SCIENCE

Vol. 86 Friday, September 3, 1937 No. 2227 The History of Evolutionary Thought: SIR EDWARD Special Articles: Some Oxidative Properties of Isolated Amphibian B. POULTON Germinal Vesicles: DR. JEAN BRACHET. Cobalt as Obituary: an Essential Element in Animal Nutrition: Dr. W. M. NEAL and Dr. C. F. AHMANN. Magnesium Sul-Vernon Lyman Kellogg: Dr. Robert A. Millikan 214 fate—an Unsatisfactory Substitute for Arsenicals in Grasshopper Baits: Dr. Roger C. Smith. Fitness, Sulfanilamide and Pneumococcus Infection in Expeditions of the Academy of Natural Sciences of the Rabbit: Dr. ARTHUR LOCKE and OTHERS. Philadelphia; The Holden Expedition of the American Museum of Natural History; The A. W. Mel-Scientific Apparatus and Laboratory Methods: An Electric Cardiometer: Franklin Henry 229 lon Educational and Charitable Trust; Proposed Buildings for the National Institute of Health; Science News 10 Grants-in-Aid for Public Health Work; The Second National Conference on Educational Broadcasting 215 SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and pub-Scientific Notes and News lished every Friday by Discussion: THE SCIENCE PRESS Upper Cretaceous Plants from Patagonia: Pro-New York City: Grand Central Terminal FESSOR EDWARD W. BERRY. Observation on Excita-Lancaster, Pa. Garrison, N. Y. tion of Fireflies by Explosions: Dr. Rudolf Ruede-Annual Subscription, \$6.00 Single Copies, 15 Cts. MANN. Secondary Binocular Vision in Birds: Austin H. Clark. An Infectious Disease Causing SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C. Wide-spread Necrosis in the Liver of the Mexican $Axolotar{l}\colon ext{Dr. Cranford Hutchinson and Dr. Bald}$ UIN LUCKÉ

THE HISTORY OF EVOLUTIONARY THOUGHT¹

AS RECORDED IN MEETINGS OF THE BRITISH ASSOCIATION

Professor Sir EDWARD B. POULTON, D.Sc., LL.D., F.R.S. HOPE PROFESSOR OF ZOOLOGY AT THE UNIVERSITY OF OXFORD

SIR WILLIAM THOMSON, in his address at Edinburgh in 1871, said that "the real origin of the British Association" was given in the words of a letter written by David Brewster to John Phillips on February 23, 1831, a few months before the first meeting: "The principal object of the Society would be to make the cultivators of science acquainted with each other, to stimulate one another to new exertions, and to bring the objects of science more before the public eye, and to take measures for advancing its interests and accelerating its progress." That the time was fully ripe for the birth of the association is made very clear by the words written by John Keble to a friend, referring to the D.C.L. degrees conferred, at the Oxford meeting in 1832, on David Brewster, Robert Brown, John Dalton

¹ Address of the president of the British Association for the Advancement of Science, given at Nottingham, September 1, 1937.

and Michael Faraday: "The Oxford Doctors have truckled sadly to the spirit of the times in receiving the hodge-podge of philosophers as they did"—an opinion on which Lord Salisbury commented at the Oxford meeting in 1894: "It is amusing at this distance of time, to note the names of the hodge-podge of philosophers whose academical distinctions so sorely vexed Mr. Keble's gentle spirit." It is not only amusing but pathetic that such words should have been used by a revered member of a university which had done splendid service for science, as has been so well shown in Dr. R. T. Gunther's volumes.²

Faced by the serious duty of preparing this address, I felt that the best hope of interesting you would be to choose a subject which has received special attention at our meetings. I have selected the progress of thought on organic evolution as it may be followed in addresses.

2 "Early Science in Oxford," vols. i-xi.

itself. When the counter has completed its stroke a short-circuiting contact is made which momentarily reduces the anode potential to a value low enough to stop the current flow, whereupon the contact opens as the counter armature returns and awaits the next heart beat. It will be noted that this contact operates after the stroke has been completed, and therefore imperfections in the contact cause no inaccuracy in the count, provided only that the potential is reduced for an instant below the ionization value before the next beat.

A telephone message counter in which the original armature has been replaced with one made from 1/32 inch steel has been found to work perfectly as a counter up to 235 strokes per minute (this high rate was secured by artificial means). It is not necessary to use other contacts if a graphic record of the beat is desired, as a thread connected to a recording pen can be attached to a flat spring which is placed so that it is hit by the counter armature near the end of its The counter and other parts of the output circuit must be well shielded, as must the circuits associated with the first amplifier stage. Also, the first 6F5 tube must be carefully selected, as about 30 per cent. of the tubes commercially available seem to have a very high hum level or are defective in other ways.

This apparatus seems to be very dependable in operation. It is only necessary to attach the electrodes, turn the amplifier on and adjust the amplification so that the meter needle swings well above the point at which the trigger action occurs. The setting is not at all critical. If the amplification is more than about 15 fold above this value, multiple counts may occur due to electric feed-back between the counter and amplifier, but, in practical use, such high amplification is not necessary. When the electrodes are properly placed, the uninsulated subject can engage in any sort of violent activity without affecting the count.

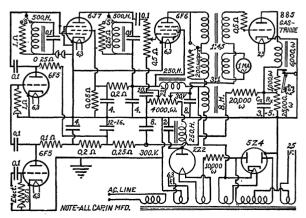


Fig. 1. The electric cardiometer.

The device seems particularly well adapted to the graphic recording of rate in connection with magnetic-clutch operated interval recorders as described by Fleisch³ and by Gesell.⁴ Additional contacts are not necessary; the magnet coil of the Fleisch apparatus, for example, is simply placed in series with the resistance R_x (see Fig. 1), which is reduced to compensate for the resistance of the coil. Experiments in progress indicate that a differentially wound magnet coil for the clutch is even better, as the anode current of the gas-triode can then release the clutch while at the same time the counter is being actuated. clutch is "off" for the duration of the counter stroke, which seems to be reasonably constant and which may be varied within limits by changing capacitor Cx and associated resistors.

FRANKLIN HENRY

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³ A. Fleisch, Am. Jour. Psychol., 45: 335, 1933.

⁴ R. Gesell, Science, 79: 275, 1934.

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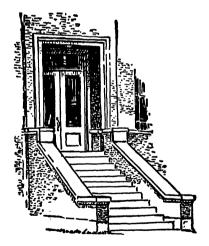
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