Another distinct feature will be the presentation of phenomena and processes of the basic sciences, rather than mere apparatus or even results which have been obtained by use of apparatus. That this is no simple undertaking will be evident to every one. To demonstrate, on the lecture table, a chemical reaction in the presence of a class is one thing; to maintain this process in continuous operation for one hundred and fifty days is quite another thing. To demonstrate the phenomena involved in some vital process in the laboratory, perhaps on the stage of a microscope, for a few minutes, is one thing; to keep the phenomena visible to a large number of visitors for a period of five months is something quite different. To what extent these dynamic exhibitions can be substituted for the static ones so largely employed hitherto must be left for the future to decide. Whatever is possible in this direction will be achieved largely by the aid of clever, generous and wise advice from various leaders of science who have in the past so freely given valuable suggestions and help.

The inherent difficulty of making clear an intellectual advance by purely material means, plus a few printed legends, is something which needs only to be stated in order to be appreciated. Curiously enough, exposition becomes especially arduous in those very fields, such as algebra and quantitative physics, which lend themselves so readily to description in mathematical symbols. Since the main goal of the Chicago Centennial is a demonstration of the indebtedness of society to science, nothing in the way of a stated course in science will be offered; on the other hand, it is hoped that the exhibits, even in the pure sciences, will furnish entertainment and inspiration as well as instruction.

The Department of Exhibits, which is under the direction of Mr. John S. Sewell, includes besides the basic sciences six other divisions, namely those of applied science, of which Mr. J. F. Bell is the chief; agriculture, in charge of Mr. Harvey J. Sconce; social science, at the head of which is Professor H. W. Odum; state and federal participation, in charge of Mr. C. Van Deventer; foreign participation, at the head of which is Mr. Felix J. Streyckmans; and fine arts, which has not yet been organized. The entire executive responsibility of the fair has been placed upon Mr. Lenox R. Lohr, who is manager of the exposition; but responsibility for the preparation and installation of exhibits in the basic sciences is in the hands of the following: chief of division, Professor Henry Crew; associate in astronomy, Professor Philip Fox; associate in physics and mathematics, Dr. Gordon S. Fulcher; associate in chemistry, Dr. Irving Muskat; associate in biology, Mr. J. F. W. Pearson; associate in geology, Professor J. V. Lewis.

The plans of the division of the basic sciences include also the publication of a series of small volumes devoted to the latest phases of some twenty branches of science, pure and applied. The authors are well-known scholars. The series will be handled by the Waverly Press, Williams and Wilkins.

Readers of SCIENCE have already learned that the American Association for the Advancement of Science will hold its summer meeting for 1933 in Chicago. A considerable number of foreign scholars in each section of the association are being invited for this occasion.

JOHN STEPHEN SEWELL,
Director of Exhibits

THE WORK OF CHINESE BOTANISTS ON THE FLORA OF CHINA

IT is interesting to note the efforts that the younger generation of Chinese botanists are devoting to the further elucidation of the very rich and complex flora of China. This work by Chinese botanists under the auspices of Chinese institutions has been developed within the last two decades. There has recently been issued under the joint auspices of the Metropolitan Museum of Natural History, Nanking, and the Fan Memorial Institute of Biology, Peiping, an important contribution to our knowledge of the fern flora of China.[1] The volume is large quarto in size, and contains full descriptions in English and in Chinese, and illustrations, of fifty-one species of Chinese ferns, including a number recently described as new by Mr. Ching. The format, typography and press work is good. The very excellent illustrations showing both macroscopic and microscopic characters renders this publication particularly useful to those interested in the study of Chinese ferns. This important work deserves a place in every botanical library.

E. D. MERRILL

NEW YORK BOTANICAL GARDEN,
NEW YORK, N. Y.

