

A photograph of a jellyfish swimming in the water near a rocky coastline. The jellyfish has a purpleish-brown bell and long, thin, dark tentacles. The water is a deep teal color, and the rocks on the left are dark and textured. The title text is overlaid on the right side of the image.

Wondrous British Marine Life

A HANDBOOK FOR COASTAL EXPLORERS

Lou Luddington

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First published in Great Britain 2019 by Pesda Press

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ISBN: 9781906095703

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Printed and bound in Poland, www.hussarbooks.pl



“Education is not the filling of a pail, but the lighting of a fire.”

W.B. Yeats



Acknowledgements

From the depths of my heart I would like to thank Ron and Joey (mum and dad) for encouraging me as a young swimmer and naturalist to work hard and bring my dreams of becoming a marine biologist to fruition. Much gratitude goes to Lyndon Lomax for giving me permission to use his wonderful images of a sunfish, common dolphins, bottlenose dolphins and Risso's dolphin, Dave Boyle for his Manx shearwater image and Trevor Rees for his image of a mauve stinger; the first lens on my lens wish list is a telephoto zoom that would at least give me the means to get images like Lyndon's and Dave's. Thanks to the Pembrokeshire Coastal Forum for permission to reproduce one of the Pembrokeshire Marine Code maps. Many, many thanks go to John Hegley, whose blessing to use an excerpt from his brilliant poem '*I Am A Guillemot*' in Chapter 8 Sea Birds gave me happy heart flutterings; I sincerely recommend his book of poems '*I AM A POETATO*' for those days when you just need to laugh. I am indebted to my niece Jordan whose wonderful design skills transformed my scribbly drawings; I have a lasting mental image of her expertly navigating Photoshop one-handed, laptop balanced on her knees while breast feeding baby Arlo. In a final crescendo of gratitude this book is dedicated to Tom, whose unfaltering belief that I can do 'the thing' keeps me reaching for the stars.

About the Author

Dr Lou Luddington is a marine biologist and photographer with a love for spending lots of time outdoors in nature. During her formative years Lou developed a connection with water and the natural world through competitive swimming, bird watching, backyard natural history and photography. Studying marine biology at the University of Wales, Bangor was an exciting and natural progression. There she gained a degree and PhD in marine biology and spent many hours underwater honing her skills as a scientific diver. Since then she has worked in marine monitoring and conservation and in the outdoor sector as an activity and wildlife guide, becoming a PADI Dive Master, British Canoeing 4-star sea kayak leader, surf coach and certified Marine Mammal Observer along the way. Alongside nature and in-water photography commissions, Lou runs professional development courses for outdoor guides and instructors on coastal and marine life. She also writes a column for the sea kayaking magazine *Ocean Paddler* on marine life and is an ambassador for Palm Equipment and Rockpool kayaks. In 2018 Lou had her first photography exhibition "The Sea From Within", a



milestone and launch pad for making her images available as fine art prints www.louluddington.com. After 17 blissful years living in Solva, Pembrokeshire with magician husband Tom, they have just sold up and moved aboard their 35ft sailing yacht *Noctiluca*. They named their boat after the bioluminescent plankton that lights up the ocean on dark nights (Noctiluca means night light), as they plan to be 'a light at sea', documenting and championing the marine environment through photography, video, science, writing and magic. Follow their adventures at www.alightatsea.com.



Being small in stature and having a hard shell make a lot of sense when living in one of the most dynamic environments on the planet. Barnacles and a tube worm on the rocky shore. This image was highly commended at the British Wildlife Photography Awards 2019.

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Kelp seaweeds form an important and beautiful habitat in UK waters.

Introduction

This book is a guide to marine and coastal life typically seen while exploring and journeying along the UK coast. It is not meant as an identification guide for putting scientific names to species; there are many of those out there who do a superb and concise job already that I have referred you to in the Bibliography. However, for the species included in this book I have quoted the scientific name so that you can be sure exactly which species I am referring to. Common names may vary wildly between texts and certainly between languages, while the scientific name is universal and therefore useful to know.

