SCIENTIFIC BOOKS

LEGENDRE ASSOCIATED FUNCTIONS

Tables of Legendre Associated Functions. By ZAKI MURSI, Cairo: E. and R. Schindler. 1941. xii + 286 pp. 22.8 × 29.5 cm.

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Legendre's polynomial of the nth degree, or zonal surface harmonic of the first kind, may be defined by

$$z = P_n(x) = \frac{1}{2^n n!} \frac{d^n(x^2-1)^n}{dx^n},$$

which is a particular solution of Legendre's equation,

$$(1-x^2)\ \frac{d^2z}{dx^2} - 2x\frac{dz}{dx} + n(n+1)z = 0.$$

The Legendre functions $P_n(x)$ were first introduced in a paper of Legendre published in 1785. Legendre's associated functions of the first kind, of the mth order and nth degree, are the functions $P^m_n(x)$ defined by the equation

$$P^m_n(x) = (1-x^2)^{\frac{1}{2}m}\frac{d^m P_n(x)}{dx^m}.$$

The present table gives values of $P^m_n(x)$ for $n = 1,2, \ldots, 10$, $m = 1,2, \ldots, 10$, and for x over the range [0.000(0.001)1.000]. These values are to eight decimal places in the beginning, and to three near the end, where the values are large. Some values are given to twelve significant figures.

For purposes of interpolation the utility of the table is greatly increased by the inclusion of columns of modified second differences, the theory of which was set forth by Dr. L. J. Comrie in the British *Nautical Almanac* for 1937. A 7-place table of Everett coefficients, for using these modified differences, is given on pages 282–283; four errata in the differences in the main body of the table are noted on p. 284. The next two pages contain an Arabic translation of the preface.

The author cherishes the hope that his table attains to a high degree of accuracy. The computations were carried out in duplicate, during the years 1937–41, by the author and three assistants. Dr. Comrie differenced 6,000 entries of the original calculations and thus found ten errors. Checking was also effected by comparison with one of A. H. H. Tallqvist's tables of 1908 (*Acta Societatis Scientiarum Fennicae,* v. 33, no. 9) for the range [0.00(0.01)1.00]. This table of Tallqvist may be regarded as the first of its kind, if the less extensive one given in his *Grunderna af Teorin för Sferiska Funktioner jämte Användingar inom Fysiken* (Helsingfors, 1905) is excluded. Mursi seems to have been ignorant of the existence of G. Prévost, *Tables de Fonctions Sphériques et de leurs Intégrales* (Bordeaux and Paris, 1933). Among other things this contains a table from $P^1_1(x)$ to $P^8_8(x)$, to not more than five places of decimals, with differences.

Thus Mursi's volume makes a notable new tabular contribution in an important field. The volume is clearly and neatly printed, and the paper is reasonably good. War conditions doubtless prevented the earlier distribution of the volumes. Up to four months ago even Dr. Comrie did not know of its publication. Since such an excellent publication is No. 4 of a series issued by the Faculty of Science of this Egyptian university, only eighteen years of age, the reader may be curious as to what works are represented by Nos. 1, 2 and 3. Although I have not seen these works I learn that they are as follows:

(1) H. Sandon, *The Food of Protozoa. A reference book for use in studies of the physiology, ecology and behavior of protozoa,* 1932.

(2) [Book of the Science of Algebra and Mathematics by Mohammed ibn Mûsâ al-Khowârizmî, with commentaries by Dr. Ali Moustapha Mochrafa Bey and Dr. Mohammed Moursy Ahmed] (in Arabic), 1937. An Arabic and English edition of this work by F. Rosen appeared at London in 1831. An Arabic and Spanish edition, by J. A. Sánchez Perez, appeared at Madrid in 1916. A Latin edition by Libri was given in his *Sciences Mathématiques en Italie,* vol. 1, Paris, 1838. L. C. Karpinski's edition of Robert of Chester's Latin translation of part of al-Khowârizmî's work was published with an English translation, at New York in 1915.

(3) Mohammed Hassib. *Cucurbitaceae in Egypt,* 1938.

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MAN AND HIS PHYSICAL UNIVERSE

Man and His Physical Universe. F. C. JEAN, E. C. HARRAH, F. H. HERMAN and S. R. POWERS. 608 + vii pp. Ginn and Co. 1943. $3.25.

