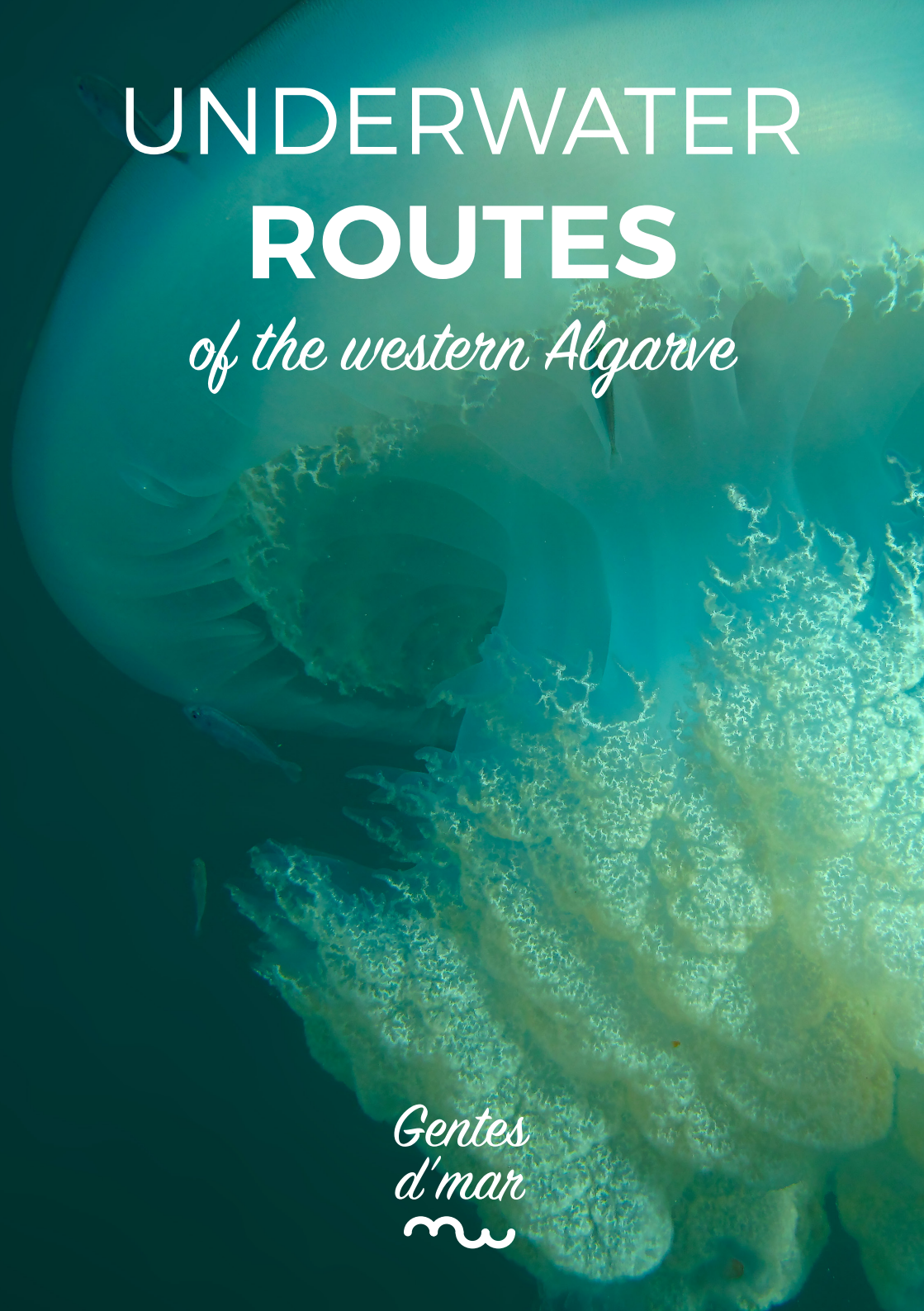
UNDERWATER
ROUTES
of the western Algarve
Gentes
d'mar

CONTENTS

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INTRODUCTION

The Algarve's marine life is characterized by having high biodiversity related to the confluence of three biogeographic sub regions with different characteristics: the Mediterranean, the Lusitanian and the Mauritanian provinces. For this reason many aquatic organisms are at the geographical / ecological limit of tolerance of their distributional range in this area.

As a part of the projects responsible for mapping the marine biodiversity of the Algarve coast (Centre of Marine Sciences / University of Algarve (CCMAR / UALG) - Rensub I-IV), to a depth of 30m (corresponding to the underwater fraction of the National Ecological Reserve), more than 1.400 different species of fauna and flora were identified, 34 of which have some conservation status (according to the Bern Convention, the International Union for Conservation of Nature - IUCN, and the Institute for Nature Conservation - ICNF).

In fact, the coastline of the western Algarve region has several habitats of high community interest which, according to the Habitat Directive may indicate the definition of Special Areas of Conservation (SACs, Rede Natura 2000). Thus, for example, the *Cymodocea nodosa* meadows identified in the "Praia dos Arrifes" (Albufeira) and in "Praia da Marinha" (Lagoa), constitute habitats of high biological sensitivity (and are located in the swimming area of the beaches), which should be managed in the framework of underwater ecotourism, acting as a special educational area and as an attraction for nature tourists.

Currently, areas of particular interest for biodiversity have been increasingly used for leisure activities. In that regard, there is a growing demand for coastal areas, where activities related with direct contact with marine life are more

and more popular. Thus, the conflict between the use of marine areas for recreational purposes and their management and conservation are increasingly important issues.

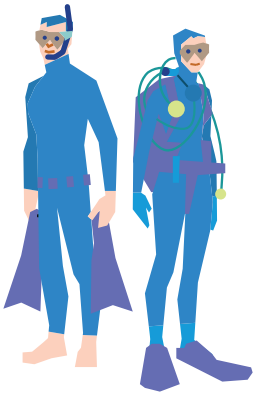
In the Algarve, the development, implementation and maintenance of a network of underwater routes in areas of particular natural and touristic interest aims at functioning as an efficient management tool for ecological maintenance, as well as a surplus-value for the touristic offer, in particular for the nature tourism offer of the region. The network was developed under the EcoSub project (CCMAR / UALG) and at the moment, the western Algarve has nine routes, three for scuba diving ("Poço" in Armação de Pera; "Ponta dos Caminhos" and "Grutas do Martinhal" in Sagres), and five for snorkeling (beaches "Praia dos Arrifes e Praia de São Rafael" in Albufeira; and beach "Praia da Marinha" in Lagoa). This work presents a selection of five routes that integrate the designed network.

The scuba diving spot "Poço" was selected because of its popularity among the visiting divers. Also, the spots located in Sagres were selected because this zone is defined as a Marine Protected Area, with several habitats that deserve special attention regarding conservation and increase of environmental awareness of users.

