

excavation of an early bronze age settlement at Therm in Lesbos illustrates the great variety of calls on experts in other sciences, which are unavoidable in archaeological work; and also the return which excavation can make, in evidence for the history of vegetation. Miss Bancroft, of the Imperial Forestry Institute at Oxford, identifies no less than seven varieties, including both vine and olive (not demonstrably cultivated) and a climbing plant like *Salacia* which does not seem to grow now in Lesbos.

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SEASONAL RHYTHMS IN MAN

Seasonal Influence on Growth, Function and Inheritance

By A. B. Fitt. (New Zealand Council for Educational Research, Educational Research Series, No. 17.) Pp. xiii+182. (Christchurch, Auckland and Wellington: Whitcombe and Tombs, Ltd.; London: Oxford University Press, 1941.) 10s. 6d. net.

THE physiological cycles of lower mammals in relation to the seasons of the year must have been included in the earliest biological knowledge acquired by primitive man when he first began to observe the processes of Nature. On the other hand, corresponding functional rhythms in man are too inconspicuous to have attracted attention without deliberate inquiry. Even so, it has for a long time been recognized that the rate of growth of the human body is to some extent influenced by, or correlated with, the seasons. Data bearing on this question, partly the result of personal observations, have recently been collected and analysed by Prof. A. B. Fitt, and published by the New Zealand Council for Educational Research. These data include the weight and height increases of school-children, the weight increases in tubercular patients, seasonal fluctuations in muscular capacity, mental ability, mortality, suicide and delinquency, and the relation of weight, height, intelligence, etc., to the month of conception. The last subject is unfortunately included by the author under the general heading of "Seasonal Influence on Inheritance", a phrase which is clearly misleading, for the relevant data do not include a correlated study of the corresponding characters in the parents.

Prof. Fitt finds that the weight increase in children is at a high level in the autumn-winter half of the year and continues at a fairly low level in the spring-summer half. On the other hand, the height increase maximum coincides with the weight increase minimum. There is a phase of high vitality in the autumn, followed by a phase of low vitality in the spring. Rates of crime and delinquency are relatively low in the autumn and winter and high in the spring and summer, while the rates for suicide and insanity are similar to those for crime except that, instead of diminishing at the end of spring, they increase up to midsummer.

In considering the possible explanations of these periodicities, the author concludes that they reflect fluctuations in the 'stress' to which the growing individual is exposed at different seasons of the year. However, he does not define clearly the meaning of his concept of 'stress', and the reader gets the impression that this is little more than a convenient term for expressing the general results of the investigation. As to the cause of the periodical variations in 'stress', the author is strongly inclined to the view that they

have an endogenous origin, that is to say, they are the expressions of an internal rhythm, possibly related to fluctuations in endocrine activity, rather than the result of environmental factors of temperature, light, humidity, diet, and so forth. Here many readers will find that Prof. Fitt proceeds much too fast for their liking. The discussion on hibernation in mammals and its relation to endocrine functions will possibly appear too indirectly related to the main thesis of the book, and the author seems too lightly to dismiss the influence of environmental factors as of little significance. We would suggest, in this connexion, that reference might appropriately have been made to the extensive studies on the effect of light on pituitary activity and thereby on general behaviour, particularly in birds and lower mammals. We note, also, that no reference is made to the detailed studies which have been made on seasonal differences in the growth of separate tissues such as the hair and nails. But perhaps it is a little ungrateful to point out such omissions, for undoubtedly Prof. Fitt's book is a valuable compendium of data of great importance to the sociologist and educationist.

The author concludes by briefly discussing some important implications which arise from his work, particularly in relation to the adjustment of the educational year to the seasonal rhythm of bodily functions. Even if it should be argued that the further analysis of more extensive data will be required before they can be confidently applied to educational policy, it will be agreed that Prof. Fitt has clearly pointed out the need for future research along these lines.

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LAPLACE TRANSFORMS

The Laplace Transform

By David Vernon Widder. (Princeton Mathematical Series.) Pp. x+406. (Princeton: Princeton University Press; London: Oxford University Press, 1941.) 36s. net.

THE theory of Fourier integrals arises out of the elegant pair of reciprocal formulæ

$$f(x) = \frac{1}{\sqrt{(2\pi)}} \int_{-\infty}^{\infty} F(y)e^{-ixy} dy,$$

$$F(y) = \frac{1}{\sqrt{(2\pi)}} \int_{-\infty}^{\infty} f(x)e^{ixy} dx,$$

in which either of the functions $f(x)$ or $F(y)$ may be arbitrarily given, and the other is then determined by it, and also forms the kernel of an integral formula which represents the given function. The Laplace formula is

$$f(s) = \int_0^{\infty} e^{-st} \phi(t) dt,$$

or the limits may be $(-\infty, \infty)$, with a corresponding reciprocal formula. The two theories are really the same, since one set of formulæ can be reduced to the other merely by a change of the variable.

When I commenced analysis some twenty years ago, the theory of Fourier transforms was little more than a footnote to the more popular theory of Fourier series. There were the classical applications to the solution of partial differential equations, such as those