tion to the fact that within this district there are located two of his so-called 'Terminalgebiete,' or cortical areas, which attain their functional powers at a later period than those which lie around them, and which may therefore be supposed to have specially high work to perform.

Without in any way desiring to throw doubt upon the observations of these authorities, I think that at the present moment it would be rash to accept, without further evidence, conclusions which have been drawn from the examination of the few brains of eminent men that have been described. There cannot be a doubt that the region in question is one which has extended greatly in the human brain, but the association of high intellect with a special development of the region is a matter on which I must confess I am at present somewhat sceptical.

But it is not only in a backward direction that the parietal lobe in man has extended its territory. It has likewise increased in a downward direction. There are few points more striking than this in the evolution of the cerebral cortex of man. In order that I may be able to make clear the manner in which this increase has been brought about, it will be necessary for me to enter into some detail in connection with the development of a region of cerebral surface termed the *insular district*. The back part of the frontal lobe is also involved in this downward extension of surface area, and, such being the case, it may be as well to state that the boundary which has been fixed upon as giving the line of separation between the parietal and frontal districts is purely artificial and arbitrary. It is a demarcation which has no morphological significance, whilst from a physiological point of view it is distinctly misleading.

D. J. Cunningham.

[*To be concluded.*]

SCIENTIFIC BOOKS.

Die Partiellen Differential-Gleichungen der Mathematischen Physik. Nach Riemann's Vorlesungen. In vierter Auflage. Neu bearbeitet von Heinrich Weber, Professor der Mathematik an der Universität Strasburg. Braunschweig, Druck und Verlag von Friedrich Vieweg und Sohn. 1900, 1901. Erster Band, pp. xvi + 506; Zweiter Band, pp. xi + 527.

The appearance of this new and greatly enlarged edition of the work founded on Riemann's lectures will be welcomed with delight by every student of the mathematico-physical sciences. Those acquainted with the preceding capital edition of Hattendorff do not need to be reminded of the high model of excellence in exposition he set. Professor Weber has not only amplified this model, but he has fairly canonized it, placing before the student a glorified summary of the physical concepts and the mathematical methods on which the great progress of the nineteenth century in physical science rests.

It is a good sign of the times that many eminent European mathematicians are reverting to the example set by the illustrious Gauss and followed with such signal success by Riemann, Clebsch, Kirchhoff and others. The advantages to be gained by the pure and by the applied mathematician in following such an example are mutual so far as existing science is concerned, while the better understanding of one another's work which results therefrom makes it easier to secure that sort of cooperation essential to rapid and permanent advances. The mathematical physicist is, therefore, under deep obligations to Professor Weber for the admirable presentation he has given us of the more important and more difficult branches of mathematical physics.

The reader who may be unacquainted with the earlier editions of this work should be warned against supposing it to be a treatise on any one of the subjects considered. Its great merit lies in the fact that while not a treatise, it states the salient principles and essential mathematical features of many branches of physics with a clearness and with an attractiveness rarely attained in formal treatises. No previous work, so far as we are

aware, is quite so successful in producing for the student the right combination of physical and mathematical difficulties.

The first volume is divided into three principal parts and into twenty-three sections. The first part is devoted to pure analysis, with sections in order on definite integrals, Fourier's integral, infinite series, Fourier's series, multiple integrals, functions with complex arguments, differential equations, and Bessel's functions. The second part treats of geometrical and mechanical theorems, with sections on linear infinitesimal deformation, vectors, the potential function, examples of potential function, spherical harmonics, and the fundamental principles of mechanics. The third part is devoted to applications in the fields of electricity and magnetism, with sections on electrostatics, problems in electrostatics, magnetism, electrokinetics, electrolytic conduction, steady electrical currents, flow of electricity in surfaces, flow of electricity in space and electrolytic displacements.

The second volume is divided into five parts and into twenty-three sections. The first part is concerned with the theory of linear differential equations, with sections on integration by means of hypergeometric series, integration by means of definite integrals, the P-function of Riemann, and, under the heading Oscillationstheoreme, a section treating very fully the equation $d^2y/dx^2 + \rho y = 0$, where ρ is in general a function of x. The second part is devoted to heat diffusion, with sections on the differential equation of heat diffusion, the problem when dependent on a single coordinate, and the problem of diffusion in a sphere. The third part is devoted to the theory of elasticity, with sections on the general theory of elasticity, statical problems, equilibrium and deformation of an indefinite isotropic solid, vibrations of stretched cords, Riemann's method of integration, vibration of membranes and the general theory of the differential equation of a vibrating membrane. The fourth part is occupied with electrical oscillations, with sections on electric waves, linear electric currents, and reflection of electric oscillations. The fifth part treats of hydrodynamics, with sections on general theorems, motion of rigid bodies in fluids (two sections), discontinuous fluid motion, propagation of an impulse in a gas and aerial vibrations of finite magnitude.

When all parts of a work like this one are noteworthy for their unsurpassed excellence, it is difficult to cite parts specially commendable or to call attention to small defects. Every reader, according to his bias, will be drawn first to those sections in which he has special interest, and he must be a narrow specialist if he does not find many such sections. Generally, the work is to be praised for its admirable clearness. Some of us foreigners find the German frequently lacking in directness and perspicuity; and we are especially mystified often by the offensive use of italics so common with writers whose thoughts are unclarified. Professor Weber's style, however, is as transparent as that of the best French standards, and in this respect his work recalls the faultless exposition of such great masters as Gauss and Kirchhoff.

The typography of the work is likewise unsurpassed. It, like the selection of the subject-matter and the treatment thereof, is a model for all makers of mathematical books. Book makers and publishers in America should take note of the fact that each of the volumes of this work (comprising over 500 pages per volume) 'made in Germany,' is beautifully printed, on excellent paper, and is yet less than 30 millimeters thick over all, including the rather stout half-morocco binding. To do as well in our country it will be essential to discard the miserable, thick, talc-loaded or lead-loaded paper now so commonly used here.

It would be possible to find some small faults with the presentation and treatment of the topics, here and there. 'There are spots on every sun'; but in this case, as with our orb, they do not disturb the general luminosity, and we may expect to see them disappear from future editions. In the meantime, students of mathematics and physics generally will find this work a mine of instructive and inspiring information accessible by the aid of a full table of contents and a good index. Every worker in mathematical physics should have the volumes constantly within an arm's reach.

R. S. W.