The aim of this guide is to bridge the gap between this plethora of natural history identification guides, and the broad body of scientific research literature that expounds the biology of the oceans. It showcases the life stories of a wide selection of coastal inhabitants, from barnacles and jellyfish to seals and lichens, and is brought to life by full colour, professional quality images from my own collection. The juiciest facts uncovered by scientific research have been cherry-picked because I believe that by encouraging you to think about how a sea anemone poos, or to ponder the astonishing length of a barnacle's penis, this book may act as a stepping-stone to further curiosity and learning.

My sole aim is to spark awe and wonder for our coastal seas by illuminating the hidden lives of those that live there. The overall ethos of the book is to impress on you a way of enjoying the natural environment that is sensitive and respectful. Most importantly, I urge you to embrace our irrefutable connection to it; with our oceans in peril from pollution, over-fishing, acidification and accelerated warming due to global climate change. The time is now.

"In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught." Baba Dioum, 1968.



Puffins.

Awe and Wonder

Through my own explorations while sea kayaking, freediving, surfing, scuba diving, sailing and swimming along the coast I have had some truly memorable experiences on days where everything aligned to put me in the right place. I recount many of these moments throughout the following chapters but one in particular, from a weekend on Skomer Island, provides affirmation of the sheer awe and wonder of British marine life.

Skomer Island is a magical place. Lying a few kilometres off the Pembrokeshire coast it is home to a diverse range of wildlife, including the Skomer vole, and a haven for breeding seabirds and Atlantic grey seals. Separating it from the mainland is a narrow sound that squeezes the tide into an exhilarating race, adding to the allure. A few summers ago, on the last days of July, my friend Jonny and I guided an immersive, wildlife-focused weekend of sea kayaking to Skomer Island with a night in the island bunkhouse. Blessed with ideal weather, we enjoyed two halcyon days afloat.

Day 1

Our route for the day was planned to take advantage of tidal flow and took us on an anticlockwise circumnavigation of the island. We launched from the mainland with everything we needed for two days on the water and an overnight stay in the island bunkhouse. Conditions were truly dreamy, with very little wind or swell, and blue skies above. Afloat, our small team of four clients plus me, Jonny and my husband Tom were all smiles. Pointing the

bows of our sea kayaks west towards the island, our journey began. With only half a kilometre of the mainland coast to cover before we hit open water, we tucked in near to the rocks to enjoy the detail. Low tide and calm water meant we could get a close look at some of the marine life surrounding us. Floating in the glassy water were compass, moon and blue jellyfish accompanied by their relatives the comb jellies, that differ in their lack of stinging cells with which to capture prey. Instead they use rows of beating hair-like structures that refract the light making them sparkle and shimmer. Stuck to the rocks were thousands of barnacles that had recently put on a growth spurt. I knew this from the shed exoskeletons floating in the water like hundreds of tiny feathers, ghostly replicas of the curly legs they use for feeding.

Having lingered long enough for the tide to turn we headed south through Jack Sound on a gentle ferry glide across the ebbing tide. Despite its fearsome reputation Jack Sound had granted us a mellow passage to the south side and we cruised on passed Midland Isle and over to the south coast of Skomer Island. This part of the island is deeply cleaved by narrow inlets – Rob's Wick, Matthew's Wick, South Haven and The

Wick; so striking are these features that the island's name reflects them – Skomer derives from the Norse word Skalmey which translates as cleft or cut island. At South Haven the island appears almost cut in two, separated from North Haven opposite by a narrow isthmus only a few metres wide. These steep, secluded lawns provide ideal nursery grounds for seal pups on the beaches and cliff nesting sites for birds. Our timing was such that many seabirds had fledged, leaving only streaks of white guano where birds would have jostled together in their hundreds only a few weeks earlier. Guillemots and razorbills were absent, by now far out to sea.

Seals on the other hand were gathering, brought together by carnal urges that were rising to a crescendo of autumn births and mating. We glimpsed the odd pup tucked away on boulder beaches and gave them a wide berth. Distressing the mother by approaching too close could result in a missed feed with knock-on effects for the pup's survival. With only three weeks in which to get their fill of fat-rich milk before being left to fend for themselves – every feed is vital.

Thick-necked, feisty bull seals popped up on occasion and let us know who was boss with a

hearty snort and deft slap of the water with a flipper. Top of their daily agenda was hustling females and beach patrols as they waited impatiently to mate. Intimidating floating humans was a good way to pass the time as female seals would not entertain them until their pups were weened.

