E. vittata* and *E. indica* are not separate species, due to their slight morphological differences. On the other hand, Ben-Eliahu (1972), who recorded for the first time the occurrence of *E. indica* in the Mediterranean Sea (Sinai Peninsula), accepts the existence of two species and supports that their discrimination should be based on the examination of large individuals, because the number of the acicular setae per parapodium - which is the main distinctive feature of the two species (2 in *E. vittata* and 3 - 5 in *E. indica*) - seems to be directly related to the body size. Anyhow, she considered this aspect as an inference open to experimentation. Day (1967) also accepts the existence of two species, using additionally in their discrimination the size of dorsal cirri in the anterior segments.

The review of the related literature showed that both the records of *E. indica* - which is considered by Por (1978) as a low probability Lessepsian immigrant - from the Levant Sea (Ben-Eliahu 1972, 1976 ; Ben-Eliahu *et al.*, 1983) and of *E. vittata* from the same area (Fauvel 1957, Laubier 1966, Amoureux 1976) are mainly based on juveniles or very small individuals. This fact does not permit us to decide which of the two species is referred to in each case. On the other hand, in the Aegean Sea, the occurrence of *E. vittata* has been established by various authors (Marinov 1959 ; Bellan 1961, 1964 ; Geldiay & Ergen 1970 ; Vamvakas 1971 ; Ergen 1976 ; Fasari 1982 ; Bogdanos & Satsmadjis 1983).

During a study on the composition of the Aegean Sea benthic fauna, we had the opportunity to collect an important number of individuals of various size belonging to the genus

Eunice. These individuals were primarily identified as *E. vittata*. However, a careful reexamination of this material showed that all the large specimens had certain morphological characteristics of *E. indica*. The finding of this material posed once more the question : are *E. vittata* and *E. indica* separate but closely related species or should they be considered as a single species ?

MATERIAL AND METHODS

For the purposes of this study, 43 intact individuals, having a total length from 5 to 42 mm, have been examined. All individuals were collected from a silty bottom in Strymonikos Gulf (station 1) in depths between 30 and 50 meters. Sampling was made with a van Veen sampler and the total number of individuals in the 15 samples taken was in fact more than 250. However, only 43 individuals were complete and are taken under consideration in this study.

In order to make the necessary correlations, the total length, the maximum width, the number of setigers, the number of acicular setae in each parapodium, the number of setigers bearing gills (branchial setigers) and the minimum and maximum number of branchial filaments were measured. For each individual, the mean number of acicular setae per setiger was also calculated, taking in account the setigers without acicular setae existing in the anterior and posterior part of the body. The size of the dorsal cirrus was also compared to the length of the foot, in the anterior setigers : according to Day (1967), the above feature is very important for the distinction of the two species.

Besides these, a large number of individuals from different areas of the Aegean Sea and various habitats (photophilous algae, phanerogam "meadows" and mixed soft substrates) were also examined, in order to collect additional information on the number of acicular setae in different populations. However, the number of intact individuals found in every one of these areas was not enough to support a statistical treatment. All the sampling areas are indicated on figure 1.

RESULTS

The length and the width of the body (Fig. 2a), the length and the mean number of acicular setae per setiger (Fig. 2c) as well as the latter and the number of setigers (Fig. 2d), proved to be highly correlated at the level of 0.001 %. The linear correlation between the number of setigers and the body length, the latter expressed in a logarithmic scale, appears to be also very strong (Fig. 2b). In the diagrams given in figures 2c and 2d the black dots correspond to individuals having up to two acicular setae while the white ones to those having more than two acicular setae in some parapodia.

Table 1 shows the extreme values of the various morphological features examined, both for the individuals having up to two acicular setae in each parapodium and for those having, in certain parapodia, more than two and up to five acicular setae. From this table, it is obvious that the morphological features examined are generally varying according to the body length. An exception is the number of the branchial setigers which appears to be the same in both groups of individuals and independent from body length, at least in the examined size classes.

