

working knowledge of the language, which proved of service to him in his travels and intercourse with the natives, and in obtaining trustworthy information.

The present volume, unlike its predecessors, is made up of a series of desultory notes or essays written at intervals during his fifty years in Chung-keng, the majority having already appeared in some published form, while the remainder are printed for the first time. Taken together, they form an interesting addition to the author's well-known work, and are published as they were written, no attempt being made to edit or rearrange the material. It is best so, as they are characteristic of the author, who won his way to the hearts of the alien folks among whom he lived and wandered in security for so many years, a people who would fain see the last of the average foreigner, whose aggressive commercialism they do not love.

In his discussion of foreign trade with China the author traverses familiar ground, but he affords some insight into Chinese diplomatic delays in his account of the years spent in fruitless endeavour before

The concluding chapters on the Chinese drama, with examples of native plays, and on Confucianism are new, and sustain the scholarly reputation of the author. A series of excellent photographs add to the attraction of the volume. J. T.

THE CALORIMETRY OF MAN.¹

A GREAT deal has been said previously as to the general excellence of the methods and apparatus developed in connection with the "respiratory calorimeter" now in use in the Nutrition Laboratory in Boston. That they are original and are carried to a unique degree of perfection, that they have been utilised in the solution of very interesting problems. All this is well known, and will be found frequently dealt with by the authors of the publication referred to below. Gratitude has been freely expressed on these points.

In this recent publication the authors, experienced investigators advantageously equipped for the purpose, have set themselves the task of laying a base

line for further calorimetric research. They will receive the thanks of every interested technical observer for the splendid series of data which they have compiled, but they have overhauled them in a manner open to some criticism.

To develop this statement let us take one set of their facts, namely, that the oxygen consumption and heat production of the human being vary during periods of sleep within wide limits when assessed per man, or per kilo of man, or per square metre of the surface of man. Of these three forms of assessment, the last is the most interesting since the loss of heat, and therefore the oxygen consumption and heat production by which it is compensated, is largely conditioned by extent of surface. Now it is of some importance that no surface measurements have been made and that the estimations of surface are really derived from the measurements of weight. The authors refer to this point with some expression of regret, and a promise of contributory data, again of an indirect kind, in future. It would, however, have been of far greater interest had they dealt soundly with their data of

height and weight in such a way as to show with unmistakable clearness that no probable corrections in their surface estimations will account for the differences in heat loss observed. A clear statement that they had found variations not accounted for, and never likely to be accounted for, by variations in surface would have been of substantial value.

That this end might have been met by an adequate comparison of the measured heights and weights of their "tall lean men, tall men, short fat men, short men," with average anthropometric data, there can be no doubt whatever. Thus let us take the particular instance of the individual giving the minimum heat loss per man, or per kilo, or per square metre of the surface of man, as compared with the seventeen other individuals whose fortunes can be followed through most of the tabulated statements. His height may best be described as the cube root of his

¹ "The Metabolism and Energy Transformations of Healthy Man during Rest." By F. G. Benedict and T. M. Carpenter. Pp. viii+255. (Carnegie Institution of Washington, 1910.)

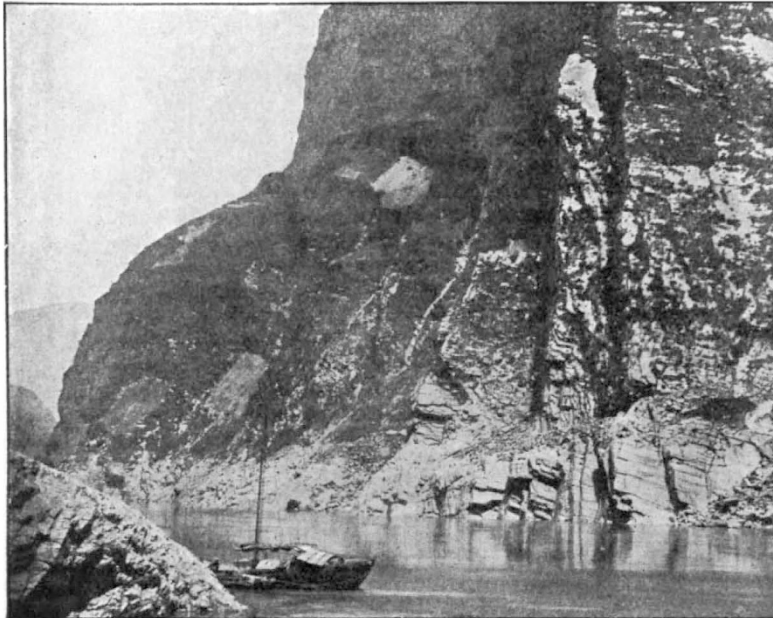


FIG. 2.—A quiet reach on the Upper Yangtse. From "Gleanings from Fifty Years in China."

Chung-keng was thrown open as a treaty port. Mr. Little was the first to take a steamer through the gorges of the Upper Yangtse, a feat so daring and hazardous as to prove what had been foreseen, that the route was impossible for regular steam traffic.

In his historical notes on the provinces from Marco Polo's time, who was the first to describe the region, he states that an interval of some 600 years elapsed before Abbé Huc gave some further account of the country in 1844. He overlooks the claims of Fradelli, Regis, and Bonjour, who, early in the seventeenth century, surveyed and described the western provinces of China, their products, and people.

