SCIENCE

FRIDAY, JANUARY 20, 1888.

WASHINGTON SEEMS DESTINED in the not very distant future to become a leading scientific centre for the student of natural history. The Smithsonian Institution and the National Museum have long offered unsurpassed facilities for research in most branches of science, although there has been a lack of facilities for the study of natural history from live subjects. The National Museum, however, has taken a step in the right direction at last, and has made a collection of live animals, which, though unimportant at present, may prove the nucleus of what may, with proper congressional aid, be made the most valuable zoölogical collection in the country. In addition to this, the Fish Commission is preparing a fine collection of fresh and salt water fishes, mostly confined to those of economic value, but which will incidentally contain many varieties of marine life not valuable for food, but interesting for study. There are at present about forty varieties of fresh fish on exhibition in addition to the regular hatcheries of carp, shad, etc. The most interesting of these is a small fish from South Carolina, which brings forth its young alive, as animals do, instead of in the form of eggs, as is almost the universal custom of fishes. In another tank may be seen nearly one hundred Mississippi River catfish from a river in the neighborhood of Quincy, Ill. These are Western fish, and the Fish Commission intends to introduce them into Eastern rivers on account of their great value as food-fish. The flesh is white, firm, and of fine flavor. The present experiment is to determine whether they will spawn in captivity. Another tank is full of beautifully marked goldfish originally from Japan. Goldfish are not indigenous to any part of America, and are all of Asiatic or Japanese origin, the latter being much the handsomest. Several specimens of the California grayling, the gamest of all the gamy fishes, are also to be seen. A fine collection of salt-water fauna will also be brought from Wood's Holl, Mass., where it has been for some months, and placed on exhibition in Washington. In addition to the various food-fishes of the ocean, the exhibit will contain many other interesting forms of sea-life. The location of the exhibition in the Armory Building leaves much to be desired, and it is but poorly adapted for the needs of the work. Such a collection should be located in a building built expressly for the purpose, which will, in all probability, be ultimately erected. The exhibit of salt-water fishes is intended, in addition to its affording valuable means of study, to demonstrate the feasibility of keeping a collection of ocean fauna at a point remote from the sea. The water used will be artificial sea-water, and the experiment has never before been made on so large a scale. The difficulties attending the transportation of sea-water prevent such exhibitions at any distance from the sea. The exhibit will be tastefully and conveniently arranged. The asphalt floor is always dry, and the display interesting and instructive to the layman as well as to the scientist, and will also give valuable aid in the other work of the Fish Commission.

IN THE JANUARY ISSUE of the *Journal of Mental Science*, Miss Ellen F. White gives a most interesting account of medical gymnastics. We hear in this country more or less about the Swedish movement-cure, but it is quite usual to regard it as simply a new phase of quackery. It is, however, something very far removed from quackery, and Miss White's paper on it makes this very clear. Ling, the originator of the system, was a Swedish officer, who happened to discover that a lameness in his own arm was cured by fencing. He reflected on this fact, and then made an exhaustive study of anatomy, physiology, and pathology for the purpose of testing the principle which he thought he had discovered. As a result he evolved his system; and it includes medical, military, and educational or hygienic gymnastics. The object of the latter is to preserve the balance of power in the body: that of the former is to restore the balance when it has been disturbed by a loss of the proper proportion between the parts. The theory premises that blood is the carrier of life and of disease, and that the flow and the quality of blood can be controlled, or at least regulated, by gymnastics. The writer instances a number of cases and of affections which substantiate these claims, and describes the various classes of movements, and explains their nature and aims. She mentions the fact, which is very evident to us in the United States, that hundreds of so-called gymnasts, who may have been a few months or a few weeks only under a teacher, are advertising themselves as specialists, and bringing discredit upon the whole system. If it is to establish itself in the public confidence, it must be taken out of the hands of charlatans and quacks.

THE UNITED STATES HYDROGRAPHIC OFFICE.

AN important bill has just been introduced in Congress by which it would seem as though the continued efficiency of this office, both as regards its relation to the navy, of which it is a most important and necessary adjunct, and to commerce and the entire maritime community, would be insured. The bill referred to provides for the appointment of a permanent hydrographer and assistant hydrographer, to be nominated by the President and confirmed by the Senate.

