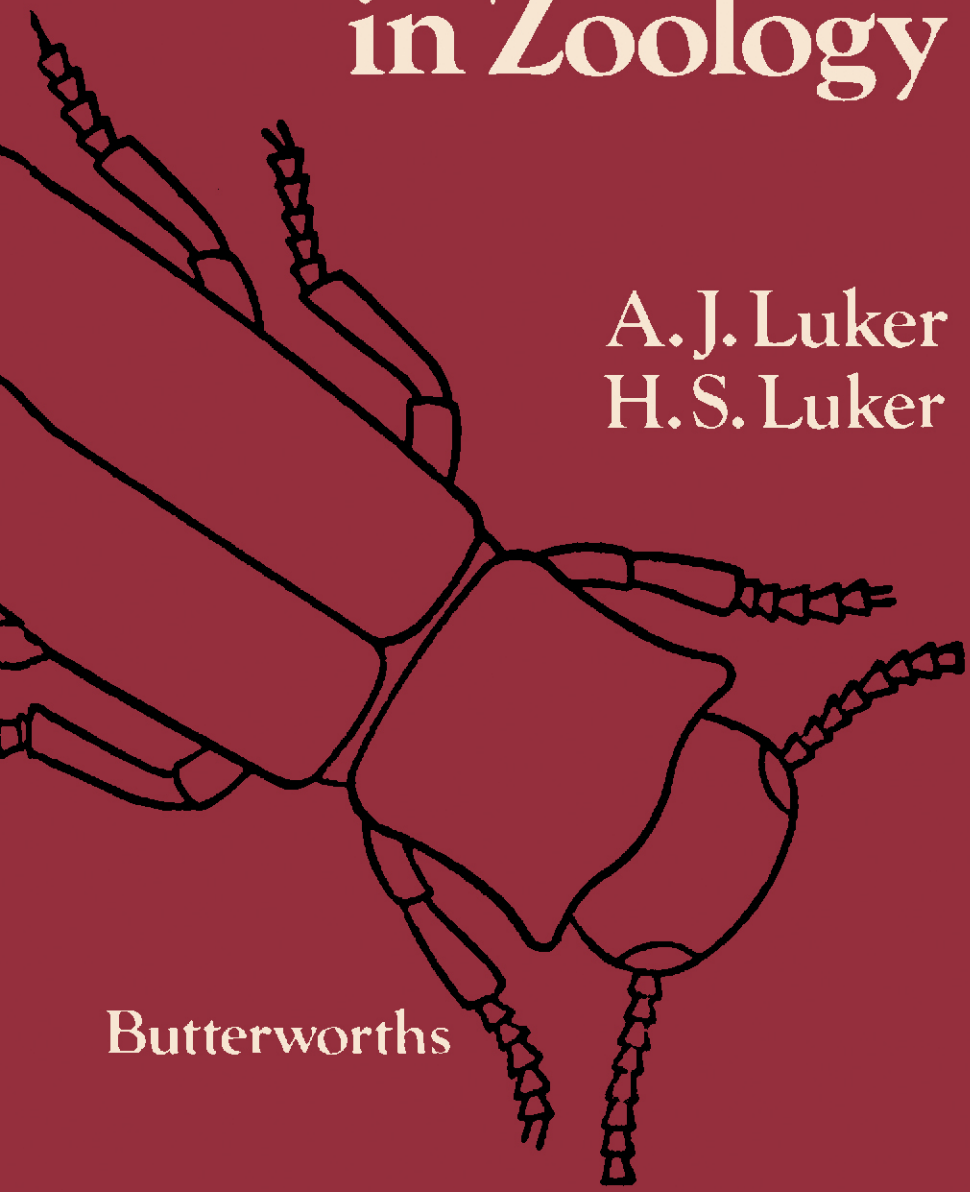
Laboratory Exercises in Zoology

A. J. Luker
H. S. Luker



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H. S. Luker, B.Sc., M.I.Biol.
and
A. J. Luker, L.C.P., M.I.Biol.
Head of the Biology Department, The Lakes School, Windermere

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Preface

These exercises are most suitable for sixth form students studying for Advanced level Zoology or Biology. However, a large proportion of the practical work suggested here could be performed quite successfully by pupils at a lower level in school.

The exercises are concerned mainly with physiology and although some dissection techniques are described this aspect of investigation has been neglected largely because we feel that there are school texts which cover quite adequately dissection methods.

This book has been compiled to provide a compact collection of information required by teachers, technicians and students in practical classes. In selecting the practical work for inclusion we have taken into consideration the demands made by the Zoology and Biology syllabuses of the various Examination Boards. The modern approach to the teaching of biology stresses the importance of practical work. As many schools are without a full time biology laboratory technician, it is often necessary for teachers and pupils to look after livestock and set up apparatus for laboratory investigations. We have taken care over choosing the type of animal whose physiology is to be examined and we have named only those animals which may be accommodated successfully in a school laboratory and which may be obtained from one of the biological suppliers. The materials required for each exercise are listed in each case and where applicable, the names and addresses of suppliers have been included. We have tried to use equipment which is not too costly and where it is possible, we have given details of the construction of some of the pieces of apparatus.

To make the exercises more meaningful we have included several short theoretical introductions but out of necessity these have been kept to a minimum.

We hope that the results of some of these investigations will stimulate further enquiry.

It is impossible to acknowledge the source of all the material included here particularly as some of the exercises have now become traditional in an introductory course in zoology. Nevertheless, we should like to thank the many unnamed colleagues, friends and pupils who have provided us, sometimes unwittingly, with ideas for this text.

Windermere H.S.L.
1969 A.J.L.

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PART A

Physical and Chemical Investigations

1. DIFFUSION

Diffusion is the movement of molecules or ions from a region of high concentration to a region of relatively low concentration and this continues until they are evenly distributed.

Diffusion through a membrane

If a 10% solution of glucose is separated from a 20% solution of glucose by a membrane which is permeable to glucose, after a time the solution on each side will contain 15% glucose and a state of equilibrium is reached when there are as many glucose molecules passing one way through the membrane as there are passing in the opposite direction.

Cell membranes are not permeable to all substances in solution, they are selectively permeable.

Provided that the membrane is permeable a substance may diffuse into the cell from the environment without the cell using any energy during the process. But diffusion alone does not account for the way in which all substances enter cells. In some cases cells are able to take in substances which are in low concentration outside the cell compared with a relatively high concentration in the protoplasm. During this process the cell expends energy and materials are said to be obtained by active transport.