As we dipped into bays and ambled along the coast, a peregrine falcon, a buzzard, a pair of piping oystercatchers and a band of noisy chough punctuated our journey. Most of the 21,000 or so Atlantic puffins that visit Skomer to breed head for the open ocean by the end of July, so we were overjoyed that for some the instinctual draw to the island was still strong. Chatting with the island warden later in the day we discovered that those still around were most likely young adults prospecting for next season's breeding sites. We saw them bobbing together in rafts, whirring by overhead and standing high above us on grassy banks.

Cruising on to South Haven we paused for a time to bob with groups of puffins. The distinctive calls of kittiwakes drifted to us from a dark cliff ahead. These pretty, rather dainty gulls form noisy colonies on high cliffs where they construct thick nests from mud, seaweed and

vegetation. They would occupy nest sites until August and formed one thread of our rich island soundtrack. After a brief but thrilling ride through the Mew Stone's shallow passage we emerged to Skomer's wilder south-west quarter. Here rock flowed and soared into impressive cliffs and formations – a grand display of the island's volcanic origins. Exploring close-in we became part of it all – humans, birds, seals, rock, earth and emerald ocean. Though unspoken I could sense the shared awe from the others at reaching this place.

Pushing on west we passed under Skomer Head – an imposing cliff swathed in black and orange lichens and a benchmark for the Ballantine Scale. This biologically defined wave exposure scale assigns a particular shore a number from 1 to 8 according to the marine communities living there. Skomer Head lies at number one, the most extreme of rocky shores that experiences regular, heavy ocean conditions and inhabited by a sparse and hardy collection of animals and plants.

Spice was added to the day on the north-west stretch where tide flowed around the island against us. Effort was rewarded with some travelling surf and expansive views of

Ramsey Island and the Bishops and Clerks to the north. At the Garland Stone, the island's north tip, we were joined by seals doing laps in the tide. We paused for a while to enjoy their attention then pressed on to the only place to land on the island, North Haven. Hauling our kayaks up high above the slipway, we took a blissful lunch in the sun. We then gathered what we needed for our night on the island and headed up the path. After a quick tour of the bunkhouse from the island staff we excitedly grabbed binoculars and hurried off along the island paths. Littering the way were the remains of Manx shearwaters, mostly wings and a few other bones, the rest devoured by their main predators the great and lesser black-backed gulls. Skomer Island supports the world's largest breeding colony of Manx shearwaters; with around 300,000 pairs the black-backed gulls were well supplied.

Rabbits (also food for the black-backed gulls and island buzzards) hopped lazily among the path-side vegetation that was scattered with the stripy caterpillars of Cinnabar moths. These caterpillars feast on ragwort leaves, accumulating the plant's toxins in their own flesh which makes them poisonous to would-be predators.

Like many other creatures they were enjoying a life of plenty on Skomer. A glorious summer evening of birds, butterflies and rabbits passed, until our own hunger called us back to the bunkhouse. As dusk fell Tom and Jonny headed back down to their kayaks; the popularity of a night on Skomer meant we could only book five beds for me and the four clients. Tom and Jonny would make the 2.5km crossing back to the mainland for the night then return to meet us in the morning. Though they didn't know it, encounters with toads, tide races in the dark, huge rafts of noisy shearwaters, frenzied black-backed gulls and bioluminescent plankton would set their evening alight.

The rest of us joined in with the island staff's daily bird log at 9 p.m. to register our bird sighting from the day, then waited for darkness to descend. Night of the blackest sort was required for Skomer's nocturnal wildlife spectacle. We ventured out from the bunkhouse at 10.30 p.m. but all was quiet, so we decided to head back for tea and chocolate and wait a bit. On second attempt an hour later, a din flooded to our ears as we stepped into the night. Manx shearwaters were in full swing, calling to each

other through the blackness. Having spent the day fishing at sea they returned to the island in the dark to avoid attacks from hungry black-backed gulls. Though beautifully adapted for a life at sea, with long narrow wings and feet placed far back on the body for efficient swimming, they are ungainly on land and an easy target for these large predatory birds.