Few landsmen are in a position fully to appreciate the scope and character of the work done by this office, much of it being of a purely technical character, involving the preparation of charts, sailing-directions, light-lists, etc., for the use of navigation in every port of the globe. Until recently, however, the tour of duty of the officer detailed as hydrographer has been so short, in accordance with the usual custom in the navy, that it has been impossible to do more than keep up the routine work of the office, which in itself requires unremitting attention and care. Thanks to a longer detail than usual, granted by Secretary Whitney at the request of the chief of Bureau of Navigation, in order to develop the latent possibilities of the office, the present hydrographer has succeeded in lifting it out of the old ruts in which it was moving, and has infused into it renewed life and energy; so much so, indeed, that it is now fully recognized as one of the great scientific bureaus of the government, and the cordial assistance and support which it is receiving from masters of vessels show far more forcibly than words can do the great practical value of its work. Branch offices have been established at six of our principal seaports, and with such success that more are demanded at other ports; American charts and other hydrographic publications have come to the front again; and last, but by no means least, the monthly Pilot Chart, a publication which is unique of its kind, has been established, and has obtained an influence and importance well attested by the fact that a large edition is generally exhausted in a few days after it is issued. All those of our readers who have crossed the Atlantic during the past three years have probably had an opportunity to form their own ideas regarding the esteem in which it is held by masters of vessels.

To keep such an establishment moving smoothly, economically, and efficiently, undoubtedly requires a longer tenure of office for its responsible head than the three years prescribed by naval custom; and the bill which is now before Congress must receive hearty and

undivided support from the scientific world, no less than from owners and masters of vessels, marine insurance companies, and, indeed, from the general public, for who is not interested in lessening the hazards of the sea? The relations which have grown up and the interchange of data now carried on between this office and other scientific bureaus of the government, no less than the recognized value of this most appropriate work for naval officers in times of peace, mark a new era in naval administration, the permanency of which should be guaranteed. The people of the United States are quick to recognize good work, and nothing can strengthen confidence in and support of the navy more than the assured permanency of the praiseworthy work of the Hydrographic Office.

THE GROWTH OF CHILDREN.

THE systematic measurement of the several parts of the human body, together with the testing of their functions, has developed into the science of anthropometry. The plan of establishing an anthropometrical laboratory, where, for a small fee, any one can have himself weighed, measured, and his powers tested, which Mr. Galton has so often and so ably advocated, seems about to be realized. The results of such measurements, when widely taken and ably compared, will be to practical biology and hygiene what statistics, in the present use of the term, are to economical science, — the experimental basis of their practical application. As in the latter, so in the former, the stating of these results in accurate form at once opens up a number of questions never before considered, and at the same time helps to solve those that have been brought to notice. In this department of study no field has been cultivated with so much zeal as the study of the growth of children, mainly because this is a field where the practical lessons can be most effective. In a recent number of a German scientific journal, Professor Gad of the University of Berlin, sums up the recent studies upon the growth of children, and thus makes accessible some very interesting facts.

About one-fourth of a human life is spent in the period of growth; and this implies not merely addition of material, but assimilation, re-formation. It involves, too, in some cases, the enlargement and change of form of elementary cells, but in most cases the formation of new cells by cell-division. We know more about the growth of the skeleton than about that of the soft parts of the body; but a more detailed knowledge of the growth of its several parts is highly desirable. The height and weight of the entire body are the most readily observed, and about them the information is most accurate. The female child weighs, on the average, 3, and the male 3.5 kilograms. At the fifteenth year the weight has become twelve times this amount. The greatest changes occur in the first year. At the end of the second year, the body weighs three and a half times its original weight, and about one-fifth more than at the end of the first year. In the third year it increases by one-tenth its weight; and from then on, the increase is tolerably constant up to the eighth year for girls, and the tenth year for boys, at about 1,500–1,800 grams per annum. The increase in height takes a parallel course. The greatest changes occur in the suckling. At birth the height is 50 centimetres, which is about one-third that of the adult. At twelve months it has increased by 20 centimetres (40 per cent), more of this increase going to the lower than to the upper half of the body. In the second year the increase is 10 centimetres (15 per cent); in the third, 7 centimetres (8 per cent); and from then on, it is about 5 centimetres annually. At five years the height has doubled, and at fifteen tripled itself. This for boys. Girls are smaller, and reach their maximum earlier. The maximum height of army recruits falls between the twentieth and the twenty-second year, and is 170.5 centimetres. If in growing the body retained the proportions of the several parts, the weight of the adult would be twenty-seven times that of the new-born child, inasmuch as the adult is three times as tall as the babe, and the volume is as the cube of the height. As it is, the adult weight is only twelve times the original, and this difference shows how much more the growth is in height than in any other direction.