For the snorkeling routes, the beaches were selected for the variety of marine habitats that they present, and for the characteristic cliffs that surround them. These characteristics make them icons for awareness and environmental education of natural values. It should be noted that the beach "Praia da Marinha", one of the most emblematic beaches of the Algarve coast for its beauty, was considered by the Michelin Guide as one of the 100 most beautiful beaches in the world and one of the 10 most beautiful in Europe. However, this beach is identified as "beach with conditioned use" for security reasons related to the risk of collapsing cliffs, although no interdiction is in place regarding the use of sand or water area for recreational purposes. In these circumstances, it is essential to follow all of the safety instructions located on the beach and on the beach access.

This work is part of the project "Gentes de Mar", of the "Agência de Desenvolvimento do Barlavento" and the CCMAR, and aims at promoting coastal tourism in the winward region of the Algarve, valuing tradition and maritime innovation. Under this project, 3 books (routes/itineraries) were developed: "Roteiros Subaquáticos do Barlavento Algarvio - Underwater Routes of the Western Algarve"; "Roteiros Litorais do Barlavento Algarvio - Coastal Itineraries of the Western Algarve" and "Aldeias de Mar do Barlavento Algarvio - Fishing Villages of the Western Algarve".

We hope that this guide will be an added value for visitors of the selected places, providing unique visits to the marine environment, and promoting the awareness for the preservation of nature.



DIVING IN THE ROUTES

SIGNALING

The different routes described have specifically designed and adapted environmental education tools, different for each situation. It should be noted that the in situ signaling, when available, is provided by the local beach concessionaries and the diving centers so, before visiting, divers should confirm if the signaling is available.

If fact, there is the possibility of not having *in situ* information at certain times of the year. In that case, the current project intends to provide all the information described in the educational tools.

For the routes available in Armação de Pera ("Poço") and at the beach "Praia da Marinha", double-sided acrylic slates (10cm/10cm) were designed with the map of the route, the substrate, the path to follow and the distances between slates. On the back of the slates the visitor can observe the photographs and the names of eight of the most commonly observed species of fauna and flora in the area where the slate is located.

In the scuba diving route "Poço" the slates are fixed in the sandy bottom with "environment friendly" anchors at the interpretative areas which they illustrate.

In the case of the snorkeling routes of the beach "Praia da Marinha", the slates are available in each interpretation spot attached to orange buoys located at the surface of the water.

Sagres is a Marine Protected Area – MPA and, thus there are no *in situ* interpretation slates designed for these routes. Nevertheless, detailed information for each route can be requested in the diving club "Divers Cape" (Sagres), or in the document "Roteiros Subaquáticos do Barlavento Algarvio" (*www.gentesdemar.pt*).

For the remaining snorkeling routes (beaches "Praia dos Arrifes" and "Praia de São Rafael") all the information considered necessary for the self-guidance of each route is available in wooden placards located on the beach (courtesy of CCDR or ARH/APA Algarve).

Double-sided acrylic slates of the routes "Poço" and "Marinha Beach"

TECHNICAL PROFILE

Each route has a technical profile defined on the basis of the diving campaigns carried out for its characterization / definition. The technical profile is based on the weighted opinion of the different researchers involved in these campaigns. In each technical profile several issues are defined/ explained: the preferred diving type (scuba or snorkeling), the minimum diving certification considered necessary (according to the Diário da República, 2ª série, Nº 148, 3 de agosto de 2009), the access to the diving site, the distance to the harbor, the average length of the route, the average depth and the habitats that characterize the diving area.

The degree of difficulty is defined according to a scale ranging from Low (extremely easy)

to High (extremely difficult), and takes into consideration several issues such as: diving typology, type of diving (which may be in a sea cave, for example, with high degree of difficulty), accessibility to the diving place (with or without diving equipment), access to the diving site for physically disabled divers, among others.

Also, the degree of landscape interest considers the evaluation of land and marine environments interest (landscape, geological interest, geography, fauna, flora, presence of endemic species and / or conservation status), using a scale ranging from Low (not interesting) to High (extremely interesting).

The conservation status of the diving zone (if it exists) is also identified.

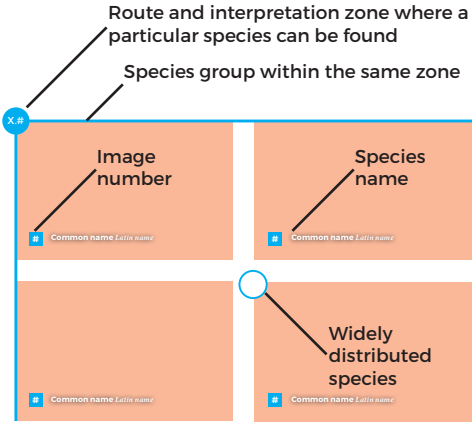
INTERPRETATION ZONES

In each route different environmental interpretation zones were defined according to the fauna and flora species most likely to be observed. The zones were named as follows: in blue with a capital letter indicating the first letter of the location name (G corresponds to the "Grutas do Martinhal") followed by a dot and a roman number. For example, G.II refers to the second interpretation zone (semi-dark zone), and the acronym M.I refers to the first zone of interpretation to visit in the route of the beach "Praia da Marinha".

PHOTOS OF THE FAUNA AND FLORA

For each route, most of the mentioned species are illustrated in the section "Photos", and their positions in the section are marked in blue superscript within square brackets. For example, the quote "*Corynactis viridis*[1]" indicates that this species is illustrated in the first image of "Photos" section.

In this section, the connection of the photos to the routes is identified in blue circles located in the corner of the image. Images of a certain route are linked by a blue line.



Legend to the "Photos" section

CONSERVATION AND ENVIRONMENTAL AWARENESS

The network of routes presented was designed for marine areas of scenic, biological and/or conservation interest. Thus, visitors should always be aware of some of the basic rules related to environment protection. The golden rule is to always "leave the place as it was found", which means that no trash should be dumped in the area (always use the appropriate disposal facilities for this purpose). Also remember that no "souvenirs" should be taken from of site (such as stones, animals, etc.), and interactions with animals should be avoided in order not to disrupt the normal functioning of the biological systems.

In the environmental education tools available (such as this web page), you will find explanations on how to behave and what not to do. However, if in doubt, always choose the precautionary principle! Always avoid changing what exists naturally. Pay special attention to all specimens and areas with some environmental protection status, since this status indicates an additional need for conservation.

And remember, the animals are not souvenirs... let them stay where you saw them, so that others can have an experience as enjoyable as yours!


