UNIVERSITY COLLEGE COURSE OF PRACTICAL EXERCISES IN PHYSIOLOGY

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649426423

University College Course of Practical Exercises in Physiology by J. Burdon Sanderson

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

J. BURDON SANDERSON

UNIVERSITY COLLEGE COURSE OF PRACTICAL EXERCISES IN PHYSIOLOGY

Trieste

UNIVERSITY COLLEGE COURSE

OF

PRACTICAL EXERCISES

IN

PHYSIOLOGY

BY

J. BURDON SANDERSON, M.D., LL.D., F.R.S.

JODRELL PROFESSOR OF PHYSIOLOGY IN UNIVERSITY COLLEGE, LONDON.

WITH THE CO-OPERATION OF

F. J. M. PAGE, B.SC., F.C.S., W. NORTH, B.A., F.C.S., AND AUG. WALLER, M.D.

LONDON
H. K. LEWIS, 136 GOWER STREET, W.C.
1882

PREFACE.

THE following exercises are intended to serve as a guide to the Practical Courses which are given in the Physiological Department of this College. Part III. comprises the Chemical Exercises relating to Food Stuffs and Animal Liquids which are performed by every Student in the Class Room, in the ordinary course of Practical Physiology. These Exercises were, for the most part, originally arranged by Mr. Page. They have been used by many hundreds of Students and have been found to work well. Part IV. contains directions for the more detailed practical study of the same subjects. In the preparation of these, I have had the assistance of Mr. North who has used them in the Practical Instructions which he has given here. The exercises in Part I. relate to the Physiology of Muscle and Nerve. In selecting them great care has been taken to include nothing which cannot be successfully carried out by the Student. Many of the exercises have been contrived by Dr. Augustus Waller, who has devoted much time and thought to the simplification of methods. The Demonstrations in Part IV. relate to various subjects. These are separated from the rest of the course, on the ground that they do not admit of being performed by each student for himself.

UNIVERSITY COLLEGE COURSE

OF

PRACTICAL EXERCISES IN PHYSIOLOGY.

PART I.

PRACTICAL EXERCISES RELATING TO THE PHYSIOLOGY OF MUSCLE AND NERVE.

1. *Make electrodes as follows:*—Prepare two straight, moderately thick wires about four inches long. Taper each to a blunt point at one end. Solder to the opposite end of each a length of thin wire. Cover each with a thin layer of packing wax. Prepare two three-inch lengths of glass tubing (which should be thick walled and of narrow bore). Warm them, and introduce the wires so that their points project half an inch. Bind the tubes together for convenience of handling and bare the wires by scraping the wax off near the point on one side.

2. *Put up a Daniell cell.* The positive element is a well amalgamated zinc rod immersed in ten per cent. sulphuric acid contained in a porous cell; the negative element is a copper cylinder containing a solution of sulphate of copper. Put a wire in each binding screw. The end of the wire attached to the zinc (negative wire), is called the cathode; that attached to the copper (positive wire), the anode.

3. *Pith* a frog and prepare a sciatic nerve without dividing it,* (See Hdb. p. 343). In the process the gastrocnemius should not have twitched.

4. *Connect the electrodes with a Daniell cell, interposing a key in the circuit.* Contraction follows make, or make and break. It does not continue during passage of current. The excitability of the nerve is increased by division or injury.

5. Arrange cell and coil for single shocks, *i.e.*, join the ends of the battery wires to the two top screws of the du Bois' induction apparatus, in which the primary wire ends, interposing a key by which the current is made and broken at will. Gradually sliding the secondary towards the primary coil, observe that the break shock is first responded to, then the make. Note the distance of secondary from primary coil at which you first get contraction in each case.

6. Arrange cell and coil for repeated shocks (faradisation), by bringing the battery wires to the two screws *A* and *E*, Fig. 1. The circuit now includes the vibrating hammer or automatic interrupter. On closing the current, the hammer is drawn down and causes a break; the current ceasing, the hammer is released, and contact is restored by the spring. You thus obtain a succession of make and break induction currents in alternately opposite directions. Prepare the second sciatic nerve, and observe that faradisation produces continuous muscular contraction or tetanus, which may be due either to the series of break excitations, or to the double series of strong break excitations and weaker ones at make. Note the distance at which you first get contraction.

7. To obtain successive make and break excitations of nearly equal intensity, arrange for single shocks as in 5.

* In future experiments it is assumed that pithing is performed as a matter of course.

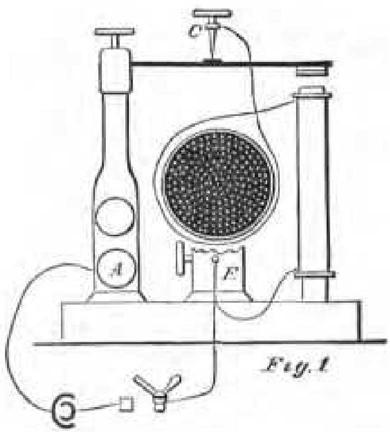

Fig. 1

But in addition, connect the two ends of the primary coil (the top binding screws), by an extra derivation or "short circuiting" wire broken by a key. By closing this key, the current in the primary coil is diminished by derivation, and increased to the same amount when it is opened. The diminution and increase give rise to induction currents, of which, the directions are opposed like those produced by make and break. Both of them are *cæt. par.* weaker than the make induction current, and they are sensibly equal to each other in their excitatory effects.

8. **Helmholtz' Modification of the Induction Apparatus.**— When it is necessary in faradising that the excitatory effects of the make and break shocks should be equal, the apparatus is arranged as in fig. 2. Connect the battery wires as in 6. Bridge the interrupter by a wire extending from B to C. Raise the upper contact screw C out of reach, and bring the