THE SEA ANEMONE *TELMATACTIS CRICOIDES* FROM MADEIRA AND THE CANARY ISLANDS: SIZE FREQUENCY, DEPTH DISTRIBUTION AND COLOUR POLYMORPHISM

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The club-tipped sea anemone *Telmatactis cricoides* (Duchassaing, 1850) of Madeira (n = 81 anemones) and of the Canary Islands (n = 124 anemones) was studied in a depth range of 0 to 62 m. Colour polymorphism, size frequency and depth frequency of the two populations of anemones are described and compared. Twenty-five different colour morphs were recorded. There was a significant but only weak (r = +0.20) correlation between anemone size and depth of occurrence. The two most common colour morphs did not differ in their depth distributions. The two most common colour morphs were equally frequent in both archipelagos. Eleven colour morphs were exclusive to the Canary Islands, three to Madeira - the remaining eleven being common to both areas. Colour pattern of individual animals appears to be stable, the longest record being 12 years for an animal observed since 1983.

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A anémona do mar *Telmatactis cricoides* (Duchassaing, 1850) dos arquipélagos da Madeira (n = 81 anémonas) e das Canárias (n = 124 anémonas), foi estudada entre 0 e 62 m de profundidade. São descritos e comparados o polimorfismo cromático, a frequência de tamanhos, e a frequência em profundidade das duas populações de anémonas. Registaram-se vinte e cinco padrões de coloração distintos. Encontrou-se uma correlação do, embora fraca (R = +0.20) entre o tamanho e a profundidade de ocorrência. Os dois tipos de coloração mais frequentes não diferem na sua distribuição em profundidade e são igualmente frequentes nos dois arquipélagos. Onze formas cromáticas são exclusivas das Canárias, três da Madeira, enquanto as restantes onze foram registadas nos dois arquipélagos. O padrão de coloração dos indivíduos parece estável, sendo de 12 anos o registo mais antigo, para um indivíduo observado desde 1983.

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INTRODUCTION

The club-tipped anemone *Telmatactis cricoides* (Duchassaing, 1850) is the largest and most conspicuous sea anemone in the Eastern Atlantic. *Telmatactis cricoides* is variable in colour (cf. colour plate) and known to harbour crustacean symbionts that live either between the tentacles or on the stem of the anemone or within a distance of only a few centimetres from the tips of the tentacles (CRIALES 1979, 1984; PÉREZ SANCHEZ & MORENO BATET 1991; WIRTZ 1991, 1995a,

1995b, in press).

Telmatactis cricoides occurs throughout the tropical and subtropical Atlantic and in the Eastern and Central Mediterranean Sea. Animals at Madeira and the Canary Islands are larger than those of the rest of the distributional range, but no other morphological characters have as yet been found that would justify the recognition of a separate species (DEN HARTOG 1995). Despite the above statement on the size of the species, no data exist on the size frequency in any population of *T. cricoides*. This paper describes and compares the size frequency, depth distribution, and colour polymorphism of two populations of *Telmatactis cricoides*, from Madeira and the Canary Islands.

METHODS

By means of SCUBA diving in a depth range of 1-62 metres (approximately 400 dives), every individual of *Telmatactis cricoides* that appeared larger than 3 cm in diameter was examined. Using an underwater writing board, that had a scale of 15 cm marked on it, the depth of the anemone (recorded with a SUUNTO dive-computer) and the colour of the anemone was recorded. To obtain the column dimensions, a tentacle tip was pinched, which caused the anemone to contract. The scale on the writing board was used to measure the diameter of the column along the longest axis of the ellipsoidally contracted animal.

For Madeira and Porto Santo a total of 81 anemones (78 plus 3) was measured. The number of anemones measured at Tenerife (Playa Paraiso, South-western coast) was 100, at El Hierro (La Restinga, southern tip) 5, at Gran Canaria (El Cabron, eastern coast) 10, and at Lanzarote (Puerto del Carmen, southern coast) 9, giving a total of 124 anemones from the Canary Islands.

Chi-square values, Pearson correlation coefficients, and their significance levels were calculated with the help of the statistical package EPISTAT.

RESULTS

SIZE AND DEPTH

Average diameter of contracted *Telmatactis cricoides* surveyed was 10 cm, the maximum being three anemones with 19 cm diameter at the Canary Islands. Figure 1 shows the size distribution of all 205 anemones (note that anemones smaller than 3 cm diameter were not recorded). The size distribution of the anemones