We hurried out along the path towards North Haven, the calls growing louder. Some calls came from overhead, others from burrows in the earth; chicks safe below ground called to parents returning with bellies full of fish. Soon birds were flapping around our heads and landing at our feet. At one-point one of our group had to duck to avoid impact from a bird careering through the night. Once on the ground they would either scurry off quickly and disappear down a hole in the ground or sit for a while looking a bit dazed before deciding which way to go. With both ground and air ringing with their peculiar calls, we were in the midst of a nocturnal bird colony in full swing. Later as I drifted off to sleep to their muffled calls, I pictured thousands of sleepy birds snoozing in earthy burrows nearby.

Day 2

The next morning as we walked back down the track to our boats and retraced our steps from last night's show, all was quiet at the path-side burrows. We felt privileged to have witnessed the exclusive shearwater performance that was reserved for overnight guests on the blackest of summer nights. For our morning entertainment we were treated to stands of puffins lining the banks of the incline down to our kayaks. As we prepared to launch Jonny arrived from the mainland full of stories from a magical evening of his own. Given the continuing favourable forecast our plan was to take the south going tide through Little Sound and make the 4km crossing to Skomer's sister island Skokholm Island. Exiting North Haven to the east, passing by Rye Rocks a seal slid into the water and started following us. Whisked through Little Sound by the tide, the seal was still with us, enjoying a free ride. Our escort provided entertainment not only for the crossing but for almost the entire circumnavigation of the island. When we stopped so did seal, reaching up to play with our bow and stern toggles and swimming belly-up

beneath our kayaks then popping up to look us straight in the eyes. He was clearly having fun. When we reached the island and stopped to rest, he turned his nose skyward and howled like a wolf. It was only when we reached Hog Bay at the south-east end of the island, an hour into our new partnership that he vanished. The group of seals that greeted us and bobbed and eyed us warily, broke the bond with our Skomer seal and left us wondering at our travelling companion's fate.

On the return crossing to the mainland, a stiffening breeze provided a lumpy sea state to occupy our thoughts. At the half-way point we were treated to a sighting of mother and calf porpoise travelling with the tide. Reaching

the south Marloes peninsula we tucked in close for some rock hopping and were startled when a white rock morphed into a seal pup. As we hastily backed away the mother landed beside the pup and started to suckle. This stretch of coast has many secluded coves and hidden caves popular for pupping so we were vigilant for other nursing seals.

With a quickening north going tide and a fair north-west breeze against it, Jack Sound was starting to look sporty. To reach the north coast and our landing at Martin's Haven, we would need to commit to the main flow but there was one more cave to explore before we did so. Jonny and one of the group headed in first and disappeared for several minutes. Just

when the rest of us were beginning to wonder if all was well in there Jonny popped back through grinning and told us to follow on. In single file we threaded our kayaks through the narrow passage, paddles stowed, feeling our way with hands on either wall, until we slid out into the light. We had tunnelled right through Wooltack Point headland and by-passed Jack Sound. Emerging from the darkness was like waking from a dream, a symbolic return from a magical world of seal friends, burrowing seabirds and candy-striped caterpillars. We returned to the mainland with full hearts and a feeling that all was good in the world.

Carnivorous blooms of the ocean.





Sea Anemones

Sea anemones, along with corals, sea fans and sea pens, belong to a group of animals called Anthozoa – meaning ‘flower animals’ in Greek. Their brightly coloured fleshy blooms are a familiar sight at low tide and in rockpools when exploring our rocky coasts. Yet despite botanical references the sea anemones are fearsome animals with the ability to catch and subdue prey.

Flowers of the deep

In UK inshore waters there are about 40 species of sea anemone and more than 70 species of Anthozoa in total. They live in a diverse range of habitats from the brackish shallows of estuaries and the silty depths of sea lochs to intertidal rock, submerged shipwrecks and even some as parasites on the shells of other animals. Their variety of form and colour are truly dazzling. In this chapter I will throw light on these blossomed beauties by delving into the lives of a few species commonly encountered along UK coasts.

