of Hilgard's description and the utilization of the information. In the interval many geologists had been over the same ground in quest of underground water, clays, iron ore, and petroleum, and presumably had read the report, but it fell to the lot of a non-technical, but keen and persevering prospector to interpret the facts and to bring to light this interesting resource. Geologists may, however, console themselves in the fact that the note as published by Hilgard was clear and accurate and that it eventually pointed the way to a valuable discovery.

In the late summer or early autumn of 1921 I met Mr. Adams at Iuka, Mississippi, not by appointment, but a purely accidental meeting. He wished to show me what he thought was a deposit of bauxite just over the state line in Alabama. On examining the material I stated that in my opinion it was bauxite, but that I would like to see an analysis of it before expressing a positive opinion. Then it was that reference was made to Hilgard's description quoted by Mr. Burchard. I am uncertain whether Adams or myself referred to it, but a letter from Adams dated in February, 1922, says, "You remember telling me, when we were at Riverton Junction (Alabama), last summer, that I should prospect over Mississippi for Al_2O_3." I do not recall the exact conversation, but I do remember telling Adams to give me the results of his examinations in Mississippi; and he accordingly, in the late winter of 1922, sent me a very good sample of bauxite from Pontotoc County.

Now, we do not take issue with Mr. Burchard in giving to J. W. Adams the credit of the discovery, which was due him. Credit for this discovery was freely accorded Mr. Adams in our Bulletin No. 19, "Bauxite deposits of Mississippi," by Paul F. Morse, which was put into the hands of the printer in December, 1923, before Mr. Burchard's article was submitted for publication. What we do find hard to explain satisfactorily is why Mr. Burchard was so careful to emphasize in the opening paragraphs of his article that previous workers in Mississippi geology (including the State Geological Survey) had failed to discover these deposits (and they could easily be overlooked by a geologist not especially familiar with bauxite), and at the same time forget so completely to mention that the Mississippi Geological Survey had, at least in a measure, retrieved its reputation by promptly arranging with the prospecting company to secure the results of their accurate and detailed prospecting, which were prepared by Mr. Morse into a full and valuable report and sent to press in December, 1923, as Bulletin No. 19 of the Mississippi Geological Survey, a month before Mr. Burchard's article was submitted; furthermore, that galley proofs of our report were sent to Mr. Burchard, at his request, as soon as they were available, some of the material and maps of which he used in his own bulletin. It seems to me a lapse of courtesy that Mr. Burchard made no mention of these things.

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CHANCE AND EVOLUTION

So much has been printed in connection with the rejuvenated controversy on evolution that an attempt to add anything might seem presumptuous. Yet it appears to the writer that one of the most pregnant causes of misunderstanding between scientists and representatives of religion has been overlooked.

It is generally taken for granted that evolution is obnoxious to an adherent of one of the current forms of religion because it teaches that he is related to animals and particularly has "a monkey ancestry." This undoubtedly is the dominant occasion for offence in many cases, but there is a more subtle cause of friction which has resulted in much greater damage than the one mentioned. This is, in brief, the constant employment in scientific and particularly in evolutionary literature of such terms as "chance" and "accident" when dealing with origins. Less is said to-day about the "fortuitous concourse of atoms" which, a few years back, excited wrath in theological circles, but the suggestion of accident is nevertheless constantly made in scientific publications and is no less repellent to one who is taught to view the universe as a product of design.

The worst of this is that the offence is wholly unnecessary and could easily be avoided by a frank explanation of what the scientist understands by those terms. For, unless he is unpardonably superficial, he never intends chance and accident to be taken in the sense ordinarily assumed by the man in the street, that of something "hit or miss." In every department of research law is found to rule supreme, and it is in the confident belief that law will continue to be found so ruling that scientific investigation is pursued. If of a hundred facts only four fifths are to-day placed under laws, the scientist does not suppose the remaining one fifth to be beyond the reign of law but that he has not yet discovered the law or laws to which they respond. Chance and accident do not connote to him anything philosophical as opposed to design; they merely signify that the source of the data to which these terms are applied is indefinite. They may be products of design or evolved apart from design, but the student's intention is merely to pigeonhole them in an indeterminate category for further examination.