The setal pattern in the populations of the other sampling stations (Fig. 1) seems to be similar to that of the population in Strymonikos Gulf. In fact, individuals having a length of 1.5-2.5 cm may bear more than two acicular setae, while all individuals longer than 2.5 cm bear 3-5 in some parapodia. An exception to this pattern is the population in station 10 (Fig. 1) in which all individuals smaller than 2.4 cm have up to two acicular setae. In this station, samples were collected from a silty sand substrate with *Halophila stipulacea* (Forsskål) in a depth of about 10 meters.

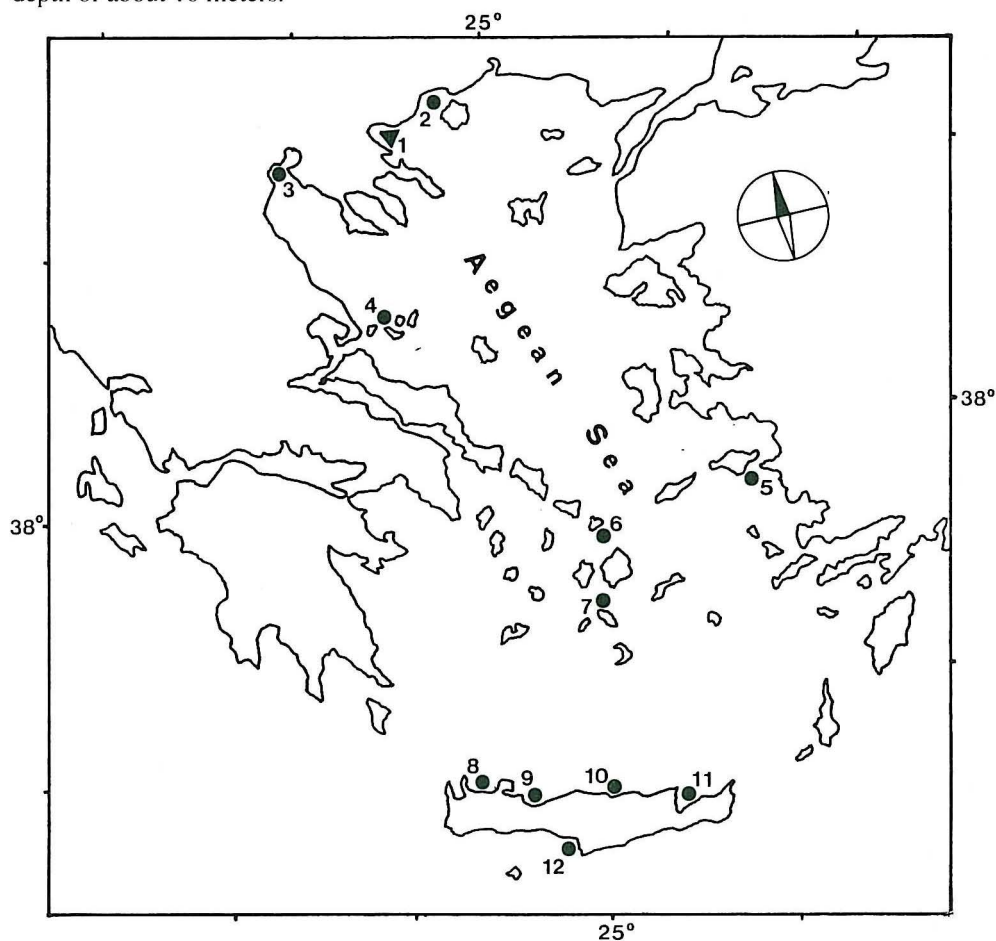


Fig. 1 : Map of the Aegean Sea showing the location of the sampling stations (The sampling area in the Strymonikos Gulf is indicated with a triangular mark).