-200
-150
-100
-50
-25
SEIXE RIVER
Odeceixe
VALE DE HOMENS
Carriagem
AMOREIRA
ALJEZUR RIVER
MONTE CLÉRIGO
ALJEZUR
Monchique Hills
Marine Protected Area
ARRIFANA
CARRAÇA
PEDRA DA AGULHA
WESTERN
Schist Cliffs
BORDEIRA RIVER
BORDEIRA
CARRAPATEIRA
AMADO
MURRAÇÃO
RIA DE ALVOR
ALVOR
LAGOS
ARTICIAL REEFS
PRAIA DA LUZ
VILA DO BISPO
BURGAU
SALEMA
PONTA DA PIEDADE
Black Volcanic Rock
BATELÃO DO BURGAU
VILHELM KRAG
PONTA RUIVA
Sagres
L'OCEAN
ZAVIAL
TELHEIRO
PEDRA DAS GAIVOTAS
SAGRES
S. VICENTE CAPE
PEDRA DO GIGANTE
BELICHE
TORVORE
ISLETS OF MARTINHAL
TONEL
MARINE PROTECTED AREA
Ponta dos Caminhos
Limestone Cliffs
Gruta do Martinhal
São Vicente Canyon


FISHING VILLAGES
UNDERWATER ROUTES
DIVING SPOTS
WILDLIFE WATCHING
SURF
OTHER ACTIVITIES
GEOLOGICAL INTEREST
TIDE POOLS
MUNICIPALITIES
PROTECTION AREA
INTEGRAL
PARCIAL
ONCHIQUE
ALGARVE
SILVES
LAGOA
ORTIMÃO
FERRAGUDO
CARVOEIRO
BENAGIL
SR.ª DA ROCHA
ARMAÇÃO DE PERA
LAGOA DOS SALGADOS
ALBUFEIRA
OLHOS D'ÁGUA
QUARTEIRA
GALÉ
OURA
MANUEL LOURENÇO
PRAIA DOS ARRIFES
LEIXÃO DA GAIVOTA
Limestone Cliffs
Sand Dunes
Red Cliffs
Poço
Praia da Marinha
Praia dos Arrifes
ARTIFICIAL REEFS
ARTIFICIAL REEFS
-50
-50
-25
-50
-100
0
10 nautical miles
Portimão Canyon

GRUTA DO MARTINHAL (SAGRES)

Situated on the West side of the islets of Martinhal, this sea cave is one of the smallest of Sagres, with low complexity topography, a single main entrance, and 16m deep. The entrance is more than three meters in height and the hall is about 10m long. The sea cave is in general moderately illuminated, being highly exposed to wave action.

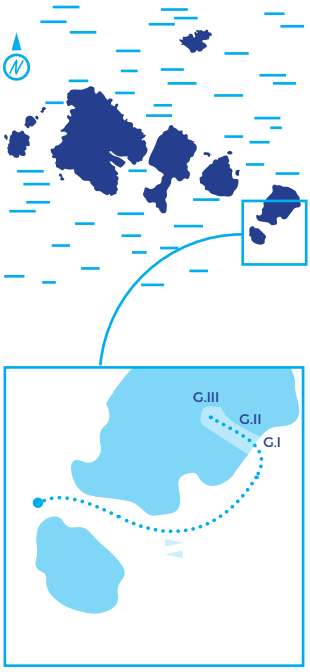
Once in the sea cave the diver can appreciate three different environments, according to the influence of the different levels of light intensity with their corresponding biological communities. Nevertheless, the observable marine species are mainly characteristic of semi-dark areas.

Zone G.I, with higher luminosity, is located near the entrance. This area is frequently inhabited by species such as the tubular sea cucumber (*Holothuria arguinensis*[61]) or the jewel anemone (*Corynactis viridis*[1]). Next, zone G.I presents characteristic fauna of semi-dark areas such as the scarlet coral (*Balanophyllia regia*[8]) and some sponge species (e.g. *Crambe crambe*[11], *Cliona celata*, *Chondrosia reniformis*[32], *Spongia agaricina*[10]).

The last zone (G.III) has species that only tolerate low levels of light intensity, and are, therefore, truly characteristic of sea cave environments, such as various types of sponges (e.g. *Hymedesmia versicolor*[33], *Corticium candelabrum*[15], *Phorbas tenacior*[17]) and corals (e.g. *Astroides calycularis*[14], *Caryophyllia inornata*[13]). Inside the cave, the diver can observe rock crevices where the common spiny lobster (*Palinurus elephas*[16]) can be spoted.

Inside the cave the substrate is mostly composed of mud, while outside the cave the landscape is filled with large rocky outcrops.

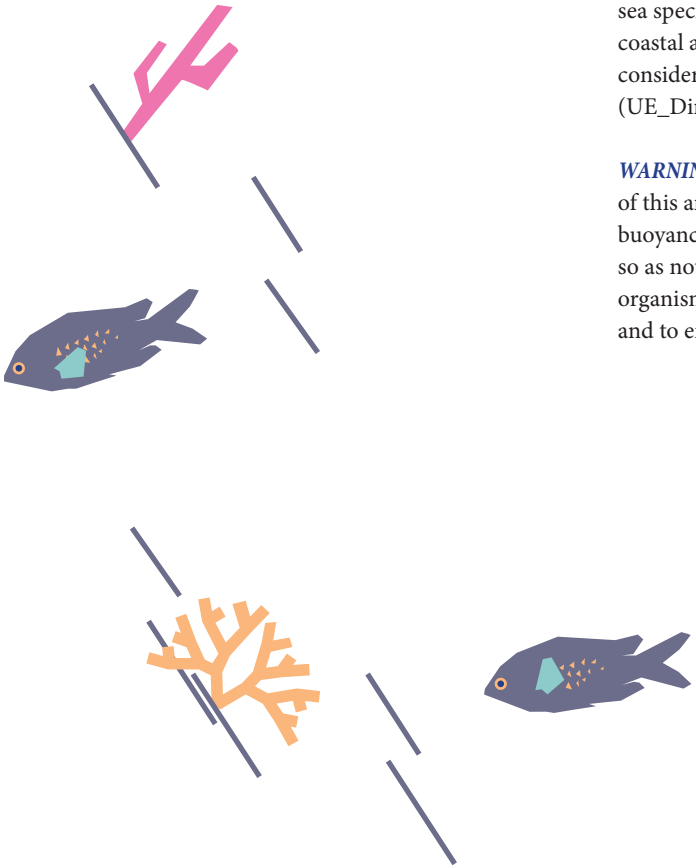
Islets of Martinhal



ACCESS	HARBOR DISTANCE	DIFFICULTY
Boat	0,70 nautical miles / 5 min. (aprox.)	Medium/High

AVERAGE TIME	MAX. DEPTH	HABITAT
45/50 min.	25m	Cave

In an underwater cave three environments with different light intensities can be identified. The initial area of the cave (entrance area) is characterized by high levels of luminosity, but a semi-dark and a dark area, where light is practically (or totally) absent, follow. The biological communities associated with these biotopes are defined by the tolerance of the species to the different light intensities.



CONSERVATION

This area requires specific and appropriate protective measures since it is a Marine Protected Area (MPA), integrated in a Marine Park (Parque Marinho do Sudoeste Alentejano e Costa Vicentina - PMSACV), and a Site of Community Interest (SCI). This habitat, like others in Sagres, is fragmented and isolated, with rare deep-sea species occurring in coastal areas, being therefore considered vulnerable species (UE_Diretiva Habitats).

WARNING_ Due to the nature of this area, extra care in buoyancy control is essential, so as not to disturb the organisms living on the bottom and to ensure good visibility.

LANDSCAPE INTEREST	BIOLOGICAL INTEREST	CONSERVATION STATUS
Medium	High	PMSACV/MPA; SCI

PONTA DOS CAMINHOS (SAGRES)

Also called "O Santuário", this diving site is located at the edge of the cliff that surrounds the bay of Martinhal. The diving area has two huge natural and parallel tunnels, linked at the surface.

