ANNOTATIONS

THE DISTRIBUTION OF INCUBATION PERIODS OF INFECTIOUS DISEASE[1]

The study of incubation periods of specific infectious diseases is of interest both to the epidemiologist and to the clinician. The length of incubation periods helps to distinguish the types of infection present and also the simultaneity or successive infectiveness of a particular epidemic in a group of people.

The incubation period of a specific infectious disease exhibits considerable variation. These variations have been attributed to the strain and size of the inoculum and to the route of inoculation. Certain factors characteristic of the host are thought to contribute to the variation also, such as age, natural or acquired resistance, and allergic states. Variation in the incubation period persists even when holding these factors as constant as possible.

The purpose of Sartwell's paper was to show that the incubation periods of various infectious diseases formed a consistent pattern. He defined an incubation period as "the time required for multiplication of the parasitic organism within the host organism up to the threshold point at which the parasite population is large enough to produce symptoms in the host." The incubation period was distinguished from the "carrier state" in which the agent remains on the mucous membranes for a length of time before some circumstance leads to proliferation and invasion of the host tissues. To show the consistent pattern of incubation periods Sartwell used three types of observations: known single simultaneous exposure epidemics; known

[1] Sartwell, Philip E.: The Distribution of Incubation Periods of Infectious Disease. *The American Journal of Hygiene*, May, 1950, *51:* No. 3, pp. 310–318.

but not simultaneous exposure epidemics; and unknown exposure outbreaks which, by studying the epidemic curve, revealed whether a single simultaneous exposure was responsible or not.

Most frequency distributions of incubation periods bore a resemblance to the normal curve when plotted on normal probability paper. It was found, however, that "a more nearly linear plot was almost always obtained if the logarithm of the time of incubation, instead of the incubation period itself, was used in graphing the curves." In plotting the cumulative percentages against log time on normal probability paper the straight line fitted by inspection was used to estimate the median. This "estimated median" was taken at the point where the straight line intercepted the 50 per cent frequency. Determining the median in this manner was felt to be a method less affected by chance than calculating the median value in the ordinary manner. A statistic termed the "dispersion factor" (the antilog of the log standard deviation) was used because it was felt to be a more reliable measure of dispersion in a skewed distribution than the arithmetic standard deviation. Also, the "dispersion factor" showed "the degree of variation in relation to the magnitude of the mean."

Sartwell used twelve infectious diseases to illustrate his method. He found that the "estimated median" of the incubation periods ranged from 2.3 hours in bacterial food poisoning (the only noninfectious disease used) to 105 days in serum hepatitis, yet the curves that resulted from plotting the frequency distributions of the incubation periods on normal probability paper all resulted in the characteristic linear plot.

In all but one of the series studied by Sartwell, the "dispersion factors" ranged from 1.14 in chickenpox to 1.58 in typhoid fever. Thus, the degree of dispersion of incubation periods was found to be related proportionately to the usual length of incubation.

The usual frequency curve of incubation time of several infectious diseases studied by Sartwell took the form of a logarithmic normal curve. This appeared to be true both in diseases having long incubation periods and those having short incubation periods.

The "dispersion factors," the antilogs of the log standard deviations, appeared to be independent of the median lengths of the incubation periods. The degree of dispersion was proportionate to the usual length of incubation.

Sartwell, using controlled studies where observational errors were at a minimum and noncontrolled studies where errors in estimation were considerable, found that the dispersion factors were approximately the same size in both. He concluded that "observational errors do not materially contribute to the variation of incubation periods but that such variation is an innate biological characteristic."

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NUTRITION IN OPHTHALMOLOGY[1]

THE author has surveyed the literature on nutrition in ophthalmology between 1922 and 1949 in the main. The three chapters have anatomical division headings with subheadings indicating the various vitamin deficiency diseases and the eye, specific ocular clinical diseases and eye disorders in possible relation to faulty metabolism.

The survey brings together adequately in one monograph the present knowledge of the role of nutritional deficiencies in the causation of functional and anatomical occular symptomatology and, the author with due consideration indicates the presumptive, the assumptive, and the dubious in the various claims for clinical recognition and acceptance.

The monograph, although in no sense exhaustive of the subject, has value in pointing out what is presently being discussed and pointing to the failure of ophthalmologists, nutritionists, and biochemists to utilize a readily observable organ in research and the paucity of gross, let alone the intimate, knowledge of metabolic disorders of the eye.

The bulk of basic, even clinical, information in the field has

[1] Stern, John J., M.D.: NUTRITION IN OPHTHALMOLOGY. Nutrition Monograph Series #1. June, 1950. New York, *The National Vitamin Foundation, Inc.* 130 p. $1.50.