

A TEXTBOOK OF OCEANOGRAPHY

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649158256

A textbook of oceanography by J. T. Jenkins

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

J. T. JENKINS

**A TEXTBOOK OF
OCEANOGRAPHY**

G
Jen

A TEXTBOOK
OF
OCEANOGRAPHY

BY

J. T. JENKINS, D.Sc., Ph.D.

AUTHOR OF "THE SEA FISHERIES"

163580
9/8/21

LONDON
CONSTABLE & CO. LTD.

10-12 ORANGE STREET, W.C. 2

1921

2
100

A TREATISE
ON
OCEANOGRAPHY

BY
J. H. VAN DIKE

NEW YORK
1911

PREFACE

IN spite of the great interest that maritime questions have for the English-speaking nations, there is no modern textbook in English on the subject of oceanography.

Considerable progress has recently been made in the teaching of geography, which is now a degree course at many of our Universities. Although there are many textbooks and manuals on navigational subjects, some of which are published under Government or departmental auspices, it cannot be claimed for these works that their oceanographical (as distinguished from their navigational) instruction is at all up to date. In fact, in most of these works such questions as, *e.g.*, ocean currents are dealt with regardless of modern methods of scientific investigation, and apparently the authors are simply content to copy from older textbooks on the subject. Consequently there is a gap which it is hoped may be filled by a book which, without being unduly technical or mathematical, will give the student an opportunity of becoming acquainted with modern methods of oceanographical research and their chief results. This book has been designed to meet the requirements of the higher forms of schools, of teachers in training, and of students attending a school of geography at one of the Universities, as well as intending naval and mercantile marine officers, since, although a textbook of oceanography can hardly be regarded as an aid to navigation, it should contain much of interest to seafarers. The book should be read with the aid of an atlas, since it is impossible, without unduly enlarging the scope of the book, to provide charts and plans to illustrate all the points dealt with. References are not (in general) given

in the form of foot-notes, but a small bibliography of the more important publications in the English language is printed as an Appendix.

Two criticisms will probably occur to many readers, so it may be worth while to attempt to meet them here. In the first place there is no uniformity in reference to depths, temperatures, etc.; the metric system is sometimes used, at other times the depths are given in fathoms. Theoretically it would have been better to have used the metric system only. Actually the British or American seafarers' concept of a fathom is more vivid than that of a metre. Until the metre is universally adopted—*e.g.*, in the British Admiralty charts—it is inexpedient to ignore the fathom. The difficulty is, however, more apparent than real, since the table for conversion (p. 198) is available.

Objection may secondly be taken to the didactic style. This style is inevitable if the information is to be compressed within reasonable compass.

My best thanks are due to Mr. Wade for friendly assistance in the preparation of the text figures; to Dr. E. J. Allen, of the Marine Biological Laboratory at Plymouth, for the loan of process blocks illustrating the hydrographical work of the International Council; and to Messrs. J. Engelhorn's Nachfolger of Stuttgart for permission to use certain illustrations taken from Krümmel's "Handbuch der Ozeanographie."

CONTENTS

CHAPTER I

	PAGES
INTRODUCTION—THE EXTENT OF THE OCEANS—CLASSIFICATION OF THE OCEANS AND SEAS—SEA-LEVEL—HYPSOGRAPHICAL CURVE OF THE EARTH'S SURFACE—THE GENERAL FEATURES OF THE OCEAN FLOOR—OCEAN DEEPS	1-22

CHAPTER II

OCEANIC DEPOSITS AND BOTTOM FAUNA—STRATIFICATION IN MARINE DEPOSITS—OCEANIC DEPOSITS AND GEOLOGICAL SEDIMENTS—PERMANENCE OF THE OCEANS	23-46
--	-------

CHAPTER III

THE TEMPERATURE OF THE SEA—SOURCES OF HEAT IN THE SEA—THE DISCONTINUITY LAYER—TEMPERATURES AT THE SEA SURFACE—THE INTERNATIONAL HYDROGRAPHIC INVESTIGATIONS—THE PROPERTIES OF SEA-WATER—SEA ICE—ICEBERGS—ATMOSPHERIC GASES IN SEA-WATER—SEA-WATER AS A FOOD SOLUTION FOR PLANTS—SALINITY	47-104
--	--------

CHAPTER IV

WAVES—THE TIDES	105-130
---------------------------	---------

CHAPTER V

OCEAN CURRENTS	131-197
--------------------------	---------

APPENDICES

I. CONVERSION TABLES	198
II. BIBLIOGRAPHY	199
INDEX	203

CONFIDENTIAL

SECRET

1. The purpose of this document is to provide information regarding the activities of the [redacted] in the [redacted] area.

2. [redacted]

3. [redacted]

4. [redacted]

5. [redacted]

6. [redacted]

7. [redacted]

8. [redacted]

9. [redacted]

10. [redacted]

11. [redacted]

LIST OF ILLUSTRATIONS

FIG.	PAGE
SURFACE SALINITIES OF THE OCEANS - - - - -	<i>frontispiece</i>
1. THE LAND AND WATER HEMISPHERES - - - - -	6
2. HYPSOGRAPHICAL CURVE OF THE EARTH'S SURFACE - - - - -	16
3. THE BRITISH ISLES AND THE CONTINENTAL SHELF - - - - -	20
4. ABYSSAL FISH (MACRURUS AND LYCODES) - - - - -	32
5. BOTTOM AND PELAGIC DIATOMS - - - - -	40
6. DIAGRAM SHOWING GRADUAL DISAPPEARANCE OF CALCIUM CARBONATE WITH INCREASING DEPTH - - - - -	41
7. CHART SHOWING LINES OF OBSERVATION PROPOSED FOR HYDROGRAPHIC WORK BY INTERNATIONAL FISHERY COUNCIL	56
8. HYDROGRAPHIC OBSERVATION STATIONS IN THE IRISH SEA (1909) - - - - -	59
9. SURFACE CHART: NORTH ATLANTIC (AUGUST, 1896) - - - - -	61
10. DIRECTION OF CURRENTS IN THE IRISH SEA WHEN THE GULF STREAM DRIFT IS AT ITS MAXIMUM - - - - -	63
11. IRISH SEA SURFACE TEMPERATURES (FEBRUARY) - - - - -	64
12. IRISH SEA SURFACE TEMPERATURES (AUGUST) - - - - -	65
13. IRISH SEA: MIGRATION OF MARKED PLAICE AND ITS RELATION TO WATER-TEMPERATURE - - - - -	66
14. NORTH ATLANTIC ICEBERGS: PHENOMENAL DRIFTS - - - - -	89
15. SOUTH POLAR ICE LIMITS - - - - -	91
16. THE PETTERSSON-NANSEN WATER-BOTTLE - - - - -	103
17. A TROCHOID WAVE - - - - -	106
18. THE ADVANCE OF A WAVE - - - - -	107
19 α . ILLUSTRATING THE EQUILIBRIUM THEORY OF THE TIDES - - - - -	112
19 β . ILLUSTRATING THE EQUILIBRIUM THEORY OF THE TIDES - - - - -	112
19 γ . ILLUSTRATING THE EQUILIBRIUM THEORY OF THE TIDES - - - - -	113
19 δ . ILLUSTRATING THE DIRECTION AND STRENGTH OF TIDE-PRO- DUCING FORCES DUE TO THE MOON (G. H. DARWIN) - - - - -	114