The route starts at about 10m from an underwater islet (average depth of 15m) that should be seen on the port side. The diver must go around this rocky formation and approach the entrance of the first tunnel, that is located on his/her right side (average depth of 16m). Along this trail, the sandy bottom is covered with rocky outcrops inhabited by several species of algae.

The tunnels are moderately illuminated and exposed to the local hydrodynamic characteristics, and can be divided in three zones corresponding to different biological settlements: the entrance area (C.I), the semi-dark area (C.II), and the dark area (C.III).

The first tunnel is wide and has an average depth of 18m. The variety of marine macrofauna that inhabits the walls and the substrate should be explored by the diver (e.g. sponges and sea stars). Species such as the white clathrina (*Clathrina coriacea*[25]), the jewel anemone (*Corynactis viridis*[1]), the crater sponge (*Hemimycale columella*[22]) or the pedunculate clathrina (*Guancha lacunosa*[36]) can be frequently observed. In the final section of the tunnel, the substrate is covered with big pebbles with high algae cover and calcareous sponges (*Leucosolenia complicata*[26] and *G. lacunosa*).

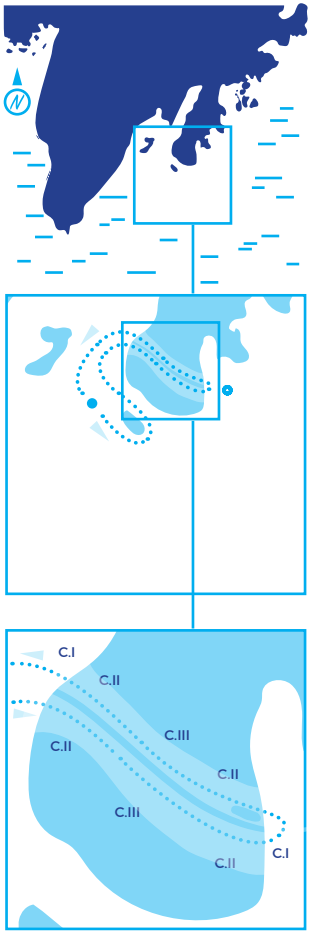
In front of the exit of the first tunnel lies the wreck of the Danish cargo ship Nordsoen that sunk during the 1st World War.

To enter the second tunnel, the diver must go around the exit of the first tunnel that will be on his/her left side. The second tunnel, exposed to stronger hydrodynamism, currents and waves conditions, is characterized by the same generic fauna of the first tunnel, but with significantly lower densities.

The substrate is mostly deprived of marine life, and is constituted mostly by small pebbles or gravel. The differences between the animal species that inhabit the illuminated areas of the tunnels (entrance and exit) and the darker areas of the middle of the tunnels (semi-dark and dark zones) must be stressed.

In the darker zones of the tunnel, the diver can observe species such as: the kidney-shaped sponge (*Chondrosia reniformis*[32]), versicolor sponge (*Hymedesmia versicolor*[33]), the jewel anemone

Ponta dos Caminhos

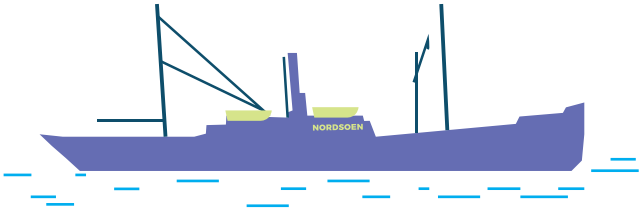


Start
Ship wreck

ACCESS	HARBOR DISTANCE	DIFFICULTY
Boat	1,3 nautical miles /10 min. (aprox.)	Low

(*C. viridis*), and the pin-head squirt (*Clavelina nana*). In the illuminated areas the diver can observe species such as: white clathrina (*C. coriacea*), jewel anemone (*C. viridis*), crater sponge (*H. columella*), pedunculate clathrina (*G. lacunosa*), spiny starfish (*Marthasterias glacialis*[82]), fan worm (*Serpula vermicularis*), or the kidney-shaped sponge (*C. reniformis*).
To return to the support vessel, the diver must reverse course at the exit of the second tunnel and head in the SW direction. This trail is characterized by the presence of pebbles and rocky outcrops with high fauna and flora coverage.

The Danish cargo ship Nordsoen, carrying barrels of herring, was detained by cannon shots fired from the German submarine U35. The cargo was intended for the Italian port of Genoa, which dictated the ships's fate. After forcing the captain and the crew to abandon the vessel, the cargo ship was loaded with explosive charges. The explosion occurred in the vicinity of Cape Sagres, but the vessel did not sink immediately, and drifted along the cliff until it finally sank next to "Ponta dos Caminhos". On the 24th of April, 1917, the Danish cargo ship Nordsoen was the first of four vessels to be sunk near Sagres.



CONSERVATION

This area requires specific and appropriate protective measures since it is as a Marine Protected Area (MPA), integrated in a Marine Park (Parque Marinho do Sudoeste Alentejano e Costa Vicentina - PMSACV), and is also a Site of Community Interest (SCI). This habitat, like others in Sagres, is fragmented and isolated, with rare, deep-sea species occurring in coastal areas, being therefore considered vulnerable (UE_ Diretiva Habitats).

WARNING_ Due to the nature of this area, extra care in buoyancy control is essential, so as not to disturb the organisms living on the bottom and to ensure good visibility.

"POÇO" (ARMAÇÃO DE PERA)

This route is located off Armação de Pera. To do the route, the diver must follow the rocky wall that can be seen along the entire trail on the left hand side of the diver.

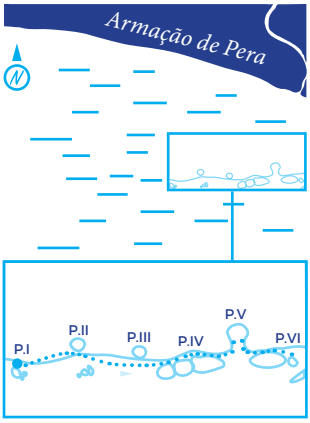
In zone P.I sea anemones (e.g. *Anemonia viridis*[79]) and sea cucumbers (e.g. *Holothuria arguinensis*[61]) dominate. Also, fish such as zebra seabream (*Diplodus cervinus*[65]), common two-banded seabream (*Diplodus vulgaris*[58]), and different species of wrasses (e.g. *Symphodus* spp.[44]) are common. Following the route, at approximately 30m, a well that appears in the rocky wall can be explored (zone P.II). This area is dominated by pouts (*Trisopterus luscus*[41]), zebra seabreams (*D. cervinus*) and black seabreams (*Spondyliosoma cantharus*). The area also has also a rich variety of nudibranchs (e.g. *Felimare cantabrica* and *Flabellina babai*[21]). The occurrence of common octopus (*Octopus vulgaris*[83]) and pink sea-fans (*Eunicella verrucosa*[40]) is to be highlighted.