The usual method of obtaining these average results is to measure groups of children of certain ages, and take the mean result. Another method is to observe the same children, and measure and weigh them for many years. The latter is the more troublesome, but the inference from it is more immediate; though the former, when based on sufficiently large numbers, gives reliable results. Dr. Landsberger has been measuring a large number of children in Posen, Germany, and always the same children, since 1880, — a period of six years. The measurements have been made always between the 5th and the 15th of May, at the same time of day, in the same place, and with the same instruments. The average period covered is from the sixth to the thirteenth year. One curious result is, that the social factor as between the rich and the poor is a much more important one than the racial as between Poles and Germans. The rich children come to school taller and heavier than the poor ones, though their increase after getting to school is not more rapid. This long-lasting effect of early care is much more conclusively shown by the figures of another observer, Russow, who has tabulated the heights and weights of children from their second to their eighth year, distinguishing between those that were naturally suckled and those that were artificially reared, and throughout all this period shows a balance in height and weight in favor of the former.

Perhaps the most original investigation in this field is that of Dr. Malling-Hansen, director of the institute for the deaf-and-dumb at Copenhagen; the measurements being made on the children of that institution ranging from nine to fifteen years in age. The weights of these children show three marked periods in each year: there is a period of maximum growth in weight extending from August to the middle of December, a period of mean growth in weight from then to the first of April, followed by a period of minimum growth in weight back to August again. During the period of maximum growth in weight, the daily increase is three times as great as during the period of mean growth; and almost all that is gained in the latter period is lost in the period of minimum growth. With regard to height, these periods are equally evident though not coincident. In Copenhagen the period of minimum growth in height is from August to the end of November; the mean period, from then to March; and the maximum period, from March to August. In the maximum period the daily increase in height is two and a half times as great as in the mean period, and in the latter two and a half times as great as in the minimum period.

The period, then, at which the general increase of the body is going on is from the end of March to December; and within this period there is a period of maximum increase in height and a period of maximum increase in weight. During the period of most rapid increase in weight, the increase in height is the slowest of any in that period, the times of mean growth of height and weight about coincide, and the period of maximum growth in height is a period of comparative rest for the weight. The height-periods begin and end about fifteen days before the weight-periods. The height first has a period of minimum growth, then a period of mean growth, then its maximum growth, and then suddenly falls back again to the minimum rate of growth. The weight, however, begins with a minimum rate of growth, passes at once to its maximum, and then slowly falls through the period of mean growth back to the minimum again. The growth in weight varies more than the growth in height. An increase of 1 centimetre of height corresponds to 2.84 kilograms during the period of maximum growth in weight, but only to .48 of a kilogram in the period of mean or minimum growth. The increase of weight in the maximum period is essentially a growth in stoutness, and the loss of weight during the period of minimum growth is a decrease in stoutness. In the period of maximum increase in height the increase in stoutness is at a minimum, and during the period of least increase in height is at a maximum. A practical lesson to be derived from the knowledge of these periods is to have as large as possible a share of the period of general greatest growth fall into the vacation time; for then the body has less strain upon it, and is in general in the best condition for growing. The Swedes and South Germans are accordingly right in giving their children two or two and a half months vacation, from July to the middle of September, thus including a good share of the greatest growth period.

Dr. Malling-Hansen has also attempted to make out shorter periods of twenty-five and seventy-five days of variations in growth,