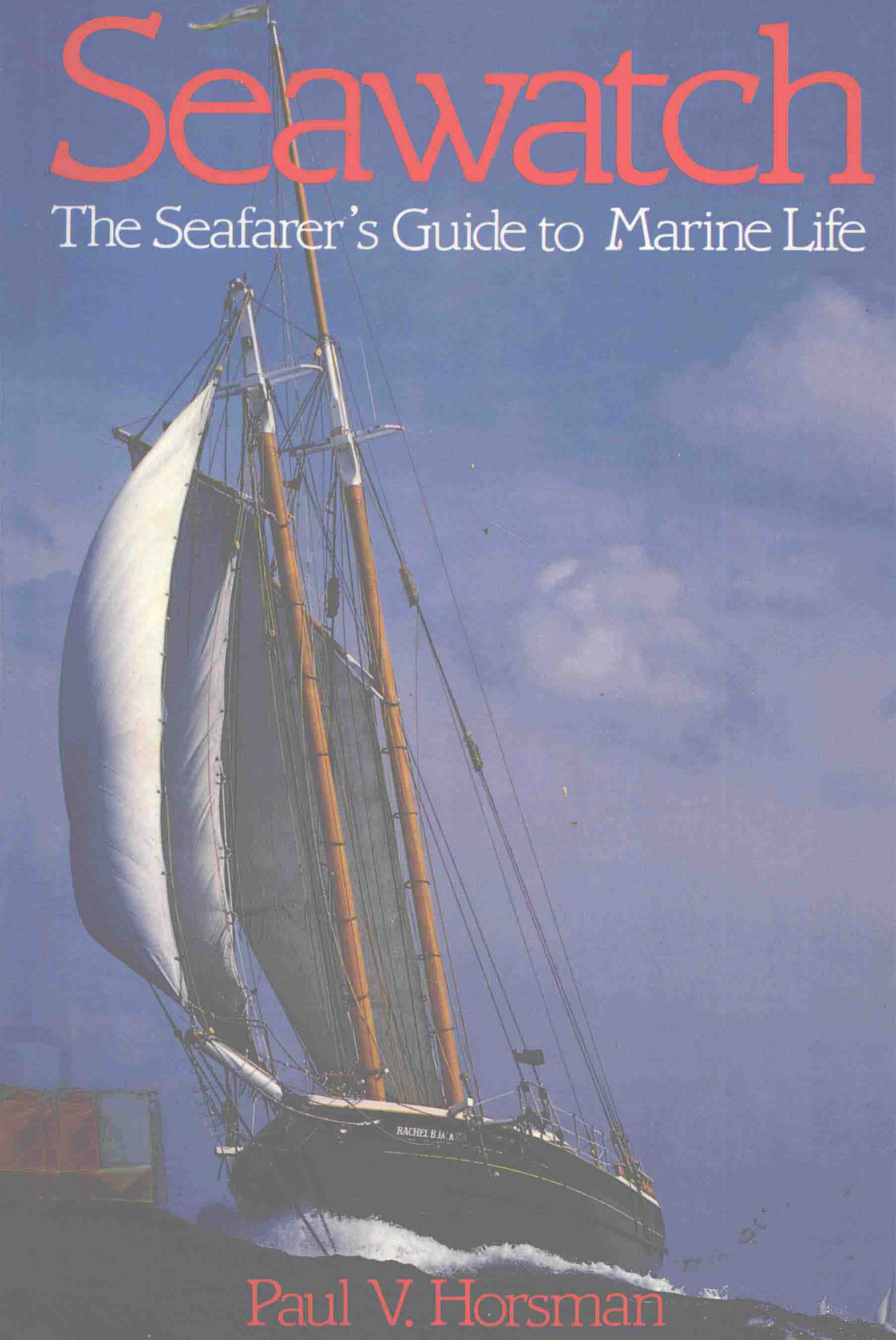
# Seawatch

## The Seafarer's Guide to Marine Life



Paul V. Horsman

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*FOR CAROL*

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# Foreword

*The Director of The Marine Society*

A highly qualified reader of this book when it was in manuscript commented, 'I like this book. Some of the descriptions of the animals are exceptionally clear, bearing witness to direct observations. Indeed, the author is at his best with an exciting, first-hand account of bioluminescence, for example. Parts have the genuine excitement of a living early nineteenth-century explorer, a novel occurrence these days.'

This is fair comment. At first sight the book may seem little more than a useful directory. This it is, of course, and it is intended for use by both amateurs and professionals as a means of identifying the plants and animals in the sea. If it were no more than this, it would be well worth publishing, since no other such practical and comprehensive guide exists. But in addition to being a well qualified marine biologist, who has had much experience round the coast, Paul Horsman has been at sea almost continuously for five years in a variety of merchant ships, operating in many different parts of the world. He has therefore had an opportunity, unique in these times, to observe plants and animals at sea, whether seen from the deck, observed while skin-diving in various ports, obtained by way of the fire hydrant or in consequence of netting, or removed from a ship's coolers, condensers, sea water intakes or filters.