EXPONENTS AND FOOTNOTES

THE writer has long wondered whether an alternative could not be devised for the now very general practice of applying Arabic numerals to footnotes, and indicating their place of reference in the text by numbers typographically identical with those employed as exponents. In a vast majority of cases, of course, no confusion results from this procedure. Either no mathematical formulae are present in a paper, or the context makes it evident, in a given case, whether or not we have to do with an exponent. But in some instances this is not true. Exponent

[1] H. H. Hu and R. C. Ching, "Icones filicum sinicarum," Fasc. 1, p. 1–102, pl. 1–50, 1930.

and footnote reference numbers may occur together on adjacent lines, set in the same type, and having approximately the same magnitudes. (I have just such a case before me in a recent issue of an important journal.)

Until a few months ago, however, this danger of confusion was, in my own case, rather an academic possibility than an actual experience. But it was realized in a rather disastrous way in a recent scientific paper of mine. On one page of this paper[1] occur two footnotes (numbered 1 and 2), likewise two fractions bearing exponents. The first of these, which should have been $(\frac{4}{5})^3$, has been printed $(\frac{4}{5})^1$. The second, which should have been $(\frac{5}{6})^4$, actually reads $(\frac{5}{6})^2$. These typographical errors result not only in errors of elementary arithmetic, but they render unintelligible the discussion of a rather important phase of my subject, both on this and later pages of the text. The source of these errors, on the printer's part, seems obvious.

Is it unreasonable for me to suggest that reference numbers (or letters) to footnotes should be set in entirely different type from those employed as exponents?

F. B. SUMNER
SCRIPPS INSTITUTION OF OCEANOGRAPHY

COLOR

BY some mistake which neither the editor nor I can explain, the last part of my note on "Color" in SCIENCE for May 8, p. 495, was omitted. The portion omitted follows:

(6) If the physiological elements in the retina which respond to red light are missing, the phenomenon ends here and the sensation of red is not excited.

(7) If the eye is normal, the sensation is transmitted to the brain and mind by a process still entirely physical or chemical but evidently quite different from that by which the light has been transmitted to the eye.

(8) In the brain and mind the sensation of red is produced. Some think the phenomenon is still physical or chemical, but no one has been able to suggest any definite picture of the processes in the mind as physical phenomena.

(9) The name given to the sensation depends on previous comparisons which the individual has made with the aid of others. If he is an American he will call the sensation red. A Frenchman will call it rouge; a German, roth.

It is evident, therefore, that color is a complex phenomenon including many diverse elements no one of which can be omitted if the phenomenon is complete.

Durant in his "History of Philosophy" defines philosophy as "the synthetic interpretation of all experience" and seems to wish to delimit science as including only analysis and description. Most scientific men will agree, I think, that science which includes only analysis and description is of a low order. To be of much value it must rise above that to coordination and synthesis. In these higher reaches science and philosophy should become identical.

What has been given above may be called a scientific philosophy of color.

W. A. NOYES
HEIDELBERG, JUNE 11, 1931

SPECIAL CORRESPONDENCE

GRANTS-IN-AID OF THE NATIONAL RESEARCH COUNCIL

AT its meeting in June the National Research Council's Committee on Grants-in-Aid made grants for the support of research as follows:

To Charles W. Jarvis, associate professor of physics, Ohio Wesleyan University, critical potentials of mercury vapor; C. E. Mendenhall, professor of physics, University of Wisconsin, photoelectric characteristics of metals; S. A. Mitchell, director, Leander McCormick Observatory, University of Virginia, the measurement of the proper motion of the stars for the determination of parallax; Louis A. Turner, associate professor of physics, Princeton University, temperature distribution and metastability of vibration and rotation states of iodine molecules; Peter I. Wold, professor of physics, Union College, electrical properties of expanded mercury, with special reference to the Hall effect and to conductivity.

To Gleason W. Kenrick, assistant professor of electrical engineering, Tufts College, statistical study of field intensities in the low frequency region of the radio spectrum.

To Wilder D. Bancroft, World War Memorial professor of physical chemistry, Cornell University, the application of physical chemistry and colloid chemistry to biological and medical problems; Harry N. Holmes, professor of chemistry, Oberlin College, concentration of vitamin A and other vitamins.

To Arthur Keith, geologist, United States Geologi-

[1] *Journal of Genetics*, November, 1930, p. 307. Barring these unfortunate, but easily comprehensible errors, the press-work was exceptionally fine.