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VOL. XI. MAY, 1918 ARTICLES VIII–X.

ART. VIII. THE REACTIONS AND RESISTANCE OF FISHES TO CARBON DIOXIDE AND CARBON MONOXIDE

BY

MORRIS M. WELLS, PH.D.

ART. IX. EQUIPMENT FOR MAINTAINING A FLOW OF OXYGEN-FREE WATER, AND FOR CONTROLLING GAS CONTENT

BY

VICTOR E. SHELFORD, PH.D.

ART. X. A COLLECTING BOTTLE ESPECIALLY ADAPTED FOR THE QUANTITATIVE AND QUALITATIVE DETERMINATION OF DISSOLVED GASES, PARTICULARLY VERY SMALL QUANTITIES OF OXYGEN

BY

EDWIN B. POWERS, M. A.

ERRATA AND ADDENDA.

Page 50, second column, line 13 from bottom, for *Danais archippus* read *Anosia plexippus;* line 8 from bottom, for *mellifica* read *mellifera.*

Page 51, line 11 from bottom, for *Danais* read *Anosia.*

Page 159, at right of diagram, for *Bracon agrilli* read *Bracon agrili.*

Page 289, second column, last line but one, for *Scalops* real *Scalopus.*

Page 294, line 3, for *catcsbeana* read *catesbiana.*

Pages 327 and 330, line 12, for *orcus* read *oreas.*

Page 347, line 4, for Cecidomyidæ read Cecidomyiidæ.

Page 356, line 7, for Anthomyidæ read Anthomyiidæ.

Page 368, line 18, dele second word.

Page 373, after line 10 insert as follows: 53a, *subpruinosa* Casey, 1884, p. 38.

Page 375, after *submucida* Le Conte, 48, insert *subpruinosa* Casey, 53a.

Page 377, after line 7, insert as follows:—

1884. Casey, Thomas L.
Contributions to the Descriptive and Systematic Coleopterology of North America. Part I.

Page 379, line 11 from bottom, for *sensu lata* read *sensu lato.*

Page 382, line 12, for VII read VIII.

Page 408, line 2, for *the next article in* read *Article VIII of.*

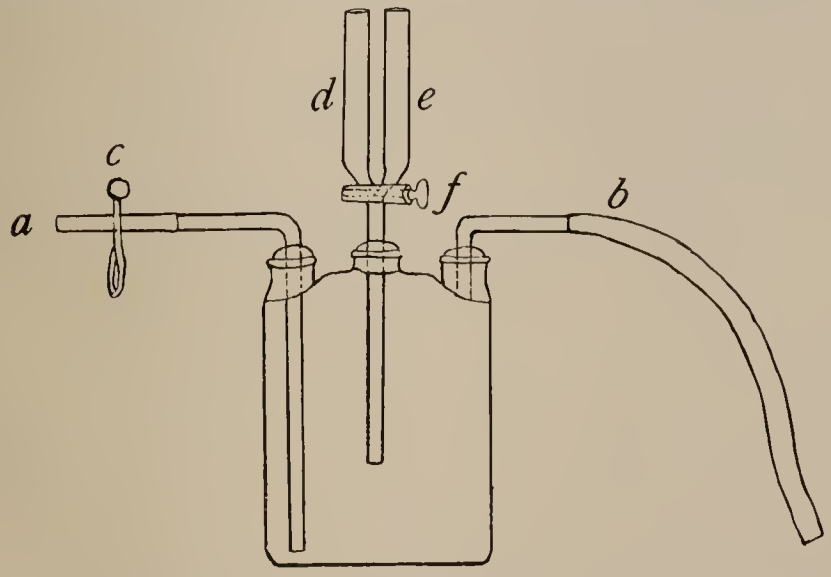
Page 410, line 6 from bottom, for $=4$ read *'11.*

Page 412, line 7, for 31 read 30.

Page 421, line 17 from bottom, insert *it* before *grows.*

ARTICLE X.—*A Collecting Bottle especially adapted for the Quantitative and Qualitative Determination of Dissolved Gases, particularly very Small Quantities of Oxygen.** BY EDWIN B. POWERS.

One of the sources of error in the Winkler method for the determination of dissolved oxygen in water, especially where the oxygen content is low, is the diffusion of oxygen into the water before and during the introduction of the chemicals. Another source of error is the mixing of the manganous chloride with the potassium iodide-alkali solution at the surface of the water, the chemicals adhering to the pipettes introducing these reagents having washed off at the top of the bottle, where they react with the oxygen present. In recent work involving the oxygen-free water apparatus described by Shelford in the preceding article of this volume, it was found especially desirable to eliminate the above sources of error. This was accomplished



*This bottle was devised primarily for the study of the oxygen requirements of crayfishes, with a view to their use as index organisms.

by a special bottle which allows the collecting of samples and the introduction of the chemicals without exposing the samples to air during the operation.

The apparatus shown in the accompanying figure is composed of a bottle having an inlet, *a*, at bottom and an outlet, *b*, at top. When the bottle is filled the inlet is clamped off at *c*. The manganous solution is introduced through the burette *d* and the potassium iodide-alkali solution through the burette *e*. The burettes *d* and *e* are supplied with a two-way stop-cock at *f*. The displaced water is allowed to pass out at the outlet *b*, which is kept open to equalize the pressure. The acid solution is introduced through the burette *d*, thus avoiding any action of a strong acid on the potassium iodide of the potassium iodide-alkali solution. A 200 c.c. pipette is used to draw a sample for titration, thus avoiding agitation of sample in presence of air. Correction for error due to the introduction of chemicals can be calculated from the per cent. of collection used for titration with sodium thiosulphate, and the oxygen content of the water can be calculated directly. In lieu of the simple pipette for drawing off sample of water for titration, the device described by Hyman L. Shoub* may be substituted.

A modification of this bottle is also very useful for work with hydrogen sulphide, sulphur dioxide, carbon dioxide, and other gases when exclusion from the air is essential.

I wish to thank Mr. Carl F. Miller and Mr. Paul Anders, of the Chemical Laboratory of the University of Illinois, for making this apparatus available.

*Hygienic Lab. Bull. 96, U. S. P. H. S. Aug., 1914.