The Anthozoa have been around for a long time; their rich and diverse fossil record extending back at least 550 million years. When compared with all other animals, their body structure is rather simple in that they have fewer types of cells. In fact, they have fewer cell types than a single organ has in most other animals. Put simply, they are made up of just three tissue layers and are essentially laminar in construction, like three pieces of paper stacked one on top of the other. These two-dimensional layers are then folded origami-style, to yield a three-dimensional structure in the form of an anemone.

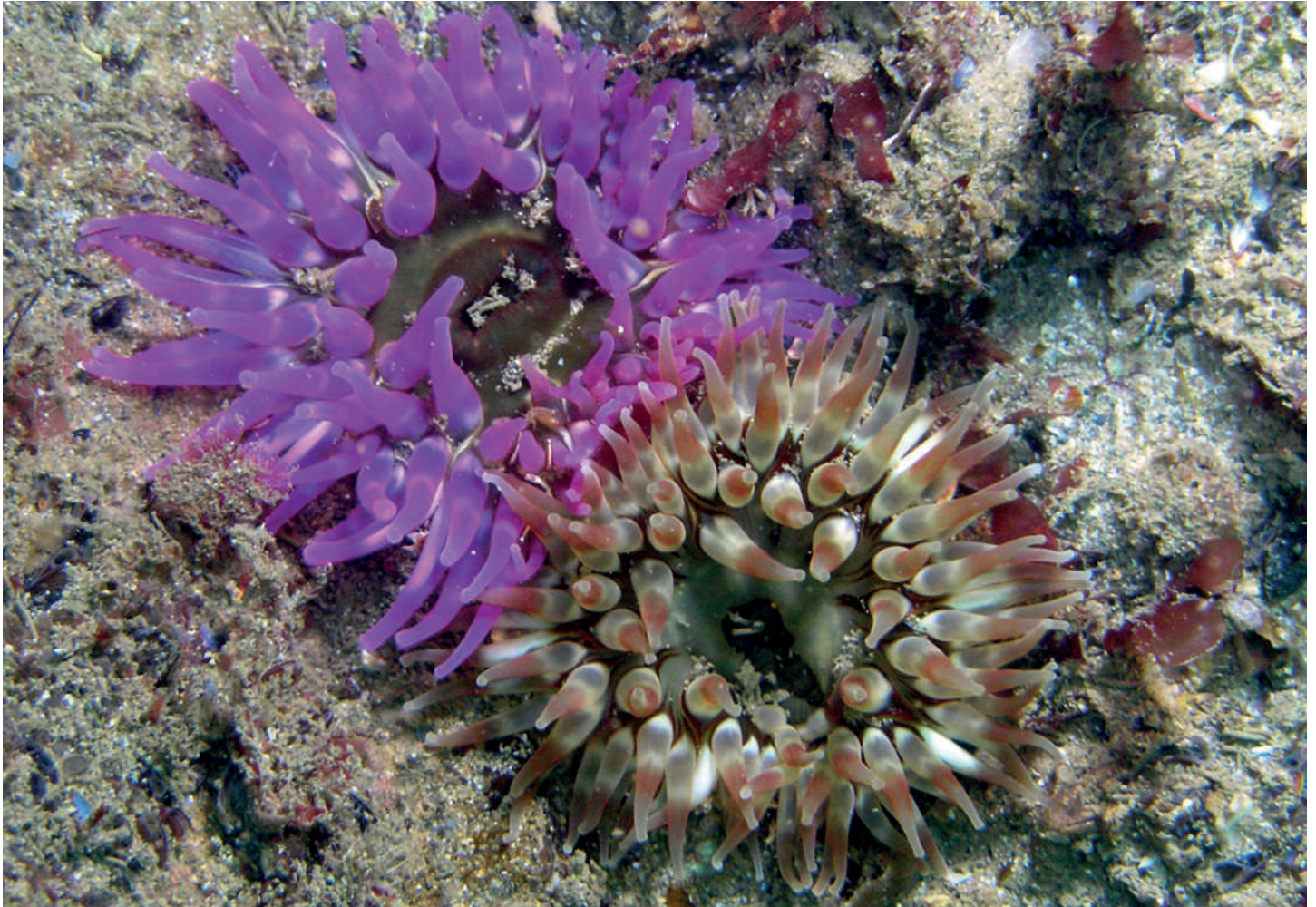
Each anemone is an elastic, muscular cylinder, open at one end and full of seawater; in fact seawater may account for eighty percent of its weight. The single opening to the outside world permits the entry of food into the central gastric cavity where digestion takes place. Any waste is then ejected from the same opening; mouth doubles as anus in the Anthozoan world.

