

difficulty in presentation. Professor Whipple has made it an attractive group of chapters, well written and even interesting.

Pages 100 to 458 are, in effect, a discussion of American demography. The chapters cover the methods of enumeration and registration; the characteristics of population; death rates, birth rates and marriage rates; specific death rates; causes of death, with especial reference to particular diseases and for specific age periods. Three chapters entitled, Probability, Correlation and A Commencement Chapter close this section of the book.

The elementary facts of the vital statistics of the United States are clearly presented in the above chapters. In fact, the author makes a special effort to hold his reader by simplicity, clearness and force of statement. Professor Whipple's book will not prove a difficult one for the student. It does not attempt too much along lines of thoroughness of treatment. Only the high spots are touched. Therein lies its value and perhaps also its danger. For while this book will undoubtedly increase the skill of the health officers in the presentation of their reports, it may also give many a feeling of competence greater than is justified by their skill. One would have wished that tuberculosis, cancer and a few other of the more important diseases had been treated more thoroughly in the light of recent contributions on these diseases. These could then have served as general models for the discussion of diseases as causes of sickness and death. In fact, the author has paid too little attention to the very important subject of the classification of the causes of death. This should be a vital matter to all health officers if they are to publish accurate statistics of the mortality of their respective communities. It is also characteristic of this book that the discussions are somewhat disjointed, perhaps because of the desire of the author not to overstrain the attention of the reader. We often find a subject treated in a number of places where a more continuous discussion would have left a clearer impression.

Altogether, this is a useful first course

which, under competent laboratory instruction, should add materially to the popularity of vital statistics among health officers and others engaged in developing the public health movement in the United States. Professor Whipple will have earned the gratitude of those engaged in public health work if the book does what is hoped for it. This may be some compensation for the time which he, as a busy sanitarian, must have taken from his work in order to have made this text-book possible.

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#### A HISTORICAL NOTE ON THE SYNCHRONOUS FLASHING OF FIREFLIES

THE interesting accounts of this remarkable habit published in *SCIENCE* during the past two years by Professor E. S. Morse and others have led me to make notes of similar accounts found in working up certain books on the East Indies and New Guinea. The excellent summary of our knowledge of this striking phenomenon published in *SCIENCE* for July 26, 1918, by Professor Morse, and the later communication from Mr. George H. Hudson led me to believe that these historical data may be of interest and possible value to those studying this habit in insects.

The first of these accounts was found in Robert W. C. Shelford's book "A Naturalist in Borneo" (London, 1916), a work replete with natural history data of great interest and value. At the time that I made a note of Shelford's observations, I had forgotten that Professor Morse in *SCIENCE* for September 15, 1916, had published Shelford's account from advance proof sheets of his book.

The next account I have chanced upon is from the pen of Nelson Annandale, the well-known zoologist of Calcutta, India. His paper, "Observations on the Habits and Natural Surroundings of Insects," made during the "Skeat Expedition" to the Malay Peninsula, 1899-1900 was published in the *Proceedings of the Zoological Society of London*, 1900.

From Part VI., "Insect Luminosity," the following extract is taken:

Of all the manifestation of luminescence among animals there is none more curious, or, in the present state of our knowledge, more inexplicable, than the manner in which large numbers of individuals of certain fireflies are able to display their light with absolute apparent simultaneity and unison and with regular intervals of darkness, under circumstances which make it impossible for all the members of the swarm to see one another. Even the power, possessed by some peculiar South-American beetles, of showing lights of different colors on different parts of the body at the same time is not more wonderful, or more conspicuous, than this. The phenomenon is not common on the east coast of the Malay Peninsula, where the soil is sandy; but it is said to be often manifested both in Siam proper and among the mangrove-swamps of Perak and Selangor in the west. I have only been able to see it on one occasion, and that was on the bank of the river Kuala Patani, one fine evening at the end of June.

A large tree was covered with many hundreds of fire-flies, the majority of which seemed, judging from the similarity of their lights, to belong to one species, or perhaps to one sex. There were three individuals seated together, however, whose lights were larger and bluer than those of the others. The lights of all the specimens of the more abundant variety flickered in unison with one another; those of the minority, the three individuals, flickered together also, but in a different time. At one instant the tree was all lighted up as if by hundreds of little electric lamps; at the next it was in complete darkness, except for three blue points. Then, again it was covered with white points, except for a little patch of darkness where the three blue points had been, and would be again immediately. A similar power of displaying luminosity in unison is said to be exhibited by some marine animals, even after they have been removed from the water; but the questions as to how this unison is effected and what is its exact object are obscure. The power by which it is regulated may be somewhat analogous to that which causes all the individuals composing a flock of birds to wheel at the same instant. As Professor Poulton has pointed out to me, the rhythmic display of light among a crowd of individuals appears much more conspicuous to the eye than the simple flickering of a number of independent points.

It will be noted first that Annandale's account is very circumstantial, perhaps more detailed than any account yet at hand. Secondly it should be noted that he writes that "it is said to be often manifested both in Siam proper and among the mangrove swamps of Perak and Selangor in the west." In other words this phenomenon is not so unusual in Malaya as might be surmised from its rare occurrence in our country.