Following the path, the diver will find a rocky outcrop consisting of two islets leaning against the rock wall (zone P.III). In this zone the abundance of sea anemones, scorpionfishes (e.g. *Scorpaena notata*[80]) and nudibranchs (e.g. *Felimare picta*[43]) should be stressed. Here, as in the entire route, the fish fauna is diverse, and the presence of pouts[41] and the zebra seabreams[65] is noticeable. The dense macroalgae rocky cover (with species such as *Halopteris filicina*) must also be emphasized.

Zone P.IV takes the visitor to the interior of the rocky outcrop, where redbanded seabreams (*Pagrus auriga*[48]), damselfish (*Chromis chromis*[50]) or the Mediterranean rainbow wrasse (*Coris julis*[69]) can be frequently observed. The landscape is accompanied by high macroalgae variety, as well as sea stars (e.g. *Marthasterias glacialis*[82]), sea urchins (e.g. *Paracentrotus lividus*[60]) and sea anemones (*A. viridis*). The frequent presence of the Mediterranean moray (*Muraena helena*[46]) should also be highlighted.

The diver must now approach a depression entering the rock wall (zone P.V). In this area, the fauna and the flora are particularly luxuriant, with the occurrence of pouts, zebra seabreams, Senegal seabreams (*Diplodus bellottii*[49]), damselfishes (*C. chromis*),

■ ***"Poço"***



● **Start**

ACCESS	HARBOR DISTANCE	DIFFICULTY
Boat	**3,7 nautical miles / 15 min. (aprox.)**	**Low**

AVERAGE TIME
45/50 min.

MAX DEPTH
22m

HABITAT
Rock platform, Sand, Rocky Outcrops, Inlets

European congers (*Conger conger*[51]) and common octopus (*O. vulgaris*).
Further along the path, the diver will find the "pedra das anémonas" (anemone rock) (zone P.VI), which indicates the end of the route. The name given to this rock is due to the fact that it is literally covered with sea anemones of the species *Aiptasia diaphana*[52] (yellow aiptasia), creating a uniquely luxuriant landscape.
In this final section of the route, the occurrence of *Codium bursa*[76], a green macroalgae with a unique globular appearance must be stressed. Gorgonians (e.g. *Leptogorgia sarmentosa*[54]) and nudibranchs are also common.

NOTES
In the summer season interpretative slates placed near the bottom will guide the divers along the route

CONSERVATION
According to the Rensub Project (*www.rensub.com*), this route is located in one of the richest marine biodiversity areas of the Algarve and should therefore be subjected to specific nature conservation measures.

LANDSCAPE INTEREST
High

BIOLOGICAL INTEREST
High

CONSERVATION STATUS
Não Tem

PRAIA DA MARINHA (LAGOA)

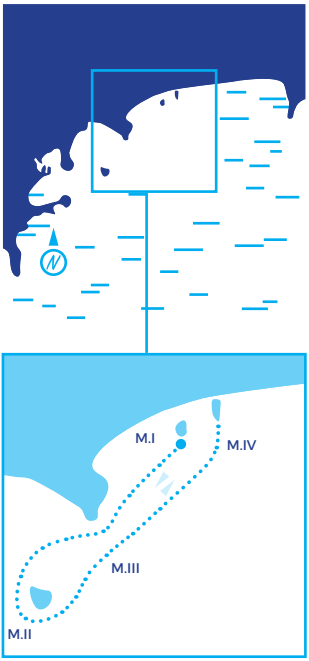
This section describes one of the three routes that were created for the beach "Praia da Marinha", in Lagoa. The four zones of the route are described with specific interpretative slates. The path starts near the rocky outcrop which delimits the beach on the West side. This area is characterized by a sandy bottom with small rocks (zone M.I). Several species of juvenile seabreams (e.g. *Diplodus sargus*[73]) populate the area and in the rocky wall, barnacles (*Chthamalus* spp. e *Balanus* sp.) can be observed (average depth of 1-2m). The diver must continue swimming away from the beach, until reaching the small island located beyond the end of the rocky wall. Along this route the bottom is mainly composed by flat sheets of rock, with high algae cover (e.g. *Cystoseira usneoides*[55]), sea anemones, sea urchins and some sea cucumbers. In the middle of this area, a small seagrass meadow of *Cymodocea nodosa*[86] can be explored (average depth of 3.3m). It must be emphasized that these meadows (although small in size) are quite rare outside the coast of the Mediterranean Sea. Common two-banded seabreams (*Diplodus vulgaris*[58]), zebra seabreams (*Diplodus cervinus*[65]), gobies and blennies (e.g. *Gobius cruentatus*[74], *Gobius xanthocephalus*[57], *Parablennius pilicornis*[84]) can be frequently observed in this habitat.

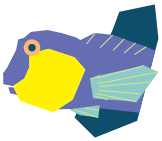
The visitor should now go around the small islet that emerges in this area in an anti-clockwise direction (average depth of 3m) (zone M.II). With high biodiversity, this area is frequently inhabited by Caneva's blenny (*Lipophrys canevae*), seabreams, different invertebrates such as sea cucumbers (e.g. *Holothuria arguinensis*[61]), and several algae species (e.g. *Asparagopsis armata*[77], *Dictyota dichotoma*[63], *D. cyanoloma*[37]).

The return path should be made towards the entrance of the beach (zone M.III) to a small sandy clearing with rocky outcrops (average depth of 3m), where gobies and invertebrates (such as the anemone *Anemonia viridis*[79] which are frequently associated with *Gobius bucchichi*[64]), are common.

The visitor must now swim back to the beach, where the sandy bottom provides a safe exit area (zone M.IV). In this final zone some fragments of the seagrass meadow of *C. nodosa* can still be explored, allowing the observation of gobies, such as the black-

Praia da Marinha





AVERAGE TIME

45 min.

MAX. DEPTH

4m

HABITAT

Flagstone, Sand, Rocky outcrops, Islands, Pebbles, Seagrass meadows

faced blenny (*Tripterygion delaisi*[81]), and the Mediterranean rainbow wrasse (*Coris julis*[69]).
Before exiting the route, next to the three small rocky blocks, juveniles of seabreams, sand smelts (*Atherina presbyter*) and mullets (*Liza* spp.) can be easily spotted.

NOTES

In the summer season an interpretative wooden placard placed in the sand will provide all the information needed for self-guidance on the route. Also, interpretative slates will be placed at the surface of the water, attached to orange buoys, to guide the divers along the route

CONSERVATION

Seagrass meadows (*Cymodocea nodosa*) protected by the Habitat Directive Habitat 1110.

CONSERVATION STATUS

This habitat requires appropriate conservation measures due to the occurrence of seagrass meadows (UE_Diretiva Habitats).

LANDSCAPE INTEREST

High

BIOLOGICAL INTEREST

High

PRAIA DOS ARRIFES (ALBUFEIRA)

The proposed route is located in the beach Praia dos Arrifes. This route was selected for having different and unusual habitats that are characteristic of the Algarve coastal area, including a sea-grass meadow (*Cymodocea nodosa*[86]), protected by the Habitat Directive (Habitat 1110).