The fact that they are mostly seawater means they change their shape and volume dramatically using muscular contractions and either opening or shutting the mouth. In water we see them with tentacles extended for feeding like flowers blooming in the sun; out of water they contract the tentacles becoming shiny beads on the rock or hanging loosely like deflated balloons. Anchoring them firmly to their preferred surface is a sucker-like pedal disc which provides a firm but non-permanent attachment. Although mostly sedentary when faced with predators, aggression from neighbouring anemones or inclement seasonal weather conditions, they are able to lift the disc and float away.

As well as being classic sit-and-wait predators, sea anemones are also supreme opportunists and will snack on any detritus drifting their way. In this way they minimise the energetic

cost of obtaining food by waiting for it to come to them. Many are also able to absorb organic matter from the water column to supplement their diet. Most species tend to have a preferred diet which reflects both where they live and the size of their tentacles. The dahlia anemone *Urticina felina* for example lives squeezed into gullies close to or often on the seabed. They have thick robust tentacles that are heavily armoured with stinging cells and tend to feed on shrimps and small fish brought to them by surging waves. By comparison the plumose anemone likes to be elevated in the flow of the tide, attached to vertical walls and artificial structures such as pier pilings and wrecks. Their numerous fine tentacles are superbly suited to capturing plankton and small particles suspended in the water column.

Playing a central role in prey capture are the cnidae (meaning nettle cells) which respond to touch and chemical stimuli from their prey. Thousands of these cells are embedded in the surface of the tentacles. Although sea anemones are relatively simple animals in their overall construction, the cnidae are extremely complex and have attracted a lot of research interest over the years, especially for their potential in



The dahlia anemone has stout tentacles with a powerful sting to seize prey as it surges past in waves.

biomedical research. There are many different types of cnidae that serve different functions, but they are broadly categorised according to their structure. In sea anemones there are two types both of which discharge explosively on contact; spirocysts eject a sticky thread to hold struggling prey and nematocysts penetrate the prey like a tiny harpoon injecting toxin as they do so. The latter are responsible for the sting of both sea anemones and jellyfish.

The snakelocks anemone *Anemonia viridis* is one of the largest anemones found on UK shores with long mobile tentacles used to reach up into the water column and out across the seabed. Studies have shown that the snakelocks has twice as many entangling spirocysts than penetrating nematocysts in its tentacles, for holding and subduing its active prey as it is fed towards the mouth. By brushing your fingertips across the tentacles, you can experience the sticky sensation of the threads trying to hold the fingers, but you do not feel the sting of the harpoons due to the thickness of the skin there. They can however deliver a painful sting to other more sensitive parts of your body, as my husband found out by experimenting with his tongue. The result



was a surprisingly painful burning sensation that lingered on the tip for several days.

To supplement its diet of shrimps and other small invertebrates, the snakelocks anemone also gains energy from tiny, single celled algae called zooxanthellae that live embedded in its tissues. This is a mutually beneficial relationship where the anemone provides the algae with a protected environment and in return, the algae produce oxygen and recycle waste



Snakelocks anemone has two colour varieties – green with pink tentacles tips (top) and brown (bottom).

products from the anemone. Most importantly, the zooxanthellae supply the anemone with carbohydrates and amino acids produced by photosynthesis. Essentially, they function like tiny solar panels generating free energy from the sun for the anemone to use. In UK waters there are eight species of anemone that harbour zooxanthellae yet the nutritional benefits they bring are small compared to those enjoyed by their tropical relatives the reef-building corals. Here zooxanthellae produce up to 90% of the corals' nutritional needs, forming the basis of the second most bio-diverse and productive ecosystem on the planet. It is the ejection of the zooxanthellae from living coral that produces coral bleaching, a widespread global crisis caused by rising ocean temperatures. Coral bleaching is the greatest threat to the sustainability of coral reefs worldwide and is one of the greatest challenges scientists face in responding to the impact of global climate change.

