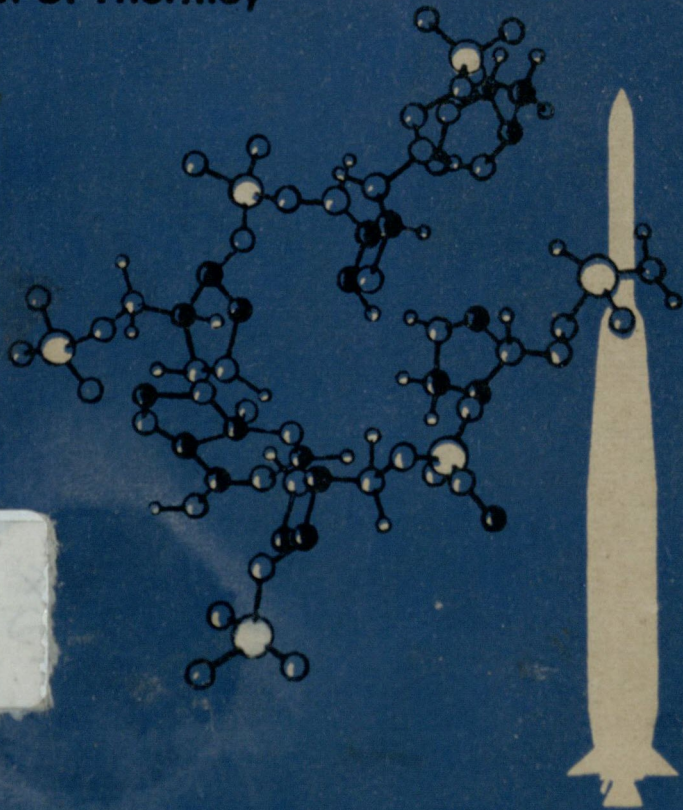


THE BRIDGE SERIES

# Changing Horizons

G. C. Thornley

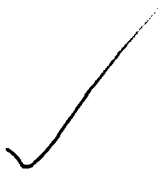




45

*The  
Bridge  
Series*

## CHANGING HORIZONS



*The following are published in this series*

NICHOLAS NICKLEBY AND MR SQUEERS

GREAT EXPECTATIONS

OLIVER TWIST

THREE ONE-ACT PLAYS

POWER AND PROGRESS

WAYS OF THE WORLD

CHANGING HORIZONS

THE MYSTERIOUS UNIVERSE

CRY, THE BELOVED COUNTRY

THE FIRST MEN IN THE MOON

ANIMAL FARM

THE KON-TIKI EXPEDITION

THE GRAND BABYLON HOTEL

THE CARD

SENSE AND SENSIBILITY

MANKIND AGAINST THE KILLERS

THE LOSS OF THE JANE VOSPER

THE HOPKINS MANUSCRIPT

STORIES GRIM, STORIES GAY

THE 'CAINE' MUTINY

LUCKY JIM

THE JOURNEYING BOY

CHRISTMAS AT CANDLESHOE

BARCHESTER TOWERS

FLOWERS FOR MRS HARRIS

AMERICAN SHORT STORIES

STORIES FROM MANY LANDS

THE RED BADGE OF COURAGE

# CHANGING HORIZONS

by

G. C. THORNLEY, M.A., Ph.D.

*Illustrated*



LONGMANS

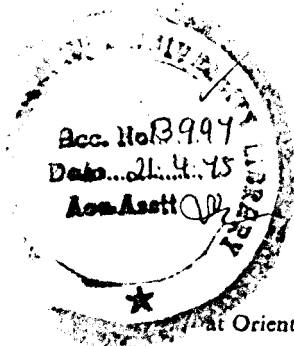
LONGMANS, GREEN AND CO., LTD.  
48, Grosvenor Street, London, W. 1  
*Associated companies, branches and representatives  
throughout the world*

PC  
609  
740

© G. C. Thornley 1962

*First published 1962  
First Indian Impression 1966*

**Price Rs. 2.50**



Printed in India  
at Orient Longmans Press, Madras 2.

## THE BRIDGE SERIES

THE *Bridge Series* offers interesting reading matter for the students of English as a second or foreign language who have reached a stage between the graded supplementary reader and full English. Having enjoyed a number of books in the *Simplified English Series*, such a student is ready for something more challenging.

The books in the *Bridge Series* are moderately simplified in vocabulary and often slightly reduced in length. Nearly all retain the syntax of the original writers. This has the dual advantage of giving practice in understanding more advanced sentence patterns and making it possible to keep the original flavour of the book.

Of intermediate difficulty between the *Simplified English Series* and the unrestricted English of literature, the *Bridge Series* books contain little of vocabulary or idiom that is not immediately valuable to the fairly advanced learner, and we hope that they will prove thoroughly enjoyable to read and study for their own sakes.

### TECHNICAL NOTE

The vocabulary of the *Simplified English Series* is the 2,000 words of the *General Service List (Interim Report on Vocabulary Selection)* and there is a degree of structure control. In the *Bridge Series* words outside the commonest 7,000 (in Thorndike and Lorge: *A Teacher's Handbook of 30,000 Words*, Columbia University, 1944) have usually been replaced by commoner and more generally useful words. Words used which are outside the first 3,000 of the list are explained in a glossary and are so distributed throughout the book that they do not occur at a greater density than 25 per running 1,000 words.