"MAN and His Physical Universe" is a text-book intended for a survey course in science. Such courses are taken by persons who do not intend to become professional scientists but who desire to be acquainted with the results of science for cultural or general educational reasons. The authors have approached the problem of presenting the results of the physical sciences by dividing the book into six "units," in which astronomy, physics, chemistry, meteorology and geology are discussed in turn. The sections are not

given these classical titles, as the writers wish to show how each subject is of importance to mankind. Thus, the part on chemistry is called "Matter as Organized Energy Possesses Properties Which Are Indispensable to Man," and that on astronomy "Man's Increased Knowledge of the Cosmos Has Modified His Thinking." An integrated thread of continuity is in this manner woven through somewhat diverse material, and the bearing of all the sciences on man's thought and activities is developed.

In the first section the errors of ancient concepts are described and the scientific method explained. Some of the more recent findings of astronomy are set forth. From this, the authors proceed to demonstrate how superstitions have been demolished by knowledge, and how practical use is made of astronomy in determinations of time and geographical location. The second section explains how the distinctions between matter and energy are broken down, and the third describes the many possible chemical rearrangements of matter, including a chapter on organic chemistry and one on the way chemical products add to the conveniences and pleasures of living.

The fourth unit discusses the physics of the various forms of energy and shows how all may be applied. The fifth reviews the effects of meteorology on life. The final part of the book is devoted to a discussion of geology, starting with a review of the structure of the earth and showing how geological changes are continually in progress. The evolution of the present surface conditions of the earth is traced and finally the authors treat the practical importance of geological forces which make many mineral products available to mankind.

As is inevitable in a book jointly written by several authors, there are differences in quality between the several sections. Thus, for example, in the chapters on geology the illustrations are referred to in the text and serve to illuminate the subject-matter there discussed, while in those on astronomy and physics the photographs and diagrams are too often left for the instructor to explain. Nor is the choice of illustrations in these sections as good. In some cases, as on page 83, they are more complex than necessary and contain material requiring explanations not germane to the matter under discussion. Further explanations by the instructor will be necessary on page 272, where it is stated that energy is kinetic or potential, and the student is left to wonder just how heat energy and subatomic energy are to be fitted into these two categories. On the whole, this reviewer was left with the distinct impression that the authors of the parts on geology and chemistry were better able to expound their subjects in a clear and interesting manner which covered the essential points than were those on physics and astronomy. On the other hand, the sections on physics and astronomy do contain many simple and instructive treatments such as that on latent heat. The scientific method is both praised and explained, but the student is given little instruction in its use and few opportunities to practice it himself. It would seem proper to add some problems for quantitative computation to the admirable ones calling for general discussion.

This text should appeal to the average student who did not expect to study science beyond a survey course. The writers of this book have undoubtedly succeeded in presenting the results of recent investigations to non-scientists in an interesting manner, while, at the same time, explaining how these results are of importance to mankind.

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SPECIAL ARTICLES

PERFUSION OF RAT LIVERS WITH ESTROGEN IN VITRO[1]

THE role of the liver in metabolism of steroid hormones has been a matter of interest for some time. Since the experiments of Silberstein *et al.*[2] and of Zondek[3] on the incubation of natural estrogens with liver brei the original finding that the free hormone is rapidly inactivated has been generally substantiated. Confirmation has been attained by a variety of direct and indirect approaches, including: (a) damage of the liver of rats by administration of CCl_4 and the observation of increased end-effects of both endogenous[4] and exogenous estrogen;[5] (b) demonstration of the ineffectiveness of estrogen crystals or pellets placed in sites drained by the hepatic portal systems[6,7] with similar inactivation on direct injection into the spleen;[8]

[1] Aided by grants from G. D. Searle and Company and the National Research Council Committee for Problems of Sex.

[2] F. Silberstein, P. Engel and K. Molnar, *Klin. Wochsch.*, 12: 1693, 1933.

[3] B. Zondek, *Skand. Arch. Physiol.*, 70: 133. 1934.

[4] N. B. Talbot, *Endocrinol.*, 25: 60, 1939.

[5] G. Pincus and D. W. Martin, *Endocrinol.*, 27: 838, 1940.

[6] G. R. Biskind and J. Mark, *Bull. Johns Hopkins Hosp.*, 65: 212, 1939.

[7] G. R. Biskind, *Endocrinol*, 28: 894, 1941; *Proc. Soc. Exp. Biol. Med.*, 47: 766, 1941.

[8] A. Segaloff and W. O. Nelson, *Proc. Soc. Exp. Biol. Med.*, 48: 33, 1941.