have no place within the domain of natural science. Natural mechanism and vitalism are insufficiently supported by accumulated evidence to be considered as well-established scientific theories.

VITALISM AS A WORKING HYPOTHESIS.

But there is still another question. There are already numerous well-established biological facts which can not be explained for the present by physics and chemistry, and we have no means of knowing whether they will ever be explained that way—what are we to do with these facts? Here is the answer: Vitalism as a storage place is indispensable. We should continue to call these facts vital phenomena until we discover a way to explain them by laws governing the inanimate bodies. But I shall still go further. I believe that vitalism as a working hypothesis is of great advantage to the progress of biology. The belief that only those biological facts which can be reduced to physics and chemistry can be considered as scientifically understood, combined with the misleading and harmful notion to elevate physiology to an exact science, confined the activity of this biologic division to some favored domains—to its own detriment. The sterility of some parts of physiology is due to this inappropriate exclusiveness. The relation of the internal secretion of the thyroid to myxœdema and cretinism and of the pancreas to diabetes, was discovered without any reference to physics and chemistry and was discovered by medical men, and not by physiologists. The important fact of the marvelous effect of the extract of the suprarenal capsule upon the circulation was discovered by physiologists without any reference to physics and chemistry. Surely physiology ought to search for the physics and chemistry of the vital processes as much as possible, but it ought to do more. It ought to unearth vital phenomena, study their characters by methods peculiar to themselves, and establish their laws aside from any relation to physics and chemistry of the inorganic world. That this can be successfully done is shown by the marvelous results obtained in the discoveries and the precise studies of toxines, antitoxines, hæmolysines, cytolysines and their like without much regard for physics and chemistry. Especially medical men have reason to ask for such physiological studies. The experiments which nature is continually making upon human beings and which physicians are called upon to interpret and to mend are not confined to domains which are accessible to interpretations by physics and chemistry. And it is to such a far-seeing, liberal, broad physiology that the science and practice of medicine is looking for a delivery from the firm grasp of the one-sided teachings of pathological anatomy.

S. J. Melzer.

SCIENTIFIC BOOKS.

Mammalian Anatomy, with special reference to the Cat. By Alvin Davison, Ph.D. Philadelphia, P. Blakiston's Son & Co. 1903. 8vo. Pp. xi + 250; 108 figs.

Another book on the anatomy of the cat can not but awaken suspicion as to its utility, but an examination of this one shows the suspicion to be unfounded. It is designed to fill the gap between the more detailed works and those which are merely laboratory guides, and to afford the student who can not pursue a lengthy course of zoological study, a general idea of the structure of a mammal and of the principles of mammalian anatomy.

In writing such a work the important point is to determine what is to be omitted, and Professor Davison has treated his subject with an admirable perspective. Occasionally, as in the description of the peritoneum, a somewhat fuller development of the subject would have been advisable, and occasionally, also, a brevity of statement tends to convey a somewhat erroneous impression. But such errors

are few and the book furnishes an excellent idea of the structure of the cat, free from a superfluity of detail which too often serves merely to conceal from the young student the fundamental principles which they may be intended to elucidate. Profusion of detail does not always make for accuracy in the student and it is principles rather than facts that he should acquire from his laboratory training.

Throughout the book are frequent remarks of a comparative nature and at the close of each chapter is a list of questions or suggestions, for the most part of a general nature, which will serve as excellent topics for comment by the teacher or for collateral investigation under his direction by the student. An introductory chapter is devoted to an account of useful methods by which the dissection of a mammal may be facilitated, and the text is illustrated by numerous figures and diagrams for the most part admirably executed.

J. P. McM.

SOCIETIES AND ACADEMIES.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 573d meeting was held November 7.

Dr. A. L. Day spoke on 'The Black Body and the Measurement of Extreme Temperatures.' He outlined the history of the theoretical study of the problem, and showed how such a body had been constructed artificially; he then discussed at length the results of experiments made with it, pointing out the relation between the temperature and the total radiation, and between the temperature and the wave-length of radiation of maximum intensity, and expressing these relations by equations; from these equations temperatures outside the range of measurement can be calculated by extrapolation.

Mr. C. E. Van Orstrand followed with 'Notes on the Emission Function,' discussing mathematically the second of the equations presented by the preceding speaker.

AT the 574th meeting, held November 21, the subject of 'Synchronous Actions in the Atmospheres of the Sun and the Earth' was discussed by Professor F. H. Bigelow, of the Weather Bureau. The curves first published in 1894, showing simultaneous variations in the sunspot areas, the magnetic field, the pressures and temperatures of the northwestern states, the movements in latitude and longitudes of the storm centers, were compared with the prominence secular variations and found to agree. The meteorological data have been extended to all parts of the earth and they give similar variations, supplemented by inversion of the type. Thus the direct type of temperature prevails throughout the tropics, and the inverse type in the temperate zones; the direct type of pressures holds around the Indian Ocean and the inverse type in North and South America. The distribution of the prominences in latitude and their movements in the eleven-year cycle were explained, also their distribution in longitude. From the latter were derived the periods of rotation of the sun in different zones, and the variations of the several periods in the eleven-year cycle, which gave the same curve as holds for the prominence frequency. This important phenomenon was referred back to the internal circulation of the sun, and it confirms the second case of von Helmholtz's equations, as applied to a rotating mass heated at the center. The fundamental period of the sun's rotation is that of the equator, 26.68 days, and as this is the shortest possible period in the sun it follows that numerous determinations of the solar rotation from terrestrial phenomena, such as aurora, thunderstorms, must be excluded as misleading. The observed synchronism at the earth has its basis in the sun's circulation, and this is of a kind to produce vertical polarization, and an internal magnetic field. Hence all stars should be magnetized while the process of cooling under their own gravitation is going on.

Mr. L. A. Bauer then presented several brief 'Contributions to the Theory of the Earth's Permanent Magnetism.' He showed that the energy of the earth's magnetization had diminished by one thirty-sixth part in forty-six years. He stated as a result of his analysis that the principal cause of secular variation resides outside the earth's crust. He also attempted a calculation of the magnetic en-