## ACKNOWLEDGEMENTS

We are indebted to the following for permission to use photographs reproduced in this book: Professor P. M. S. Blackett, page 110; the Bodleian Library, Oxford, page 139; British Railways, page 39; Camera Press Ltd., page 15; Central Electricity Generating Board, page 28; French Railways, page 38; A. F. Kersting, page 12A and C; Keystone Press Agency Ltd., page 124; the Mansell Collection, page 12B; Planet News Ltd., pages 12D and 55; the High Commissioner for the Federation of Rhodesia and Nyasaland, page 20; A. F. Sozio, page 38; United Kingdom Atomic Energy Authority, page 117; United States Information Service, page 75; Westland Aircraft Ltd., page 57.

## CONTENTS

CHAPTER	PAGE
I The Changing World	7
II New Building Materials	14
III The Coming of Electricity	22
IV The Transmission of Electric Power	29
V Electric Trains	35
VI Train Wheels	46
VII A Real Flying Saucer	54
VIII Early Ideas of Space Travel	62
IX Rockets	69
X Approach to Space Travel	80
XI What is an Atom?	94
XII Smashing the Nucleus	106
XIII Atomic Power	113
XIV Radio Isotopes	125
XV Electromagnetic Waves	131
XVI New Horizons in Surgery	142
XVII The Way Onwards	147
Notes on some Proper Names	151
Glossary	156

*Men my brothers, men the workers, ever reaping something new:  
That which they have done but earnest of the things that they  
shall do.*

ALFRED, LORD TENNYSON

## CHAPTER I

### *The Changing World*

THE world into which we all come has been left to us by our fathers and their fathers before them. It is composed more of the past than of the present. The cities and villages in which we all live were built by hands other than ours, and the railways that carry us from place to place were planned and constructed by men who are now probably dead. Everything around us is due, in whole or in part, to the skill, labour and energy of those who went before us along the road of life.

As each of us grows up and becomes acquainted with the world that other men have built, he explores it with interest, and sometimes with anxiety and even fear. For our surroundings are complicated and astonishing, kind and cruel, varied and vast. They are also constantly changing.

No generation leaves the world as it finds it. We shall change our cities and villages, just as men have done in the past. The great and wonderful city of Babylon consists now of ruins buried in the ground, and its glories are forgotten. Cities, like people, grow and die; they increase or decrease in importance. All such changes are the result of the restless energies of man. The generation now growing up will have the same energies and will not be satisfied with what it finds in the world. Some of us will invent new machines or instruments; some will suggest new scientific theories; some will explore new places or new regions of thought. Every fresh mind is different from every other mind of the present or the past, and it may have a contribution to make to the progress of mankind. And so the changes continue, for better or for worse.

## CHANGING HORIZONS

In the last century the speed of these changes in many of men's fields of activity has enormously increased. There was not a great deal of difference between a Roman chariot and an eighteenth-century gentleman's carriage. Both were pulled by horses and the construction of the two vehicles was much the same. The sound of traffic outside a Roman and an eighteenth-century window was in each case the sound of horses' hoofs, yet the interval was a period of about 2,000 years. But the difference between the first locomotives and a motor-car or aeroplane of today, less than a century and a half later, is apparent to everyone. Stephenson's 'Rocket' could move at 35 miles per hour; aeroplanes now can fly at speeds exceeding the speed of sound. Even the aeroplane in which Blériot crossed the English Channel looks old-fashioned to us, and we may be rather surprised, when we see a picture of it, that it could fly at all. The television receiver which we watch every day and accept as part of the furniture would have astonished and perhaps frightened the people of the last century. We live in a changing world of speed and of scientific invention.

The increasing rate of advance of science is in some ways more than surprising—it is alarming. Men now have the power to destroy the whole human race by means of atomic bombs. The invention of the steam-engine and the first locomotives, when iron for the first time in the history of the world moved by itself from one place to another, started a process which has widened, has developed, and has now brought us to the atomic age. In the next century we may be sure that the speed of discovery and invention will increase further (if there are still men on earth), and indeed it is difficult to picture the world as it will be in the year 2050.

Newspaper headlines are an indication of our changing world. What would our forefathers say if they could read a newspaper of today? They would notice that the events of yesterday in distant places of the earth were fully described. They would read of atomic submarines which travel under the

ice of the North Pole. They would read that Satellite III could be seen north-west of London at three o'clock in the morning, and they would not understand at all what Satellite III meant. They would notice that the world now contains instruments that can calculate in a few minutes what an expert mathematician cannot calculate in a year. They would read of some kind of machine which the papers call a flying saucer.

They would be astonished at these things and they might not even believe them. But the people of the modern world are becoming quite accustomed to new machines, new instruments and new theories.

The changes in the scientific world are mostly in the direction of progress. In medicine we have new drugs that can quickly cure illnesses which either killed our forefathers, or at least kept them in bed for weeks. Operations are now performed on the human brain and heart, and we accept such wonders as normal events. Yet even a modern viewer may be rather astonished when he watches on a television screen the heart of a fish still beating and alive in a liquid contained in a glass vessel.

Machines now do much of the work which men and women used to do with their muscles. Usually the machines do the work better and more quickly; and they do not get tired. The farmer of the past used a wooden plough pulled by a horse, and he cut the golden grain by hand. Nowadays both ploughing and reaping are done by machines. If his crops are attacked by disease, aeroplanes fly over them and spray them with gas to kill the pests.

It is not long since most women spent long periods of time washing the pots used for meals and washing the clothes worn by the family. Different machines can now do both and can help the woman of the house in other ways. There are machines which can remove dust from the carpets and cushions; others can keep the food cold and in good condition. The machine in