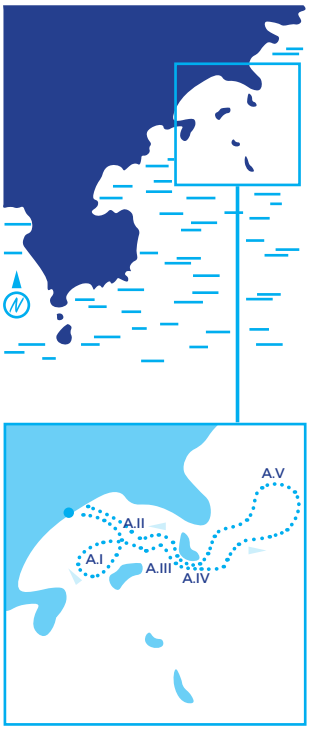
The route starts in front of the beach support bar, bearing to the center of the two rocky outcrops that can be easily seen on the East side of the beach (average depth of 1-2m). The landscape of the first part of the route (zone A.I) is mostly composed of sand and pebbles with high algae cover (e.g. *Halopteris* spp., *Codium* spp., *Plocamium cartilagineum*, *Jania* spp., *Ellisolandia elongata*). Several macrobenthic species can be observed in this algae cover, such as: the marine gastropod mollusk (*Gibbula cineraria* and *Gibbula pennanti*), the snakelocks anemone (*Anemonia viridis*[79]), the sea urchin (*Paracentrotus lividus*[60]), the spiny starfish (*Marthasterias glacialis*[82]), and the common brittlestar (*Ophiothrix fragilis*). Also, the diver should explore the presence of cryptic fish, such as the Bucchich's goby (*Gobius bucchichi*[64]), the ringneck blenny (*Parablennius pilicornis*[84]), or the sand gobies (*Pomatoschistus* spp.). The presence of the starlet (*Asterina gibbosa*[85]) must be highlighted, as it has a protected status under the Berne Convention in the Mediterranean region.

A closer observation of the sandy bay, delimited by the beach and by the rocky outcrops visible on the surface (zone A.II), is advised, as the sand and the pebbles, protected by the surrounding rocks, create unique habitats such as rocky enclaves.

In both areas (zone A.I and A.II) salemas (*Sarpa salpa*), white seabreams (*Diplodus sargus*[73]), common two-banded seabreams (*Diplodus vulgaris*[58]), sand smelts (*Atherina presbyter*) and several species of wrasses (e.g. *Symphodus bailloni* [70] or *Symphodus melops*) proliferate.

The visitor must now dive towards the middle of the two rocky outcrops (zone A.III) located in the East side of the beach (average depth of 3-4m). In this area the rocky enclaves intensify, with strong colonization of macroalgae similar the first zone of the route. Among the rocky crevices the diver can observe several animals such as: gobies, blennies, the spider crab (*Maja brachydactyla*), the

Praia dos Arrifes



● Start

ACCESS	HARBOR DISTANCE	DIFFICULTY
Beach	-	Low

common octopus (*Octopus vulgaris*[83]) and the velvet crab (*Necora puber*[78]), which select these zones for shelter and food. In fact, benthic macroinvertebrates such as nudibranchs (e.g. *Felimare tricolor*[75]), sea urchins and sea anemones are extremely common in these ecosystems. Seabreams, sand smelts, salemas, and wrasses can also be easily seen in this part of the route. The diver can also observe the rock-pool blenny (*Parablennius parvicornis*[80]), which was not previously registered for the Portuguese coast.

In the left rocky outcrop, the diver can explore the two cavities that cross through the outcrop (zone A.IV). Besides the beauty of the underwater sea caves, common octopus (*O. vulgaris*) can be frequently observed in these habitats. An interesting characteristic of these animals is its ability to "camouflage" (mimicry - the ability to imitate the environment through the transformation of color and/or body texture), as a response to danger.

The episodic occurrence of the barrel jellyfish (*Rhizostoma pulmo*) must be highlighted in this area. If this occurs, the diver should leave the place, or pay special attention to the animal, since it possesses stinging cells on the tentacles.

When reaching the alignment with the beginning of the entrance to the pontoon of the Albufeira marina, the diver must aim towards the coast to explore one of the best preserved seagrass meadows of the specie *C. nodosa* that still exists in the South coast of Portugal (zone A.V).

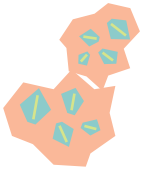
After going through the meadow, the direction must be inverted, and the visitor can begin the return to the starting point, crossing again the two rocky outcrops located in the East zone of the beach.

NOTES

In the summer season an interpretative wooden placard placed in the sandy area of the beach will provide all the information needed for self-guidance of the route.

CONSERVATION

This habitat requires appropriate conservation measures due to the occurrence of seagrass meadows (UE_ Diretiva Habitats).

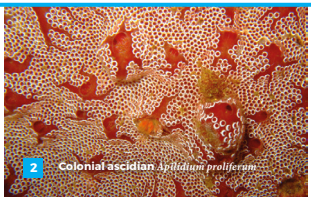


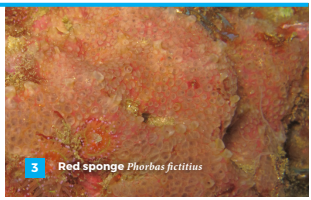
The **seagrass meadows** *serve as areas of refuge and feeding of various marine organisms, and are therefore associated with a large number of animal species. For this reason, a careful observation of this seagrass meadow is recommended. This meadow, although not as dense as before, is one of the last of this kind in Portuguese coastal waters (other than estuaries and lagoons).*