A striking example of this is the old Darwinian expression "accidental variations," which no evolu-

tionist would, I suppose, take to connote a haphazard origin of the factors so designated, since much investigation has been and is being devoted to a discovery of the causes of just such variations—all of which would be so much time thrown away if they actually respond to no law whatever.

But unfortunately certain would-be popularizers of science and superficial thinkers with scientific pretentions have interpreted these terms in accordance with the popular meaning and have spread abroad an impression that science denies design in nature. Certainly, science does not affirm it, because to do so would be to usurp the functions of philosophy. But she is so far opposed to the haphazard that no one would be more startled than a scientist at the appearance of an absolutely uncategorizable or lawless phenomenon. Science will not deny the possibility of such an apparition, but she will wait to be shown.

Much disturbance of the sensibilities of the religious minded will be avoided and a load of prejudice removed from the minds of great masses of people if teachers of evolution will take pains to explain to their classes the exact sense in which "chance," "accident" and similar terms are understood by scientific investigators.

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SCIENTIFIC BOOKS

TWO RECENT HISTORIES OF ELEMENTARY MATHEMATICS

THE literature of the history of elementary mathematics has recently been greatly enriched by the appearance of two unusually extensive works. One of these was published during the years 1921–1924, in seven small volumes, composed altogether of about 1,300 pages, while the other was published during the years 1923 and 1925, in two volumes, involving together about 1,350 pages. The former was written by J. Tropfke, Oberrealschuldirector, Berlin, Germany, and bears the title "Geschichte der Elementar-Mathematik," while the latter bears the more general title, "History of Mathematics," and was written by D. E. Smith, Teachers College, Columbia University. While both of these works should be of considerable interest to the student of the general history of science, the latter will probably appear especially attractive to such a student.

It may be of interest to note here that the term *elementary mathematics* is used with different meanings by the authors of the two works under consideration. D. E. Smith uses this term for "mathematics through the first steps in the calculus," while J. Tropfke excludes the calculus from the subjects covered by this term, placing its upper limit at the close of the elementary developments in analytic geometry. This is in accord with the fourth edition of volume 1 of the well-known "Encyklopädie der Elementar-Mathematik," by Weber and Wellstein, while the definition used by D. E. Smith is in accord with the earlier editions of this volume, as well as with common usage in our country. Notwithstanding the fact that the work by Smith aims to reach a somewhat higher limit as regards the subjects treated than that by Tropfke it actually presupposes less mathematical knowledge on the part of the reader and pays less attention to the more advanced developments in the subjects considered by both of these writers.

The subtitle of the first volume of this work by Smith is "General survey of the history of elementary mathematics," and in each of its ten chapters a brief sketch of the development of elementary mathematics during a certain period is given, beginning with "prehistoric mathematics" and ending with the mathematics of the "eighteenth century and after." The subtitle of the second volume of the same work is "Special topics of elementary mathematics," and it is also divided into ten chapters, with the following headings, in order: Development of the arithmetica, logistic of natural numbers, mechanical aids to calculation, artificial numbers, geometry, algebra, elementary problems, trigonometry, measures, the calculus. The subject of analytic geometry is treated very briefly in the chapter devoted to geometry and only twenty-seven pages are devoted to the history of the calculus.

The fact that there is now a demand for such extensive works devoted to the history of elementary mathematics is evidence of a rapidly growing interest in the history of science. Teachers of elementary mathematics will find in these works a large amount of material which may be used occasionally to exhibit the fact that the modern form of elementary mathematics seems, in many cases, to have resulted from the survival of the fittest, and to be much more free from difficulties than the earlier expositions. In particular, many elegant results which can now be easily established by means of Taylor's theorem escaped the notice of such shrewd minds as those of Newton and Leibniz, who are commonly credited with the invention of the calculus. The cheerful view that the human race is making actual progress in realms of abstract knowledge and that at least some truths are definite and not merely relative is perhaps supported more strongly by the history of elementary mathematics than by any other subject with which the young students become familiar.

An interesting feature of these works is the fact