THE NEWTONIAN POTENTIAL.

Théorie du Potentiel Newtonien. By H. Poincaré. Pp. 366. (Paris : Georges Carré and C. Naud, 1899.)

THE course of lectures given by Prof. Poincaré at the Sorbonne during the session of 1894-5 has, under the editorship of Dr. Édouard Leroy and M. Georges Vincent, assumed the form of a text-book on attractions and the theory of the potential.

The subject-matter naturally falls into two sections, one referring to special properties of potentials of linear, superficial and volume distributions, and the other dealing with Dirichlet's problem and its solution. It is rather a pity that this division was not adhered to in the arrangement of the text. Chapter vi., dealing with the potentials of magnetic shells, is quite out of place in the middle of Dirichlet's problem, and should logically have preceded the two previous chapters.

In opening what we have regarded as the first subject, M. Poincaré introduces concurrently with the Newtonian potential the logarithmic potential corresponding to the law of the inverse distance, which represents the two-dimensional potential of infinite cylindric distributions. The first chapter, which includes calculations of the potentials of rods, cylinders, spheres, and other simple forms, deals with potentials of bodies at external points. It contains a brief account of Legendre's coefficients. In passing to the interior of the attracting mass in Chapter ii., the question of the convergency of the integrals representing the potential and its derivatives naturally necessitates a brief digression on convergent integrals in general. Chapter iii. deals with potentials of linear and superficial distributions of matter, and naturally leads on to the misplaced Chapter vi., which treats at considerable length of "double layers" (*doubles couches*)—in other words, magnetic shells.

The second subject opens in Chapter v., where Dirichlet's problem is stated, the principal properties of Green's function are proved, and the equivalence of the two problems is established. In the next chapter Prof. Poincaré gives the solutions of Dirichlet's problem for a circle and a sphere, and deals with the properties of conjugate functions and conformal representation in two dimensions. Chapter vii. treats of the method of exhaustion (*balayage*), and the remaining eighty pages contain a fairly detailed account of Neumann's method and its extensions.

Lecture notes are rather apt to be deficient in explanation on points which have either been taken for granted by those who transcribed them, or have been incidentally explained in a conversational way by the lecturer. Any one not starting with a previous knowledge of the definition of the potential would hardly find M. Poincaré's opening very clear. In first "letting" $f_1'(r_1)$ be the attraction at distance r_1 and afterwards defining the potential as $-\Sigma f(r)$ it ought to be explicitly stated that $f_1'(r_1)$ is the derived function of the subsequently introduced function $f_1(r_1)$. Moreover, why should the constant of integration in $f_1(r_1)$ be taken as zero in the Newtonian and as $-m \log r_0$ in the logarithmic potential? A few additional words of explanation in such cases would often save readers from wasting time over unnecessary difficulties.

There are many problems which, although belonging to the subject proper of attractions and potential, are not included in the present volume. The potentials of ellipsoids are untouched, Lamé's ellipsoidal harmonics being dismissed with a mere reference. Then, again more might have been said about spherical harmonics. It will be seen, however, that M. Poincaré's lectures have reference to the general theory of the potential rather than to special problems, which find appropriate treatment elsewhere.

As an introduction to this theory dealing at some length with Dirichlet's and Neumann's developments, M. Poincaré's volume bids fair to be a useful addition to the library of college lecturers as well as of the more advanced class of mathematical students. G. H. B.

OUR BOOK SHELF.

Faune de France—Mammifères. By A. Aclogue. Pp. 84 ; Figs. 9. (Paris : Baillière.)

As compared with that of the British Isles, the mammalian fauna of France is much more extensive, comprising a number of Mediterranean types quite unknown among the former. It is therefore, altogether apart from patriotic considerations, well worthy of being separately monographed. This task has been undertaken by the author of the present little volume ; and although in the main the very condensed descriptions given appear satisfactory so far as they go, we cannot but regret that the work was not written more on the lines of Bell's "British Quadrupeds."

The volume commences with an illustrated dissertation on the characteristics of, first, the Vertebrata and then of mammals ; and in this part we notice that on p. 21 the author figures the skull of a bat as that of a mole, and also one of a porcupine as that of a second representative of the insectivorous order.

The illustrations are, indeed, very discreditable, the only passable ones being those borrowed from other works. In these days of cheap "process-blocks" it does seem inexcusable to issue caricatures like those in the present volume. The type, too, is extremely small.

The descriptions of the genera and species, although, as already said, very short, are sufficient to admit of their identification. Some of the terms used, such as (p. 73) "*Bosidi*"—the equivalent of *Bovidae*—sound, however, somewhat strange to English ears ; and it may be added that the nomenclature generally is by no means altogether up to date. Moreover, even if it be considered advisable in a work of this nature to introduce the ordinary indigenous domesticated animals, such as sheep and oxen, there seems little to justify the inclusion of such a palpable foreigner as the guinea-pig.

The best we can say is to express the hope that the author may, before long, see his way to reissue what forms the rudiments of a very useful work on a scale more commensurate with the importance and interest of the subject. R. L.

Anatomical Diagrams for the use of Art Students. By James M. Dunlop. Pp. 72. (London : George Bell and Sons, 1899.)

As to how much or how little knowledge of anatomy the art student should possess is a matter on which opinion is very much divided. Your youthful impressionist is apt to sneer at anatomy ; as a rule, his contempt for the subject is revealed in the construction of the forms he represents. On the other hand, the more serious-minded and studious of the artistic fraternity, those who, by hard work and diligent study, are laying the foundations upon