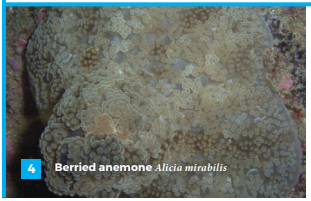
PHOTOS

G.I

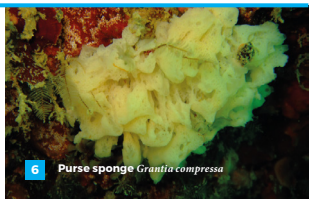

1 **Jewel Anemone** *Corynactis viridis*


2 **Colonial ascidian** *Aplidium proliferum*


3 **Red sponge** *Phorbas fictitius*


4 **Berried anemone** *Alicia mirabilis*


5 **Trumpet anemone** *Aiptasia mutabilis*


6 **Purse sponge** *Grantia compressa*

G.II


7 **Sea finger** *Alcyonium acaule*


8 **Scarlet coral** *Balanophyllia regia*


9 **False coral** *Alcyonium coralloides*


10 **Elephant ear** *Spongia agaricina*


11 **Orange-red encrusting sponge** *Crambe crambe*


12 **Goosebump sponge** *Dysidea fragilis*

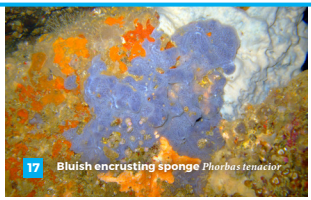
G.III


13 **Carnation coral** *Caryophyllia inornata*


14 **Star** *Astroides calycularis*


15 **Orange sponge** *Corticium candelabrum*


16 **Spiny lobster** *Palinurus elephas*

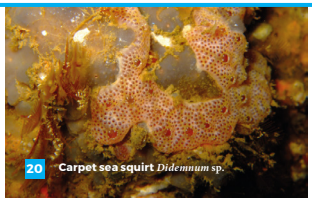

17 **Bluish encrusting sponge** *Phorbas tenacior*


18 **Mediterranean slipper lobster** *Scyllarides latus*

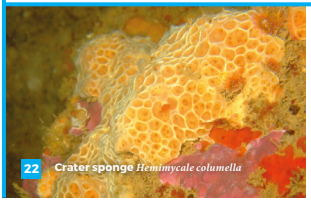
P. 20

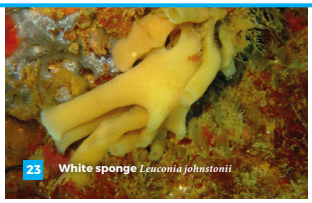
C.I


19 Twin fan worm *Bispira volutacornis*


20 Carpet sea squirt *Didemnum* sp.


21 White flabellina *Flabellina babai*


22 Crater sponge *Hemimycale columella*


23 White sponge *Leuconia johnstonii*


24 Black ascidian *Phallusia fumigata*

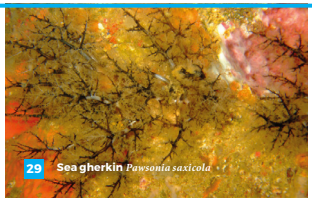
C.II


25 White clathrina *Clathrina coriacea*


26 White sponge *Leucoselenia complicata*


27 Coral worms *Filograna* sp.


28 Reddish-yellow bryozoan *Schizomavella* sp.

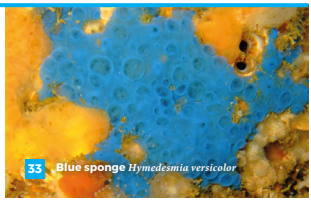

29 Sea gherkin *Pawsonia saxicola*


30 Carpet flatworm *Thysanozoon brocchii*

C.III


31 Stinker sponge *Sarcotragus fasciculatus*


32 Kidney-shaped sponge *Chondrosia reniformis*


33 Blue sponge *Hymedesmia versicolor*


34 Pin-head squirt *Pycnoclavella taureanensis*


35 Transparent sea squirt *Ciona* sp.


36 Pedunculate clathrina *Guancha lacunosa*

PHOTOS

P.I

37 **Iridescent brown algae** *Dictyota cyanoloma*

38 **Portuguese blenny** *Parablennius ruber*

39 **Striped blenny** *Parablennius rouxi*

P.II

40 **Pink sea-fan** *Eunicella verrucosa*

41 **Pouting** *Trisopterus luscus*

42 **Rose gorgonian** *Eunicella labiata*

P.III

43 **Giant doris** *Felimare picta*

44 **Corkwing wrasse** *Symphodus melops*

45 **Comber** *Serranus cabrilla*

P.IV

46 **Moray eel** *Muraena helena*

47 **White sea fan** *Eunicella gazella*

48 **Redbanded seabream** *Pagrus auriga*

P.V

49 **Senegal seabream** *Diplodus bellottii*

50 **Mediterranean damselfish** *Chromis chromis*

51 **Conger eel** *Conger conger*

P.VI

52 **Yellow aiptasia** *Aiptasia diaphana*

53 **Tube anemones** *Cerianthus membranacea*

54 **Orange gorgonian** *Leptogorgia sarmentosa*

M.I

55 **Bushy blader-chain wrack** *Cystoseira usneoides*

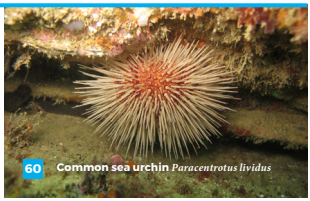
56 **Cuttlefish** *Sepia officinalis*

57 **Golden goby** *Gobius xantocephalus*

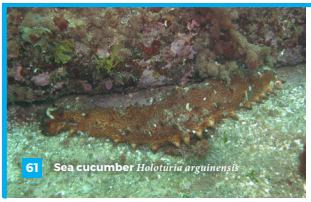
58 **Two-banded seabream** *Diplodus vulgaris*

M.II

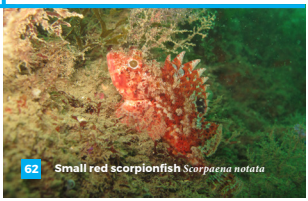
59 **Harpoon weed** *Asparagopsis armata*



60 **Common sea urchin** *Paracentrotus lividus*

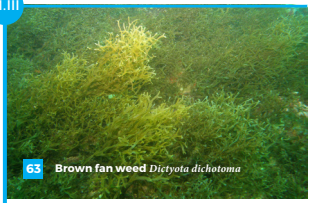


61 **Sea cucumber** *Holoturia arguinensis*



62 **Small red scorpionfish** *Scorpaena notata*

M.III



63 **Brown fan weed** *Dictyota dichotoma*

64 **Bucchichi's goby** *Gobius bucchichi*

65 **Zebra seabream** *Diplodus cervinus*

66 **Ballan wrasse** *Lalbrus bergylta*

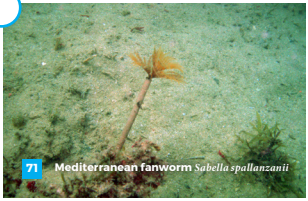
M.IV

67 **Black scorpionfish** *Scorpaena porcus*

68 **Peacokc's tail** *Padina pavonica*

69 **Rainbow wrasse** *Coris julis*

70 **Baillon's wrasse** *Symphodus bailloni*



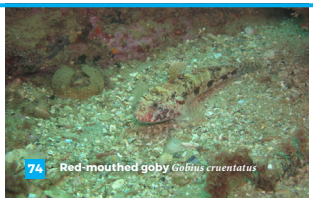
71 **Mediterranean fanworm** *Sabella spallanzanii*

72 **Small sea hare** *Aplysia parvula*

PHOTOS

A.I


73 White seabream *Diplodus sargus*


74 Red-mouthed goby *Gobius cruentatus*


75 Nudibranch tricolor *Felimare tricolor*

A.II


76 Green sponge ball *Codium bursa*


77 Goldsinny wrasse *Ctenolabrus rupestris*


78 Velvet crab *Necora puber*

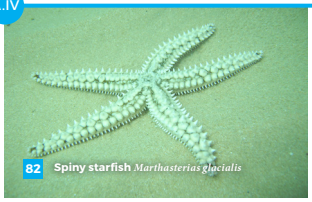
A.III

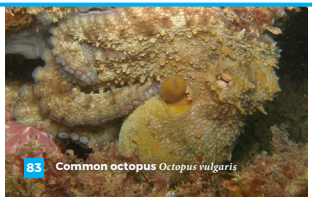

79 Snakelocks anemone *Anemonia viridis*


80 Rock pool blenny *Parablenius parvicornis*


81 Black-faced blenny *Tripterygion delaisi*

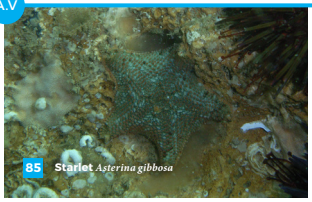
A.IV


82 Spiny starfish *Marthasterias glacialis*


83 Common octopus *Octopus vulgaris*


84 Ringneck blenny *Parablennius pilicornis*

A.V


85 Starlet *Asterina gibbosa*


86 Slender seagrass *Cymodocea nodosa*


87 Mystery blenny *Parablennius incognitus*


88 Slippery lobster *Scyllarus arctus*


89 Greater weever *Trachinus draco*


90 Nudibranch *Flabellina affinis*

CURIOSITIES

Black-faced blenny (*Tripterygion delaisi*[81]):
The black-faced blenny presents sexual dimorphism. The female has a marbled and discreet colour, while the male is much more colorful, with a black head and yellow body.