Sea anemones reproduce in a variety of ways. Similar to other marine animals, many release eggs and sperm into the water. Once fertilised the eggs grow into larvae that swim in the plankton for a few weeks, whereafter they settle to the seabed becoming fully-formed adults.

Others employ much quicker, simpler tactics. For example, the gregarious plumose anemone *Metridium senile* found in deep water is able to create a new neighbour by tearing a small piece from the disc that attaches it to the seabed. This fragment then grows into a clone of the adult. The snakelocks anemone goes a step further, splitting itself in half length-ways in just a few days to double its numbers. The beadlet anemone *Actinia equina*, so familiar on UK rocky shores, are able to brood their offspring internally before ejecting the live young from the mouth, spitting them like grape pips to settle on the seabed. They are believed to be produced by a process of internal budding, where small fragments of the anemone tissue break off internally and grow into miniature replicas of the adult, though not all scientists agree on this.

Beadlet anemones are also known for their displays of aggression towards each other in competition for space on the rock. Each is well supplied with a battery of stinging cells in structures called acrorhagi that form blue knobbles at the base of the tentacles. In disputes the aggressor will lean over thrusting its acrorhagi into contact with its victim causing it to make a slow retreat. Other species such as daisy



Beadlet anemone with tentacles expanded ready for action surrounding the central mouth, a single opening that performs a double duty (top).

Beadlet anemone with tentacles retracted at low tide to conserve moisture (bottom).

anemone *Cereus pedunculatus* and plumose anemone have large inflatable catch tentacles which serve a similar offensive function.

With such a potent line of defence you might be surprised to learn that sea anemones have several natural predators. In fact, several species of sea slug feed exclusively on sea anemones. The shaggy looking aeolid sea slugs are a group of anemone connoisseurs that will gorge on whole anemones at a rate of three per week. They are distinguished from other types of sea slug by their possession of cerata; soft, horn-like outgrowths on their back containing specialised structures called cnidosacs. The cnidae are passed unharmed through the digestive system to cnidosacs (*cnido* from the Greek word meaning nettle) at the tips of the cerata. Here the cnidae are stored by the sea slug as second-hand weaponry for its own defence; we met one such sea slug *Facelina auriculata* in Chapter 4, whose iridescent blue colouration warns of its potency and is thought to be mimicked by the blue-rayed limpet. Certain fish species also include anemones on their varied menu, nibbling at the tentacles or biting chunks from the disc rather than eating the whole thing. This is thought to allow the anemone to survive for subsequent visits. Perhaps the sting factor is



Acrorhagi (blue knobbls) may be used in aggressive disputes between neighbouring anemones.

only bearable in small mouthfuls; they must taste good to make it worth it.

Despite decades of study creatures as familiar and accessible as the beadlet anemone are still managing to perplex scientists with their curious methods of reproduction and

intricately engineered stinging cells. Their flower-like appearance and sedentary habit belie a deadly microscopic armoury, aggressive outbursts toward neighbours and a penchant for self-replication. Beware the flowers of the deep, they are not what they seem.