Between voyages Paul Horsman has also made a close study of the reports on marine life submitted to the Meteorological Office by seafarers over a period of more than one hundred years — the first such study ever made. These reports have been of great help to him in the construction of his world distribution maps.

There is much in these pages to fascinate any reader, whether it be the parasitic barnacle which castrates a crab; the 'right-handed' and 'left-handed' *Physalia*, which have evolved to travel clockwise or anti-clockwise according to which side of the equator they find themselves on; the electric ray which can develop an electric charge as high as 220 volts; or the tiger sharks whose stomachs have yielded cans, bottles, clothes, shoes, half a crocodile and even undetonated explosives. Paul Horsman moves through this unfamiliar world with ease, wearing his learning lightly.

The Marine Society, the world's oldest maritime charity, has long employed tutors at sea to teach on board merchant ships. Paul Horsman was recommended in this capacity by Dr Frank Evans of the Dove Marine Laboratory, himself at one time a Merchant Navy officer, and his employment was made possible by financial help received from the Leverhulme Trust. It was

The Marine Society which felt that this book was needed and encouraged Paul Horsman to write it. The book also owes much to the artwork of David Henderson and Stephen Devane, who was employed by The Marine Society when the book was being written, and to the drawings of Peter Baker, a professional seafarer at sea with P & O and also very much in touch with The Marine Society.

Ronald Hope

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My thanks to David Henderson and Stephen Devane for their artwork and to Peter Baker for his black and white drawings. The Meteorological Office at Bracknell have been very helpful in allowing me access to their archives.

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A warm thanks to everyone who accepted me into their company at sea on board: mv *Vancouver Forest*, mv *Seatrain Saratoga*, mv *Troll Park*, mv *Wellpark*, mv *Manistee*, ss *British Trident*, ss *British Norness*, ss *Uganda* (on several occasions) mv *Author* and mv *Wellington Star*.

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# Contents

# Introduction

For as long as ships and boats have sailed the oceans, seafarers have watched the marine life that surrounds them. In the days of sailing ships, in calm weather there was little else to do except look over the side or to the horizon, see what was there, and pray for a fair wind. Today, ships are faster and rely little on the wind, but there is still time to gaze into the blue depths and even pull out a bucketful of water for a closer look. Over the years, seafarers have made very sharp observations, sometimes helped by a vivid imagination, and these have been included in the ships' meteorological logbooks. These logbooks contain accurate descriptions and drawings from which it is possible to identify the organisms.

For the last five years I have travelled on board British merchant ships collecting specimens and observing marine life. This book has been written mostly at sea as a result of my observations and the data accumulated in ships' logbooks. Many of the photographs and most of the drawings are of specimens collected or seen at sea, in ports and on beaches. It is hoped that this book will be interesting to people on the largest tankers, on passenger ships, fishing vessels, ocean-going yachts and small coastal craft. It is intended to enable anyone to identify any marine life they encounter in the course of their travels.

## HOW TO USE THIS BOOK

All the species commonly seen are described. If a species is not in the text it will be possible at least to identify the group to which it belongs. The range of species likely to be seen is so wide that it is impossible to include all the possibilities. The appendix contains a list of books and organisations that will help the enthusiast in search of more information.

The first chapter is a general introduction to the marine world. Chapter two covers the range of small organisms you are likely to see through a magnifying lens or simple microscope. Chapter three looks at the strange phenomenon of bioluminescence, sometimes called phosphorescence. Each subsequent chapter is devoted to a particular group of species. At the start of each group there is a simple classification or 'family tree' covering the families in the group. This will guide the reader to the relevant section of the chapter. The organisms are then described individually, with brief notes on their particular habits.

Every species has a particular geographical range in which it lives, and at the back of the book there are distribution maps that will help in identification. In many cases, such as some of the mammals, it is possible to identify a species purely from where it is found.

The scientific names of each species are given together with any

common names. This is to ensure that there is no confusion with other books and also because it is felt that they are of interest. With practice anyone can become fairly expert in the marine world; after all, the old whalers could identify different whales by the shape of their blow from miles away — why not today's seafarers?

Finally, the last chapter raises some questions about the future of our marine world. With 70,000 ships plying the oceans, and the subsequent increase in accidents; the increase in oil exploration, mineral extraction and fishery exploitation; the demands of tourism, and the need for education and conservation, what does the future hold? Can the marine world cope? Who has to take responsibility? These are some of the problems being faced today by governments, industry and seafarers.