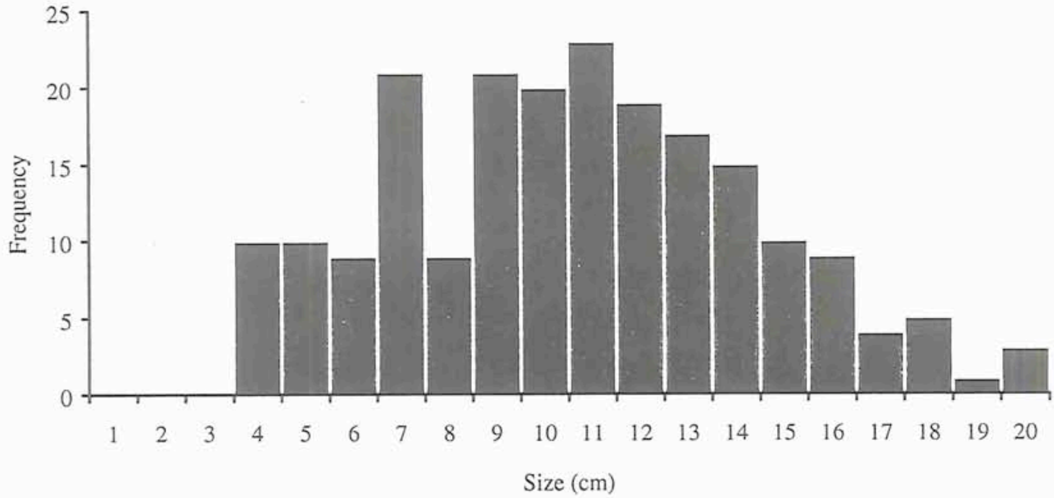


Fig. 1. Size distribution of *Telmatactis cricoides* (n = 205 anemones at least 3 cm in diameter).

was not significantly different between Madeira and the Canaries ($\chi^2 = 4.81$, df = 6, p = 0.56).

Anemone size did correlate significantly with depth at Madeira but not at the Canaries (r = 0.29 and p = 0.008 for Madeira, r = 0.17 and p = 0.07 for the Canaries; total sample r = 0.20, p = 0.005).

The depth at which the 205 anemones were recorded varied from 5 to 42 m, median depth being 20 m. The depth distribution of the *Telmatactis cricoides* from the Canary Islands, was significantly different from those of Madeira ($\chi^2 = 12.34$, df = 5, p = 0.03): anemones of the Canaries were recorded both in shallower and in deeper water than those of Madeira (where only three anemones were recorded shallower than 10m depth and none deeper than 35m).

Table 1

Percentage of colour morphs at Madeira (n = 81) and the Canary islands (n = 124).

	Madeira	Canary
green	31	23
blue-white	20	20
reddish brown	12	9
light brown	0	1
wine-red	2	9
red	0	2
greyish white	6	5
yellow-orange	1	8
greyish orange	0	1
greyish purple	0	1
disk brown, tentacles white	0	9
disk reddish brown, tentacles purple	4	1
disk light brown, tentacles red-brown	7	0
disk greyish brown, tentacles green	0	1
disk greyish green, tentacles white	4	1
disk yellowish green, tentacles red	0	1
disk brownish green, tentacles purple	1	3
disk greyish white, tentacles pink	0	2
disk greyish white, tentacles red	0	1
disk greyish white, tentacles greyish red	4	0
disk greyish white, tentacles purple	0	2
disk greyish white, tentacles green	2	0
disk greyish white, tentacles brown	1	1
disk greyish white, tentacles yellow	0	2
disk greyish white, tentacle bases brown, tips white	0	1