We can do little more than name some of the other subjects dealt with in the volume—the possible partition of China, China's Christian missions, an essay in which the views expressed may not meet with the approval of those engaged in the work, although he pays a just tribute to the workers as "the promoters of all good in the advance made by China in the past fifty years."

weight multiplied by 4.5. Armed with a convenient table of cube roots and plenteously available data, it will be found that this man is a departure from the average, but a departure in the opposite direction to that which would promise the concealment of much weight under a partially spherical and disproportionately small surface. In this country at least the average height of the youth from eight years of age to eighteen is $4.3\sqrt[3]{W}$, whereas the stouter child and adult above and below these ages is liable to possess smaller heights, such as 4.2 to $3.7\sqrt[3]{W}$.

So far is this man's rate of heat-loss per estimated square metre of surface below the average, and so unlikely is it that direct measurements of his surface will lead to any compensatory change in the statements such as would bring it near to the average, that it might have been of value to direct special attention to his indisputable peculiarity. Had this been done, another peculiarity of his might perhaps have been brought to mind and have been found of interest, namely, that he is a veteran *habitué* of the calorimeter. It may be suggested, indeed, that this is the important fact inasmuch as it enabled him to sleep amidst these peculiar surroundings and modified atmosphere with unusual unconcern. That unconcern is truly a factor of some importance may perhaps be gathered from a consideration of the unexplained greater evaporation of water from the surfaces of the few women bold enough to enter the calorimeter. It might be suggested that there is no mystery in the fact that these ladies perspired unduly.

It is almost certain that this particular case might legitimately be used to illustrate the statement that sleep, like scientific literature, is sometimes profound although often not so. It is indeed a well-known fact that the excitability of the nervous system during sleep is a very variable value, and it is extremely probable that its variations are attended with changes in the "tone" of the skeletal musculature, and therefore with modifications in the quantity of concurrent metabolism. Once take this point of view, which is apparently not dealt with by the authors, who describe all alike as being in profound sleep, and it will, on sound grounds, be found that there is not one of these recorded cases that does not require some consideration in these terms. Thus it will be found that every individual with a metabolism during sleep that is below the average value by more than 5 per cent., awakes to a metabolism increased by from 26 to 63 per cent., whereas every individual with a metabolism in sleep greater than the average by more than 5 per cent. awakes to a smaller increase varying from 10 to 22 per cent. It is necessary to suggest that the one set awake to a relatively much greater increase of metabolism because they awake from a more profound state of slumber. Nor is the suggestion the less necessary when it is discovered that although several not infrequent visitors to the calorimeter are found on either side of the average, yet the initials of the best-known *habitués* are found in the heavy slumber class and those of certain restless probationers in the list of light sleepers.

J. S. MACDONALD.

NOTES.

In a four-column article which appeared in the *Times* of December 22, the outbreak of plague in East Anglia, and particularly the rat-infection in the locality, is dealt with ably and exhaustively. The writer of the article points out that no adequate measures have yet been taken to deal with the situation, and urges that it is one of national importance and for direct Government intervention. It is suggested that a sum of 10,000*l.* at the very least is required to prosecute the necessary inquiries and

investigations, and that there is immediate necessity for expert inquiry under Government control and at Government expense. Compared with the issues involved, the expenditure of such a sum, or even one many times larger, need not be considered, and the course of action recommended will commend itself to those who have a real knowledge of plague, and it is to be hoped that the authorities will speedily take in hand an organised scientific inquiry into the outbreak of plague in England and the remedy for its control. Similar views in outline were expressed in the article on "Plague" which appeared in *NATURE* of the same date (December 22, p. 237).

THE appalling loss of life associated with the terrible colliery disaster at the Yard Mine of the Hulton Colliery Co. at Bolton, Lancashire, has again emphasised the desirability of perfecting, so far as is practicable, the warning of approaching danger. The explosion, which occurred shortly before 8 a.m. on Wednesday, December 21, resulted in the loss of about 350 lives. The *Times* of December 22 says the disaster followed immediately upon a colliery warning, which appeared on Monday in newspapers circulating in various mining districts, and the warning was said to be in continuation of one which had been circulated a week earlier. Such warnings are not, however, issued by the Meteorological Office. With the advance made in recent years in our knowledge of weather changes, it seems desirable to determine the atmospheric conditions under which explosions generally occur, and, if possible, to place the warnings of approaching danger on a scientific basis and to make some public authority responsible for the issue of such warnings. The weather chart for 7 a.m. December 21 issued by the Meteorological Office is of quite a common type, and is representative of many such occurrences in the course of an English winter. A region of low barometer was situated to the south of Iceland, and a region of high barometer was situated over Germany. The barometer at this time was fairly steady at about 29.95 inches over Lancashire. Examining the atmospheric conditions under which fifteen of the greatest colliery disasters of recent years occurred, between the years 1880 and 1910, there is a preponderance of explosions with a high barometer, and about the time that the central area of an anticyclone is situated in the neighbourhood. There are, however, marked exceptions to this, and the disaster near Wigan on August 18, 1909, occurred when an area of low barometer readings was centred close by. Irrespective of the absolute height of the barometer, the instances examined seem to occur about equally with a rising and a falling barometer.

A BILL to make Paris official time coincide with Greenwich time was presented to the French Senate on December 21. The Bill was passed by the Chamber of Deputies several years ago, and has been approved by the senate committee and by the Cabinet, so that in all probability it will become law. Paris time is 9m. 21s. ahead of Greenwich time; and upon the day prescribed by the law, the clocks indicating official time in France will be put back by that amount. By the adoption of the change, France will be brought into the international system of Standard Time reckoning which is now followed in most civilised countries. On this system, the hour of each successive fifteen degrees of longitude, reckoning from the Greenwich meridian, is used for the Standard Time; hence the difference in time in passing from one zone to another is always an exact number of hours.

It was announced a short time ago that a new zoological garden in course of construction by Mr. Carl Hagenbeck in the grounds of the Villa Borghese, Rome,