Antedating Annandale by twenty years is an account by Burbidge of an excursion on the Scudai River, Jahore (Johore?), near Singapore. He says (1880) that:

The silence of the night was unbroken, save by the regular dip of the oars, and as darkness increased, the tiny lamps of the fireflies became visible here and there among the vegetation on the banks. As we glided onward, their numbers increased, until we came upon them by thousands, evidently attracted by some particular kind of low tree, around which they flashed simultaneously, their scintillating brilliancy being far beyond what I could have imagined to be possible.<sup>1</sup>

Still earlier than Burbidge we may find in Sir John Bowring's "The Kingdom and People of Siam: with a Narrative of the Mission to that Country in 1855":

How can I pass the fireflies in silence? They glance like shooting stars, but brighter and lovelier, through the air, as soon as the sun is set. Their light is intense, and beautiful in color as it is glittering in splendor—now shining, anon extinguished. They have their favorite trees round which they sport in countless multitudes, and produce a magnificent and living illumination; their light blazes and is extinguished by a common sympathy. At one moment every leaf and branch appears decorated with diamond-like fire; and soon there is darkness, to be again succeeded by flashes from innumerable lamps which whirl about in rapid agitation. If stars be the poetry of heaven, earth has nothing more poetic than the tropical firefly.<sup>2</sup>

<sup>1</sup> Burbidge, F. W., "The Gardens of the Sun: or a Naturalist's Sojourn on the Mountains and in the Forests and Swamps of Borneo and the Sulu Archipelago," London, 1880, p. 34.

<sup>2</sup> Bowring went to Siam as minister plenipotentiary to negotiate a treaty of peace and open up a

However, antedating even Bowring, the synchronous flashing of fireflies on the Meinam River had been described by another. In 1690, Engelbert Kaempfer left Batavia as physician to the Dutch Embassy to Japan. For some unexplained reason this embassy went to Nagasaki via Siam, and describing his return down the Meinam River from Bangkok in 1690, Kaempfer wrote:

The Glowworms (*Cicindalæ*) represent another shew, which settle on some Trees, like a fiery cloud, with this surprising circumstance, that a whole swarm of these Insects, having taken possession of one Tree, and spread themselves over its branches, sometimes hide their Light all at once, and a moment after make it appear again with the utmost regularity and exactness, as if they were in a perpetual Systole and Diastole.<sup>3</sup>

Another account is taken from John Strachan's "Explorations and Adventures in New Guinea," London, 1888. This account is not strictly in line with that preceding, since it seems to be of synchronous movement rather than flashing, but at any rate it seems worth while to quote Strachan briefly. Of the man and his book no information is at hand. On page 38 he writes of fireflies observed near the Fly River:

We sat gazing enraptured on a pyramid of living light, suspended, as it were, by threads of fairy gold. On a huge black walnut [?] tree there had gathered myriads of fireflies, which, moving through the dark foliage as if to the time of some enchanter's music, presented a scene of exquisite loveliness, which it is impossible to describe. As the fairy mass revolved, now up, now down, then round as to the measured time of a dance, my companion in ecstacy exclaimed "Captain, I would way for British trading ships. He ascended the Meinam River to Bangkok and on this journey witnessed the scene described above. His book was published at London in two volumes in 1857. Our reference is to Vol. I., pp. 233-234.

<sup>3</sup> Kaempfer, Engelbert, "The History of Japan with a Description of the Kingdom of Siam," translated by John Caspar Scheuchzer, 2 vols., folio, London, 1727. This is best available to the general reader in the elegant reprint in three volumes of the 1727 edition by James McLehose and Sons, Glasgow, 1906. Our reference is to pages 78-79 of Volume I. of this edition.

work twelve months for nothing to see such a sight as this."

The last notice that has come to light is distinctly of synchronous movement but it may not be amiss to quote it here. Burbidge on one of his trips to Kina Balu, the great mountain of Borneo, found the natives of Kalawat, a village near its base, raising bees in hives of hollow tree trunks set under the projecting roofs of their huts. Of these bees, Burbidge says:

The kind of bee kept is very small, much smaller than that common in England, and I was much struck at the peculiar manner in which they wriggle their bodies simultaneously as they congregated in groups on the hive near the entrance.

The above accounts are those that have been found in the course of reading for other ends, but it is more than likely that a systematic search through large numbers of books of travel in the East Indies would bring to light other accounts. At any rate those given indicate that there is a "literature" even though small of this remarkable phenomenon.

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## SPECIAL ARTICLES

### THE ORIGIN OF NERVE CELL PIGMENTS

THE determination of the origin of the two recognized pigments of the nerve cell, the melanin and the lipochrome, has equal application to other somatic cells and correlates their normal and abnormal occurrence. The subject is therefore one of general biologic interest.

The melanin pigment is produced by functional depression of some duration in any cells. It has been fully excluded experimentally from normal function and overfunction, and also from the natural senescence which ultimately results from function (senility of excitation). In short, the nerve cell by its specific differentiation is never hampered in its normal processes by the permanent accumulation of waste products of metabolism.

The histogenesis of the melanin is from nuclear material, both intranuclear and the