[illegible] "Whether we say that among sea-animals will be found some that give milk to their young or whether we say that among animals that give milk to their young will be found some that inhabit the sea, is for all purposes of argumentation quite indifferent, and the equivalence is here so evident that the school of "exact," or mathematical, logicians are almost unanimous in adopting as their standard, or canonical, form of expressing the same fact, substantially this: "There is an aquatic mammal." Newton's great discovery is usually stated in elementary books, and is thought of by ordinary people in the form that each separate body in the solar system has an instantaneous component acceleration toward every other proportional to the mass of that other and inversely proportioned to the square of the distance between them, but is otherwise constant for all and at all times. But in writings on celestial mechanics (as in Equation 15 on p. 175 of Dr. Moulton's admirable little "Introduction" to the science), the form in which the same fact is often stated and intended to be thought is that the sum of the *vires vivæ* (or their halves, according to the old definition) of all the bodies of the system subtracted from the sum of the reciprocals of the distances between the several bodies, each reciprocal being multiplied by the product of the masses of the pair of bodies concerned and these masses being expressed in terms of a gravitational unit, remains unchanged. Since these two statements represent, and would in all conceivable cases represent precisely the same state of things, they are for all purposes of reasoning interchangeable. It follows that for logic they are equivalent, although, since this equivalence is not self-evident, they cannot strictly be called identical. From such considerations it follows that, in general, logic has nothing to do with different dresses of thought which cannot possibly represent different states of things; or at most has no more to do with them than to demonstrate that whatever state of things is represented by the one is equally represented by the other. That this principle, suitably modified for modals, ought to determine what is and what is not relevant to logic has been practically or virtually acknowledged in every system of logic excepting some of those which have arisen since the bankruptcy of Hegelianism, with the consequent *de facto* supremacy of psychology in current philosophy. But none of those which deny that application of the principle have improved reasoning in the smallest particular.

What Professor Baldwin means by calling his logical system "genetic" is that in it the main stress is to be placed [illegible]

As soon as the first volume came before us, we thought it almost if not quite inevitable either that there was to be no logic, properly speaking, in the work, or else that the logical matter was to be confused by the introduction of entirely irrelevant conclusions. Since the whole of that first volume, with the exception of seventy pages, was regarded by the author himself as relating to "pre-logical" topics, and since it seemed unfair to condemn the whole on account of that fragment of seventy pages, or simply because it did not relate to logic as we conceive that science, we contented ourselves with acknowledging that it was a sound piece of scientific work as far as it went. But we find the second volume to be distracted from the pure consideration of the genesis of thought by discussions of truly logical questions—discussions which are far from strong in themselves, and which do not evince the knowledge of logic that would have been necessary for carrying them through intelligently. In these discussions, positions are taken which neither necessarily result from the genetic theory nor are supported in any solid way, but which, rather, seem to have been selected on grounds of personal predilection, or at random. For example, the author regards judgments of probability as intermediate between the "universal" and the "particular" propositions of formal logic. He comes to that opinion in consequence of his understanding the "particular" form as being, for example, "Some men are mortal," and the "universal" as being, "All men are mortal." He thus shows us that he has not read logic with sufficient attention to remark that the subject in both the logical forms is in the singular number, "Some man is white," *aliquis homo est albus*, and "Any man is white," *omnis homo est albus*. Had he told us that he proposed to wipe out the existing terminology of logic and to use the old terms in new senses, the question would have been a different one; but as the architect of a "Dictionary of Philosophy," he must, and does, know that to do so (especially without notice) would have been to trifle with the ethics of science; and therefore he certainly intends to use the terms "universal" and "particular" according to their authoritative definitions. He even goes so far as to say that when in a judgment of probability, the probability becomes 1, the proposition becomes the logical "universal." A student of the doctrine of chances who did not distinguish between the two would soon find himself in a snarl. A very large number of players sit down to play an even game against a banker. That is, each bets at each play one franc that an event will turn out one way or another, the probability being one-half, that it will [illegible]

way. If the player loses, he pays a franc to the banker; and if he wins, he receives a franc from the banker. But as soon as a player has made a net gain of one franc, he retires from the table, and his place is taken by a fresh player. On the other hand, as soon as the banker has netted a gain, he yields the bank to a fresh banker. Now, every player and every banker is supposed to have unlimited funds or credit. Consequently, by one of the easiest of those problems in the doctrine of chances that are called "problems on the duration of play," the probability is 1 that any given player will, sooner or later, make a net gain, and the probability is equally 1 that every banker will ultimately net a gain. So, then, if probability 1 were equivalent to a logical universal affirmative, every player and every banker must come out of the game richer than he went in, which would obviously be making money out of nothing. But the truth is that probability relates to what would happen in "the long run"; that is, in an endless run; and probability 1 means that in such endless run the expectation to which it refers will be verified infinitely oftener than it is falsified; but, for all that, it may be falsified infinitely often. A teacher of logic ought to make this clear.