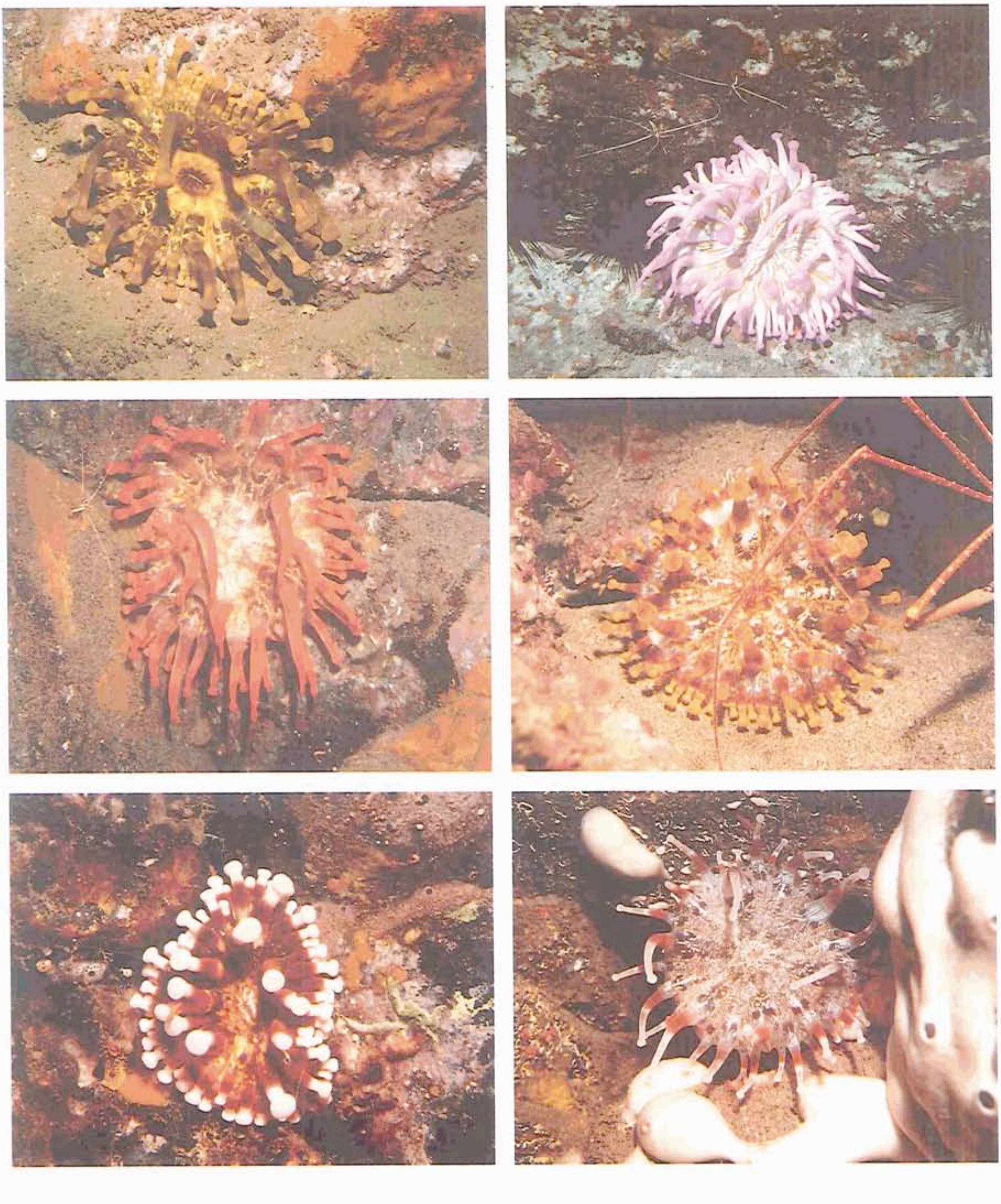
COLOUR

Telmatactis cricoides shows a high degree of colour polymorphism. The colour plate shows some examples (Figs 2-7). Twenty-five different colour morphs were recorded (Table 1). The two most common colour morphs were "green" (subjective experience to a diver; flash light photos show the true colour to be a golden-brown; cf. colour plate) and "blue-white" (subjective experience to a diver; flash light photos show the true colour to be pink and white; cf. colour plate). In other colour morphs, the body and the tentacles of the anemone could either be of the same colour or the tentacles could be of a different colour than the body (cf. Table 1 and Figs 2-7). Table 1 gives the frequencies of the colour morphs observed.

All colour morphs neither "green" nor "blue-white" were lumped as "others" for further analysis. When comparing the relative frequencies of the colour morphs green, blue-white, and "others", no significant differences were found between Madeira and the Canaries ($\chi^2 = 1.87$, df = 2, p = 0.39), the averages being 26, 20 and 54 percent. However, an inter-island difference did exist: eleven out of the 25 colour morphs were recorded only from the Canary Islands and three only from Madeira (cf. Table 1).

The three colour morphs green, blue-white, and "others" did not differ in their depth distributions (i.e. there appears to be no relation between depth and colour morph): $\chi^2 = 5.28$, df = 6, p = 0.51.

The colour pattern of individual animals apparently is stable over time. An individually recognisable anemone in the bay of Garajau, south coast of Madeira island, belonging to colour type "blue-white", was first photographed in September 1983 and has not changed colour in the last 12 years. Other individuals of various different colour patterns observed repeatedly for up to five years have also not changed colour.



Figs. 2-7: 2. Colour morph "green", Madeira; 3. Colour morph "blue-white", Tenerife; 4. Individual from Gran Canaria; 5. Individual from Lanzarote; 6. Individual from Gran Canaria; 7. Individual from Tenerife.

DISCUSSION

The depth distribution 2 partly reflects sampling effort, with dives deeper than 30 m being rarer and of shorter duration. Two *Telmatactis cricoides* were recorded at the maximum depth visited that had rocky substrate (i.e. 42 m, at greater depths the bottom was sandy). Given suitable substrate, the species probably also lives at even greater depths.

The observation that colour type and depth did not correlate suggests that colour polymorphism is not an adaptation to differences in light regime. The greenish colour patterns (nor any of the other colour patterns observed) are not due to symbiotic zooxanthellae, because species of the genus *Telmatactis* do not harbour zooxanthellae (DEN HARTOG 1995, pers. commn). The functional significance (if any) of colour polymorphism in *Telmatactis cricoides* remains unknown.

The presence of different colour morphs at the two archipelagos suggests a certain degree of genetic isolation. Several times, two individuals of a very rare colour morph (e.g. body white, tentacles pink) were found in close vicinity - an observation not expected in randomly mixing populations and suggesting asexual reproduction. That more colour morphs are restricted to the Canary Islands than to Madeira could indicate that transport from the Canaries to Madeira is less common than vice versa, as might be expected from the prevailing current patterns.

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