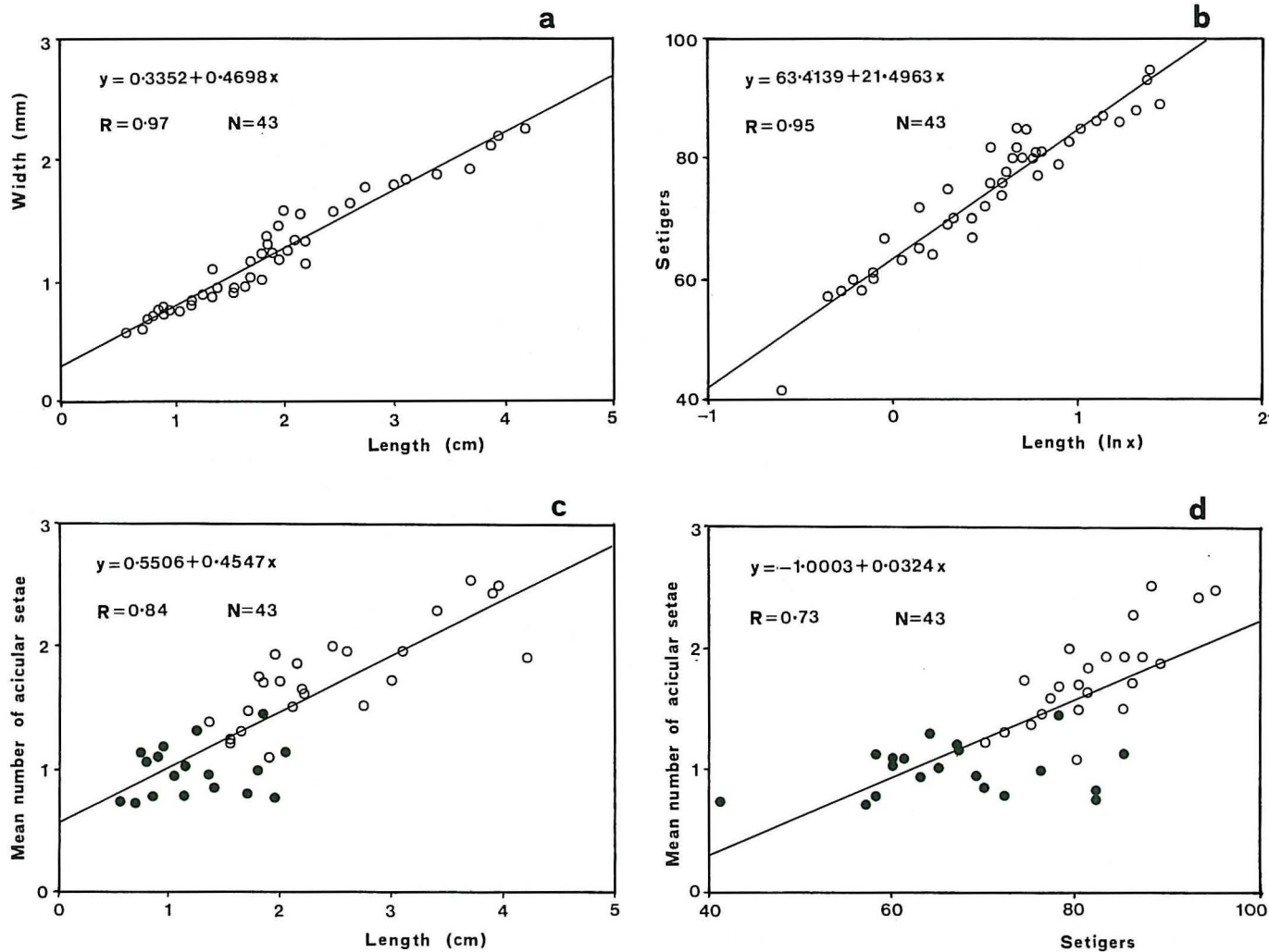


Fig. 2 : Linear regressions between : a. length and width ; b. length and number of setigers ; c. length and mean number of acicular setae ; d. number of setigers and mean number of acicular setae.