Dr Lou's low-down ... Anemone biology in a nut shell

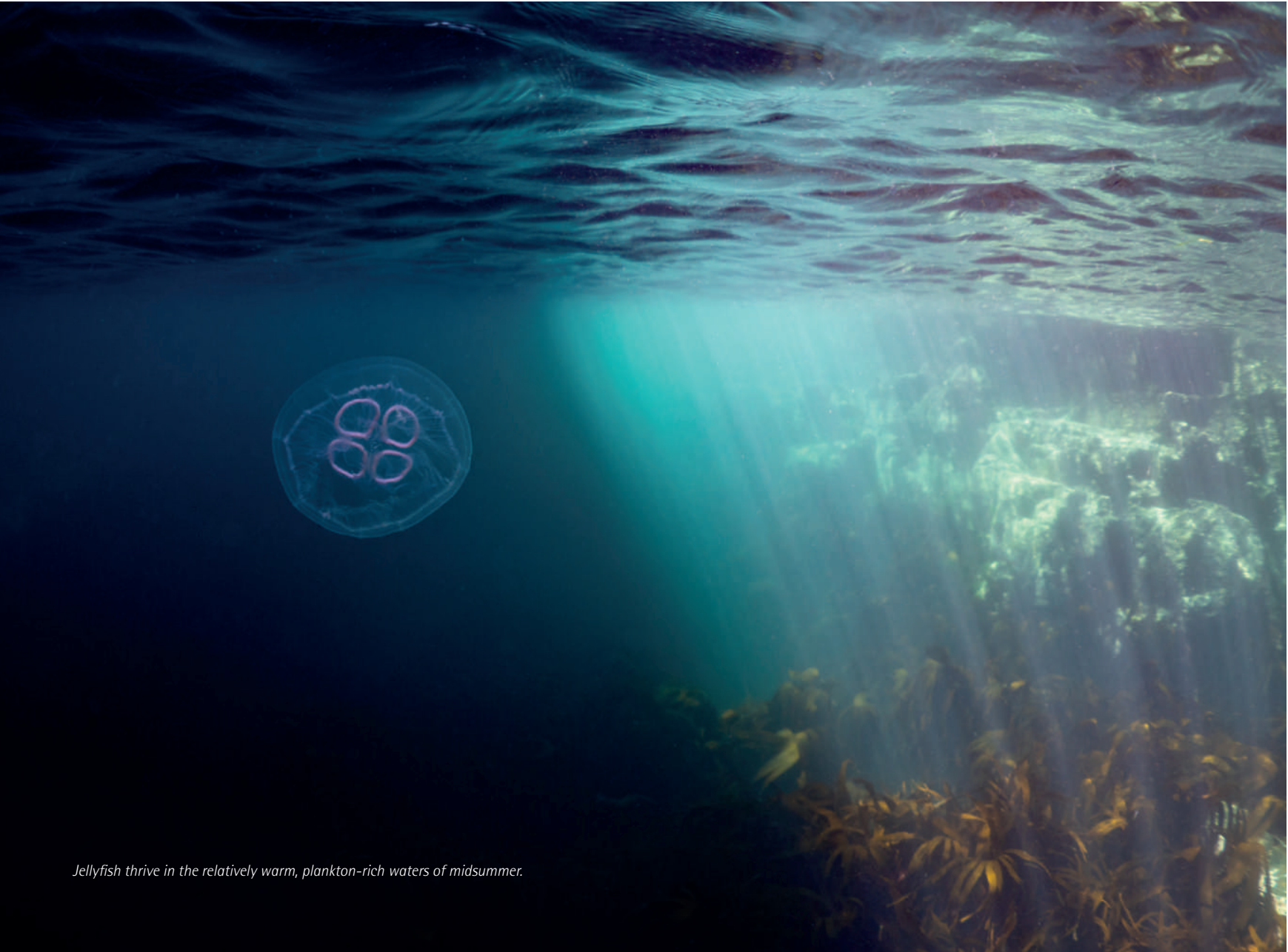
Offensive blue knobs – or acrorhagi (*ak-ro-ra'gee*) to give them their scientific name; these batteries of stinging cells are used in aggressive confrontations with neighbouring anemones.

Mouth-anus combo – anemones keep it simple with a single opening to the outside world that performs a double duty.

Sticky, stingy tentacles – a variety of complex, explosive cells that eject sticky threads and miniature harpoons ensure a nourishing fleshy meal is ensnared and directed towards the mouth.

Reproduction by self-mutilation – anemones can create their own party by tearing a piece off themselves or splitting in two.

Solar powered anemones – a few species have microscopic algae in their tissues that act like solar panels providing free energy from the sun.



Jellyfish thrive in the relatively warm, plankton-rich waters of midsummer.

Wondrous British Marine Life

A HANDBOOK FOR COASTAL EXPLORERS

Lou Luddington

This book is aimed at walkers, wild swimmers, kayakers, divers, in fact anyone exploring the coastline whether along the shore, on, or under the water. No doubt it will give equal pleasure to the armchair explorer.

Lou's entertaining and clear writing showcases the life stories of a wide selection of coastal inhabitants; from barnacles and jellyfish, to seals and lichens and is brought to life by full colour, professional quality images from her own collection.



ISBN 9781906095703



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