Some of Professor Baldwin's work in this volume is of a far more ambitious kind than that which we have illustrated. The reader will naturally suppose, however, that if he has not been able to control his mind to sound reasoning in the small problems, he is unlikely to have done so in the greater ones. At any rate, we can testify that, having gone through the whole with the utmost care and with predilections not unfavorable to the author, we do not think it worth our reader's while to enter into the necessarily more lengthy criticisms of the more difficult problems as treated in this volume. We greatly regret our disappointment with it.

Science.

African Nature Notes and Reminiscences. By Frederick Courtney Selous. New York: The Macmillan Co. $3 net.

This contribution to hunting lore and natural history is by the last of the big-game hunters of South Africa. It is an attractively written narrative of the adventures of over thirty years, spent mostly in the regions south of the Zambesi. President Roosevelt suggested publication and furnished a "foreword" in which he heartily supports, from his own observations in the Rocky Mountains, the views of the author as to the fallacy of much of the theory as to pro[illegible]

consists chiefly of reprints of the year's most important scientific memoirs. Charles A. Parsons's essay on "The Steam Turbine on Land and Sea," is a popular historical sketch, very different from Prof. A. Turpain's "Development of Mechanical Composition in Printing," which follows it. Professor Turpain's account of the electrotypograph, while technical, is a very clear, brief statement of the mechanism of this remarkable Hungarian invention. Frank J. Sprague's "Some Facts and Problems Bearing on Electric Trunk-Line Operation," is an abridgment of a paper presented before the American Institute of Electrical Engineers. An admirably simple report of the principles and operation of wireless telegraphy is given by Prof. J. A. Fleming. Two papers of interest to photographers are T. W. Smillie's "Recent Progress in Color Photography," and S. R. Cajal's "Structure of Lippmann Heliochromes," the latter an investigation of interference phenomena. The contributions on zoölogy and anthropology are the most extensive. They include a summary of Gustave Loisel's exhaustive study of English, Belgian, and Dutch Zoölogical Gardens; Theodore Gill's "Systematic Zoölogy: Its Progress and Purpose"; Prof. Theobald Fischer's sketch of "The Mediterranean Peoples"; Dr. E. Baelz's "Prehistoric Japan"; Henry Balfour's detailed examination of the types and geographical distribution of the fire piston; and other papers. The volume closes with Camille Matignon's intimate sketch of Marcelin Berthelot and Edward L. Greene's memorial address on Linnæus.

The "Infantilism" of C. A. Herter (The Macmillan Co.) is a highly specialized little treatise on a curious and hitherto unknown or imperfectly recognized disease of childhood in which growth is retarded and disturbances of digestion are conspicuous. It has been possible to show that this condition depends on the persistence of bacteria more or less characteristic of infancy and on the deficient development of other bacteria commonly found in older intestines. Dr. Herter's discussion of the question is interesting, and his proposals concerning a rational therapy are full of promise.

Dr. Woods Hutchinson's volume, "Instinct and Health" (Dodd, Mead & Co.), is made up of sixteen chapters on various topics related to the conduct of life. All of them have been seen in magazines or reviews of the last two or three years, and doubtless many of their readers will be glad to have them in a collected form; others may perhaps find the collection just a little cloying. The writer has a ready pen and without hesitation handles large problems in a light and easy fashion as though their solution were merely a playful exercise of intelligence. The central thought, set forth in the very first pages, but bobbing up at short intervals all through the book, seems to be that the human machine has been some twelve or thirteen million years in the making, is pretty well made, and having an extraordinary power of adjustment may be permitted in large measure to run itself. Dr. Hutchinson recognizes, however, that some guidance is necessary and gives considerable advice, often rather indefinite and vague, but on the whole sound. Unfortunately, there is a tendency to overlook what care has done for the machine and to disparage serious investigation of the conditions under which the machine works best. The teaching is largely by iteration and assertion with no marked fondness for careful argument or exact demonstration, and yet the book, while not aimed very high, ought to prove helpful to many, particularly among those to whom the literature of breakfast foods is precious, and who, in general, are keenly interested in diets.