Gorgonians:
Gorgonians are colonial cnidarians with an arborescent aspect. The colonies have an axial central stem with branches where small polyps are distributed throughout the surface. The most branched and flexible gorgonians are found in shallower zones with stronger currents. The different species of gorgonians have different colours: pink, yellow, red and white. It is relatively easy to identify the six different species that can occur in this area (*Eunicella verrucosa*[40], *E. labiata*[42], *E. gazella*[47], *Leptogorgia sarmentosa*[54], *L. lusitanica*, *Paramuricea clavata*) .

Anemones (*Aiptasia diaphana*[52] e *A. mutabilis*[5]):
These anemones are very similar and particularly difficult to distinguish. However, the first one does not exceed 5cm in height and 2-3cm in diameter, while the second may reach 20cm in height and 10cm in diameter. Also, *A. diaphana* possesses up to 80 tentacles, while *A. mutabilis* can have more than 160.

Blue sponge (*Hymedesmia versicolor*[33]):
The scientific name of this species refers etymologically to its colour range. In the Algarve it presents a very vivid blue colour, but in the Mediterranean it is yellowish. This species is associated with shadow areas, particularly in caves or areas below 20m depth.

Sea cucumbers (*Holothuria* spp.[61]):
Several species of sea cucumbers can be found in the Algarve coast. They are slow growing animals which reach maturity at the age of 5 to 8 years, but they can reach considerable sizes, ranging between 1cm to more than 1m in length. Besides the different colourations, one of the diagnostic and curious characteristics of these animals is the release (or not) of Cuvier tubes. These extremely adhesive filamentous structures possess toxicity, and are released when the sea cucumbers are attacked or simply handled.

Mediterranean ovulid (*Simnia spelta*[42]):
This gastropod of approximately 1cm inhabits a depth range from the 4m to the 60m, and feeds of gorgonians. The animal has diverse colorations, from the white to bright pink, but as a rule, it presents the coloration of the gorgonian where it is located.

Mediterranean rainbow wrasse (*Coris julis*[69]):
This fish presents noticeable sexual dimorphism, with brightly coloured males (with some predominance of green), and brown females. The fish is hermaphrodite and females can reverse sex to become secondary males.

Iridescent brown algae (*Dictyota cyanoloma*[37]):
This algae belongs to the brown algae group. The algae is flexible and of green-brownish or yellowish colour, but once in water, it acquires a bluish iridescence coloration in the margins, which distinguishes this species from all other algae.

Red algae (*Asparagopsis armata*[59]):
This is a red algae with modified branches that form spines (origin of the term "armata"). Its life cycle has two phases with morphologies so different that they have different scientific names (*Falkenbergia rufolanosa* and *A. armata*). Nevertheless, and whatever the live cycle phase, the divers are advised that this algae sticks to the neoprene diving suits, being extremely difficult to remove.

INTEREST FOR CONSERVATION

Coral (*Astroides calycularis*[14]):
This species is characteristic of dark areas (e.g. caves) and is protected in the Mediterranean Sea under the Berne Convention. It is one of the corals that can be seen in the Portuguese coast. Corals are a group of distinct marine macroinvertebrate species which have 6 tentacles, or multiples of 6, and secrete an external calcareous skeleton.

Pink sea-fan (*Eunicella verrucosa*[40]):
According to the IUCN Red List, this species presents a "Vulnerable" status, and faces the risk of extinction due to accidental catches during fishing activities. In the Algarve coast the species presents stable population numbers.

Common-sea-urchin (*Paracentrotus lividus*[60]):
Although not having any special conservation status in the Portuguese coast, this species (like others that occur in Portugal, such as: the elephant ear (*Spongia agaricina*[10]), the spiny lobster (*Palinurus elephas*[16]), the Mediterranean slippery lobster (*Scyllarides latus*[18]) and the Slippery lobster (*Scyllarus arctus*[88]) is protected in the Mediterranean Sea under the Berne Convention.

Seagrass meadows of *Cymodocea nodosa*[86]:
These seagrass meadows are protected by the Habitats Directive (92/43/CEE and by the Decreto-lei 140/99, de 24 de abril) for the conservation of natural habitats in Europe. In fact, these habitats are unusual in the oceanic beaches of our coast, but there are still some remains of these meadows at Marinha Beach and Arrifes Beach. The meadows are highly productive habitats, which help to reduce coastal erosion, stabilize sediments, improve water quality and increase biodiversity, since they act as shelter, feeding and breeding areas for many marine species. These meadows can also be used for ambush by invertebrate predators like the common octopus (*Octopus vulgaris*[83]) or the cuttlefish (*Sepia officinalis*[56]).

DANGERS

Sea anemones (*Aiptasia diaphana*[52], *A. mutabilis*[5], *Alicia mirabilis*[4] and *Anemonia viridis*[79]): These species have stinging cells (cnidoblasts) that release a toxin when disturbed. This toxin causes skin, eye, and mouth irritation. For this reason touching and handling must be done with extreme care.

Scorpionfishes (*Scorpaena* spp.):
The scorpionfishes have poisonous toxins at the base of the dorsal fin spines. These fishes (*Scorpaena notata*[62], *S. porcus*[67]) have the extraordinary ability to mimic the environment, and are difficult to distinguish because of their camouflage on different substrates. The scorpionfishes that occur in the Atlantic are not lethal to humans, but the sting causes dormancy, pain and wounds. The pain can last up to 12 hours, and discomfort can last for days or weeks. The pain may be accompanied of a wound, which can develop into vesicles associated with varying degrees of edema. If stung by a scorpionfish, you must consider seeking medical advice.

Weever fish (*Trachinus draco*[89] *and Echiichthys vipera*):
The weevers are marine fishers that inhabit sandy areas. These animals are considered a concern for sea-bathers because they are responsible for most of the reported accidents with poisonous animals in the Algarve. In fact, the weevers have venom glands on the base of the first dorsal fin spins and in the operculum area. The poison is potentially dangerous if it reaches the bloodstream, because it can paralyze a foot or a leg for some hours. Edema and pain are also common symptoms that can be treated by soaking the wound in hot water and/or applying local anaesthetic to the wound.

READING SUGGESTIONS

www.algaebase.org
www.apambiente.pt
www.fishbase.org
www.idesporto.pt
www.marinespecies.org
www.seaweedafrica.org
www.sealifebase.org
(*websites* last accessed in December 2015)

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