no reactions, or very few, but nevertheless they should be looked over.

In the revised list of journals the abstractor's number, to whom the journal has been assigned, follows the name, and two check marks indicate that the journal has been finished. This list, together with abstracting rules, will be sent to any one else desiring to have a part in this worth-while undertaking.

C. A. JACOBSON,
Editor in Chief

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PIGEON MALARIA IN CALIFORNIA

FOR many years, the presence of a sporozoan malarial parasite in pigeon blood has been known to produce a disease of economic importance. The causative organism of pigeon malaria is *Haemoproteus columbae* Celli and San Felice. The parasite can be transmitted from bird to bird only by means of a blood-sucking vector, a hippoboscid fly, *Pseudolynchia canariensis* (Macq.). Bishopp[1] states that this fly was introduced into the United States about 1896. It is distributed throughout the southern states and in California.

Although pigeon malaria has been reported from many parts of the United States, to our knowledge, no previous record exists which establishes its presence in California. Our interest was aroused when a report came to us from a Southern California squab farm that birds infested with *P. canariensis* showed signs of unthriftiness. The symptoms were quite variable in intensity, ranging from mild to severely morbid states. Examination of blood samples from these birds showed the erythrocytes to be parasitized by *H. columbae*.

The extent of the disease in California has not been determined. A survey is in progress with this object in view. The presence of the parasite should stimulate the application of vigorous control measures against the fly vector.

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SPECIFICITY OF RENIN

UNDER date of Friday, December 13, there appeared in SCIENCE, page 554, a note from the University of Buenos Aires relative to the absence of pressor response in man when swine renin is injected intravenously. In this connection we have the following to report.

Since February, 1940, we have experimented with hog renin in humans, the material employed having been prepared especially for us by Professor W. W. Swingle, of Princeton University, who reported that 0.1 mg per kilo of body weight of this material, given intravenously to anesthetized dogs over a period of two to five seconds, raised the mean arterial pressure 40 mm of mercury. We have thus far failed to obtain any significant elevation in blood pressure response in human beings with this material even when injecting intravenously quantities of renin, which appear relatively large. After cautiously experimenting with the material on ourselves, a group of 20 patients on Dr. Schnabel's service were tested for sensitivity by the intradermal injection. In two instances mild positive skin tests were obtained. On March 6, 1.76 mg of renin were injected intravenously into a patient, with no significant effect on blood pressure. The following day 2.9 mg were injected, with negative results. Since then we have injected this material in normal individuals and in patients suffering with hypertension in gradually increasing doses. Our last experiment was with a 38-year-old male, who was given rapidly 7 mg intravenously, without effect on blood pressure. Five minutes thereafter 14 additional mg were given intravenously, still without effect on the blood pressure.

It might be of interest also to state that a large injection in a patient who earlier had demonstrated a positive skin reaction, had no effect upon the patient's blood pressure.

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SCIENTIFIC BOOKS

MATHEMATICS

The Development of Mathematics. By E. T. BELL. xi + 583 pp. New York: McGraw-Hill Book Co. 1940.

"ONCE we venture beyond the rudiments," says Mr. Bell, "we may agree that those who cultivate mathematics have more interesting things to say about it than those who merely venerate." No more eloquent substantiation of this assertion could be wished for than this book in which it appears. A cultivator himself, its author requires no introduction to mathematicians. He knows mathematical creation—its trials and its rewards—at first hand. Nor does he need introduction to the wider reading public. It seems to this reviewer, however, that in this work he has risen to a new level of accomplishment, which merits the genuine appreciation of all those who regard mathematics and its related sciences as a vital field of human activity, and find interest in the history of their development. This is an eminently readable book, written in an engaging and graceful style. At the same time it is a scholarly work with a wholly serious purpose,

[1] F. C. Bishopp, *Jour. Econ. Ent.*, 22: 974, 1929.

full of information and fact, and covering much material which is otherwise not easily accessible.

As the keynote of the book the author sounds an old quotation: "There is probably no other science which presents such different appearances to one who cultivates it and to one who does not, as mathematics. To [the noncultivator] it is ancient, venerable, and complete; a body of dry, irrefutable, unambiguous reasoning. To the mathematician, on the other hand, his science is in the purple bloom of vigorous youth, everywhere stretching out after the attainable but unattained, and full of the excitement of nascent thoughts; its logic beset with ambiguities, and its analytic processes, like Bunyan's road, have a quagmire on one side and a deep ditch on the other, and branch off into innumerable by-paths that end in a wilderness."

To the student of mathematics the historical development of his subject appears all too inevitably as a wilderness, and moreover as an almost impenetrable one when the last century or two are approached. With research pressed in this time and at the present on many fronts by a vast number of investigators, with many different groups of these pursuing apparently quite diverse objectives, and with all of them changing their tactics and goals disconcertingly often, the residue of their attainments is a weltering jungle indeed. Through this the present book lays a very welcome road. The typical and more significant trends and episodes are isolated, the genesis, growth and efflorescence of some of the concepts and methods, whose survival to the present is their guarantee of significance, are traced, and often their decadence in periods of sterile over-elaboration is observed.

The book is not of the "popular" kind, as this term is generally understood, since it makes small effort to be intelligible to readers wholly uninitiated mathematically. Indeed, its appeal will probably be found to vary almost directly with the reader's mathematical attainments. The less trained will find much that is entirely narrative and non-technical, and will sometimes find quite enlightening the concise but generally clear technical surveys that are given. The advanced student of mathematics and science will find much more to interest him, and will value the orientations which the book supplies. Professional mathematicians, even those who are themselves momentarily engaged in extending mathematical theories and their applications, will find the book a thoroughly worth-while reading of mathematical evolution. This is not to say by any means that they will in all instances read from the noted trends and related episodes precisely the same inferences as does the author. The better, perhaps, that in some cases they should not.

For the purposes of this review it is convenient to regard the book as falling into two parts, consisting respectively of the first six chapters, which treat of mathematics up to the year 1637, and the remaining seventeen chapters which terminate the discussion at the present time. The first part, which begins with a general prospectus, is given over thereafter to a review of mathematics in the ancient Babylonian and Egyptian eras, in the Greek period, in the dark age of Europe, through the Arabian epoch and the Renaissance. While completely non-technical, even these chapters are not to be regarded as a historical text. There is not the customary cataloguing of names and facts, but rather a sort of running narrative commentary, of which a full appreciation will be somewhat conditioned upon the reader's previous knowledge of the history. The author acknowledges these pages to hold in the main a collation of material from more or less familiar and classical works. This reviewer found these chapters to be by far the weaker part of the book; to be in fact a trifle pedestrian, though not always unprovocative. As is well known, iconoclastic tendencies are not invariably eschewed by this author. The so-called *debunking* of tradition is often salutary. An excess of it, however, though it adds a sensational element to the reading, may in the case of immature or otherwise undiscriminating readers leave impressions that are not wholly fortunate or just. Enjoyable or regrettable, as the reader may find them, he will find here, and throughout the book, a sprinkling of the quips and sophistications which those who know the author would rather expect, and some will perhaps deplore his occasional momentary lapses from a generally prevalent high scholarly objectiveness to the inclusion of less happy and rather discordant contemporary comment.

The peculiar contribution of the book is by all odds to be found in its second part. Here the author's excellent qualifications for his task, which include a technical equipment beyond the range of the usual historian, and a literary facility far beyond the range of the usual mathematician, really come to bear. The wide gamut of topics discussed is perhaps best suggested by the chapter headings, which are the following: The beginnings of modern mathematics 1637–1687; Extension of number; Toward mathematical structure; Arithmetic generalized; Emergence of structural analysis; Cardinal and ordinal to 1902; From intuition to absolute rigor, 1700–1900; Rational arithmetic after Fermat; Contributions from geometry; The impulse from science; From mechanics to generalized variables; Differential and difference equations; Invariance; Certain major theories of functions; Through physics to general analysis and abstractness; Uncertainties and probabilities.

It would be entirely impossible to abstract these chapters briefly. They should be read in their com-

pleteness. Mathematics and mathematicians live in them, and not infrequently lend themselves to genuine drama. The presentation of the whole is admirable. It is flowing and graceful and often characterized by a genuine and delightful humor. A feature which will be prized is the author's almost invariable practice of labelling all investigators and notable publications with their nationality and dates.

The publishers of the book are to be thanked for an attractive and legible volume. The author deserves recognition and high praise for a significant and timely work. Many the scientist who has come to realize, to his humility, that his vaunted work would in his absence have soon been accomplished by another. One may safely venture that no other would soon have written this book had Mr. Bell not done so.

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RADIOLOGIC PHYSICS

Radiologic Physics. By CHARLES WEYL, S. REID WARREN, JR., DALLETT B. O'NEILL. xvii + 459 pp. Springfield, Illinois: Charles C Thomas. 1941. $5.50.

THE book is divided into two parts: "(1) The theory and practice of electrical engineering as applied to radiological apparatus. (2) The theory and application of radiation physics with reference to x-ray diagnosis and x- and gamma-ray therapy." The first part includes chapters on electric circuits; electrical measuring instruments; transformers, generators, motors and distributing systems; electronics; electromedical apparatus. The second part deals with radiant energy; x-rays and matter; radioactivity and nuclear physics; measurement and control of x-rays and gamma rays; physical aspects of the use of x-rays for therapy, fluoroscopy and roentgenography.

The authors have adopted the analytical method in the presentation of the different subjects discussed, starting with the simplest concepts and gradually working towards the more complex ones. The book is intended as a text for students of radiology and as a reference book for the practicing radiologist and others. Exhaustive treatment of the great many topics discussed is not claimed by the authors. In general a judicious choice of the material included and details omitted has been made. There are some original and ingenious explanations of the operation of apparatus and the fundamental principles involved.

Bearing in mind that the book is intended primarily for radiologists, the desire on the part of the authors for pedantic accuracy and completeness is rather unfortunate. It conflicts with the requirement of simplicity and here and there leads to explanations which are too involved for the radiologist but too superficial for the physicist. An example of this may be found in the discussion of the standard free air ionization chamber on p. 291 *et seq.* Explanation of the operation of such items as the induction motor could have been left out to advantage. At times statements are qualified at length when a few words would have sufficed. As an illustration consider the statement on p. 320: "The quality of the γ-rays produced by a radioactive substance is independent of the amount of the substance that is used (whenever the number of atoms of radioactive material is large enough to produce γ-radiation that is continuous with time from the practical point of view)." The qualifying clause (which this reviewer has put in parenthesis) could very well have been omitted or at any rate replaced by the phrase "in radium therapy."

The disintegration constants of the uranium series on p. 262 are not the latest values, as given, for instance, in Rasetti's "Elements of Nuclear Physics." There are very few misprints. The type and paper, as well as the numerous illustrations, are excellent. The style and language are typical of the better engineering texts.

The authors are to be congratulated for the vast amount of time and effort spent in the preparation of this book, which, in spite of some shortcomings, successfully fills a gap in radiological literature. For the first time it is now possible to get a comprehensive view of the radiological armamentarium from a single volume. The book will be most useful particularly to the small, but rapidly increasing, group of physicists and engineers interested in radiologic physics.

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SPECIAL ARTICLES

CHEMISTRY OF ENERGETIC ATOMS PRODUCED BY NEUTRON CAPTURE

SOON after the discovery of the neutron production of artificial radioactivities by Fermi and his coworkers, Szilard and Chalmers[1] in England observed that a considerable part of the radioactive iodine (I^{128}) produced by irradiation of ethyl iodide with slow neutrons could be removed by the simple process of extracting with water or an aqueous solution of iodide ion. The explanation of this phenomenon was clear almost from the first. It was well known that throughout the periodic table nuclei differed in mass

[1] L. Szilard and T. A. Chalmers, *Nature*, 134: 462, 1934.