DISCUSSION

Besides the number of acicular setae in the setigers, Day (1967) considered as a very important distinctive feature between the two species the ratio of the dorsal cirrus length to the length of the foot in the anterior segments (more than 2 : 1 in *E. vittata*, less than 2 : 1 in *E. indica*). However, in the total of the individuals examined from the Aegean Sea, such a difference has not been observed. The same has been noticed by Ben-Eliahu (1972) for the specimens she examined. In the same paper however, the author used also, for the distinction of the two species, the number of the branchial filaments (1 or 2 in *E. vittata* ; up to 5 in *E. indica*). In our specimens, such a distinction does not seem to exist. Some of the individuals that should be considered as *E. vittata* had up to six branchial filaments (Table 1), a fact that is not contrary to the older descriptions of the species (Fauvel 1923, Day 1967) nor to the recent ones (Campoy 1982). According to the above, the most important feature that can be used for the distinction of the two species is the number of the acicular setae.

In the specimens collected from the Strymonikos Gulf having 1 to 5 acicular setae according to their size, the main biometric characteristics examined (Fig. 2) showed a strong linear correlation which is an indication of the existence of one species population. In this population, the growth of the third acicular setae starts in lengths between 1.5 and 2.5 cm. In other populations, as for example in that of Crete Island, this setal pattern can be more or less differentiated. This could possibly explain the fact that Ben-Eliahu (1972, 1976) found "large sized specimens" (the exact length not being reported) with 2 acicular setae, which she considered as *E. vittata*, on the coasts of Cyprus ; "very small" individuals also with 2 setae, which she identified as *E. indica*, in the Suez Canal ; and finally "larger specimens containing up to 4 acicular setae", which she also considered as *E. indica*, in the Sinai Peninsula.

Izuka (1912) was the first who reported individuals from Japan having 2 or 3 acicular setae, which he considered as *E. vittata*. These individuals "because of the serial occurrence of these bi- or tridentate subacicular hooks" have been later replaced in *E. indica* by Imajima & Hartman (1964). Afterwards, Fauvel (1936) implied that *E. indica* and *E. vittata* are not separate species, an aspect that was strengthened later by Fauvel & Rullier (1957). These authors believed that the few differences observed between the two species do not justify their separation and they considered them as "formes si voisines". Finally Campoy (1982) reports specimens of *E. vittata* bearing 1 to 5 acicular setae per parapodium from the western basin of the Mediterranean and he wonders whether the two species coexist in the Mediterranean or whether they are in fact one single species. The author seems to accept the second aspect, having in mind the great diversity of this quantitative character.

According to the present study, it seems that the number of acicular setae is a meristical feature that increases in proportion to animal size in Aegean Sea populations, because neither big individuals having 1-2 acicular setae, nor small individuals having more than two were found. Taking into account the review of the literature and the findings of the present

TABLE 1

Extreme values of the various morphological features of the specimens with up to two acicular setae and of those with more than two in some parapodia.

	Length (cm)	Width (mm)	Number of setigers	Mean number of acicular setae	Branchial filaments	Branchial setigers
1-2 acicular setae (23 specimens)	0.55-2.05	0.59-1.32	41-85	0.72-1.31	1-6	16-27
more than two acicular setae (20 specimens)	1.35-4.20	0.93-2.25	70-93	1.09-2.53	1-9	16-28

study on Aegean populations, we conclude that, on the basis of the morphological features, there is one single species. In this case according to the Law of Priority, the name *E. vittata* (Delle Chiaje, 1825) must be kept.

Consequently, *E. vittata* should be considered as a species with a distribution wider than it was thought until now, extending from the Mediterranean and the Red Sea to the Indian and Pacific Oceans, as well as to the Atlantic Ocean.

ACKNOWLEDGEMENTS

We thank Dr. K. Fauchald for his encouragement to writing of this paper and Dr. A. Eleftheriou for the critical reading of the manuscript.

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