Among the new works published by R. Oldenbourg, Berlin, two by Friedrich Ratzel command attention. One is a selection in two volumes of his minor writings, "Kleine Schriften," edited by Hans Helmolt; the other is a little book, "Uber Naturschilderung." Ratzel's contributions to ethnography and physical geography have been distinguished by an artistic handling of the material quite rare in works of science.

Oliver Wolcott Gibbs, chemist and physicist, Rumford professor emeritus at Harvard, died at Newport, R. I., December 9. He was born in this city February 21, 1822, the second son of George Gibbs, an eminent mineralogist. The boy was, besides, brought under the influence of quite another section of the intellectual world, by close family relationship with the Channings. He was graduated from Columbia College in 1841, and thereupon entered the laboratory of Dr. Robert Hare in Philadelphia. Subsequently, he enrolled himself as a student in the New York College of Physicians and Surgeons; but after receiving the degree of M.D. in 1845 he went to Berlin in order to devote himself to chemistry under the great analyst, Heinrich Rose, then at the acme of his fame. He simultaneously studied mineralogy under the guidance of Rammelsberg. Subsequently, he was led by the rising star of Liebig to Giessen, there to bend his attention to that organic chemistry which was just beginning to crystallize in urea and uric acid; and then, as Victor Regnault was engaged in those determinations which have never yet been superseded, the young student betook himself to Paris. In 1849 he was appointed professor of chemistry in the Free Academy, since entitled the College of the City of New York. He was already becoming distinguished in his profession; and when, in 1853, Dr. James Renwick retired from the chair of chemistry in Columbia, Gibbs was regarded as his natural successor. But to the Board of Trustees of that day, under the presidency of Charles King, the idea of appointing a Unitarian to teach chemistry in Columbia was quite too shocking to be entertained; and Dr. Gibbs continued his work in the Free Academy for another ten years. In 1863, on the resignation of Eben N. Horsford, who had been in charge of the chemical laboratory of the Lawrence Scientific School at Harvard, Dr. Gibbs succeeded to the position, and became Rumford professor. His success there is shown by the great attention the contributions from that laboratory everywhere attracted, and still more positively by the number of Gibbs's students who have since received distinguished scientific honors. He made important investigations in light and heat, but his greatest triumphs were in inorganic chemistry, where he opened up new realms, so to say, particularly in reference to complex inorganic bases and acids. His work on the platinum metals is also important. He was author of numerous articles and contributions to scientific journals, as well as to the *Nation;* and he was a member of many scientific societies, American and foreign. Gibbs was not only eminent as a scientist, but he was, besides, a man of great public spirit. During the war of the rebellion, he served upon the Executive Committee of the Sanitary Commission—nobody more actively. In order to aid and supplement that work, he thought it best that the earnest supporters of the war should be able to see one another daily in a club. To that end, he called a meeting in 1863, which resolved itself into the Union League Club.

From Berlin comes the report of the death, in his seventy-eighth year, of Hugo Hertzer, former professor of mathematics at the Technische Hochschule. He was the author of "Die geometrischen Grundprinzipien der Perspective" and "Fünfstellige Logarithmentafeln."

Charles Ballet, a well-known French horticulturist, and head of Ballet Frères at Troyes, has died at the age of seventy-nine. He wrote a number of books, notably "Les Bouves poires," besides contributing to French and English journals.

Drama.

Henrik Ibsen: The Man and His Plays. By Montrose J. Moses, New York: Mitchell Kennerly. $1.50 net.

This is a comprehensive summary of a considerable body of literature on Ibsen, which will be very useful to those junior students of the Norwegian dramatist who have neither time nor opportunity to consult the original authorities. It contains a sufficiently full sketch of his life; detailed, if not always clear, synopses of his plays; a variety of selected comment and interpretation, mostly of a highly laudatory description; and a liberal proportion of the author's individual views, which, though sometimes extravagant in their enthusiasm, often evince strong common sense and a power of discrimination never found in the fanatical worshipper. Like many other disciples of Ibsen, Mr. Moses is prone to exaggerate both the achievements and the influence of the master, but he does recognize some of his limitations. Thus he insists upon the imitative qualities of Ibsen's earlier plays and points out his persistent failure, especially in the days of his youthful iconoclasm, to realize that the world he satirized acted upon theories which might be worthy of consideration, even when they differed from his own. The frequent reappearance of identical motives and personages, under slightly changed conditions, in successive plays, Mr. Moses accepts as an indication that Ibsen's power of dramatic invention was restricted. He notes also that Italy never inspired him as it did Byron, Keats, or Shelley. It is, indeed, a curious fact that the first fruit of his southern travel was "Brand," than which nothing