# 1. The Ecology of the Sea

The marine world extends from the ocean surface to the deepest seabed and from shore to distant shore. There are many millions of animals and plants to be found in this world, but this book is a guide to those that are likely to be seen by seafarers, at or near the surface of the sea.

Ecology is the study of where living things are found, and why they live in particular areas. Animals and plants need certain conditions in order to live: oxygen and light are required in sufficient quantities; various kinds of nutrients are necessary; and the temperature must be favourable. Different species have different requirements. A species living in an area that has all the right conditions is said to be in its **habitat** (Figure 1.1).

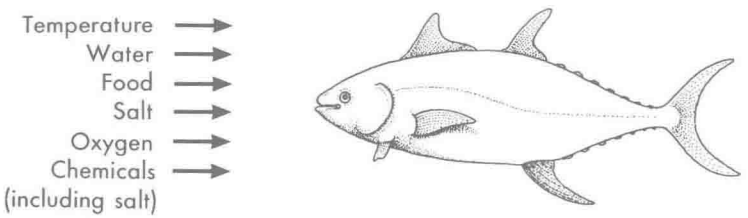


*Figure 1.1: Factors affecting marine organisms*

## VARIABLES IN THE MARINE ENVIRONMENT

The sea is not the same everywhere, but changes with different areas. These changes — in temperature, saltiness, amount of oxygen and so on — have an effect on the marine life. It is not possible to discuss here all the variations and their implications, but below are some of the most important. Although each is considered under a separate heading for clarity, in life they are inseparable, each affecting the others.

### SALINITY (SALTINESS)

The average amount of salt in the sea is about 35 parts of salt per 1,000 parts of water. The body fluid of all marine invertebrates is at the same concentration as, or very near to, the concentration of the seawater. (The blood of land animals, including man, is about half the seawater concentration.) By contrast the body fluid of freshwater animals is more concentrated than the surrounding water; in these animals the water is constantly trying to enter and dilute the fluid to make it the same concentration as that outside. Freshwater animals must excrete water to maintain the higher concentration inside their bodies. Marine animals do not need to do this. Marine fish excrete salt to keep their fluid concentration lower than the seawater.

The salinity of the sea is not constant. Near land, fresh water dilutes the sea causing a lower salinity; near the poles and around icebergs melting ice also causes a lower salinity. But higher temperatures cause the water to evaporate, and this increases the salinity.

Coastal water species must be more tolerant to changes in salinity

than oceanic water species, hence we can define organisms as being either coastal or oceanic.

## TEMPERATURE

Temperature varies with latitude, and the oceans can be divided into a number of regions (Figure 1.2). The following divisions are often crossed as surface currents move between different areas. Warm currents may travel into temperate areas; the Gulf Stream, for instance, warms the west coast of Europe. Cold currents may travel to warm areas; for instance, the cold Humboldt current is felt as far north as the Galapagos Islands.

Equator to the tropics (23.5° north and south) — Equatorial or Tropical
The tropics to 40° north and south — Subtropical
40° north and south to 55° north and south — Temperate
55° north and south to 66° north and south — Circumpolar
66° north and south to the poles — Polar.

Organisms found over a large area must be able to tolerate large variations in temperature. Many whales migrate from tropical and subtropical waters, where they mate and breed, to polar waters where they feed. Whales are mammals and therefore are warm-blooded (meaning that they can maintain their internal body temperature regardless of the environment) and they can tolerate a wide range of temperatures. They have thick layers of blubber to keep them warm in the cold waters, but this is used up for energy on their journey to the tropics where food may be scarce.

All animals except birds and mammals are cold-blooded — that is, they have a body temperature that changes with the surrounding temperature. Some of these animals undertake long migrations too, but keep roughly to the same latitude. It is possible that some green turtles, *Chelonia mydas*, travel from one breeding site on Ascension Island in the tropical Atlantic to the Brazilian coast and back — a distance of 2,700 miles along the same latitude.

The combined effect of salinity and temperature changes the density of the sea, which in turn influences the ocean currents. These are discussed later.

## LIGHT

Sunlight is vital for life; it is the major source of energy. This energy is used by plants to grow; the plants are then eaten by animals, and so the energy is passed on.

Plants do not need complicated food like carbohydrates and proteins: they can make their own from simple compounds. Carbon dioxide ($CO_2$), which is breathed out by all living things, and water ($H_2O$) are combined together, using the sunlight for energy, to make carbohydrates (which have the general formula $C_6H_{12}O_6$). This is the process of **photosynthesis**. Plants have special pigments, like the green chlorophyll, which are energised by the sun so the reaction can take place. The photosynthesis reaction can be written simply like this: