COMPOSITE PORTRAITS OF MEMBERS OF THE NATIONAL ACADEMY OF SCIENCES.

Those of the members who were present at the Washington meeting of the academy last spring will remember, that, at the request of Professor Brewer and myself, they sat for their separate photographed portraits for the purpose of obtaining an experimental composite picture. Professor Baird kindly offered the facilities of the photographic department; and the pictures taken by Mr. Smilie, the photographer in charge, bear the same stamp of excellence that characterizes so generally the work of that department of the national museum.

As only one or two previous attempts, I believe, have been made to produce composites in this country, I will state briefly what they are, and how they are made.

The idea in its broadest sense was conceived and applied by Francis Galton for the purpose of obtaining an average or type portrait; i.e., a picture that should show the features that are common to a group of individuals, and exclude those that are purely individual. It is clear, that, in proportion as this result is attainable, the method will be of value in obtaining a clear conception of the external characteristics of any given type or class.

Galton reminds us, that, during the first days of a traveller's meeting with a very different race, he finds it impossible to distinguish one from another, without making a special effort to do so: to him the whole race looks alike, excepting distinctions of age and sex. The reason of this is, that, by short contacts with many individuals, he receives upon his retina, and has recorded upon his memory, a composite picture emphasizing only what is common to the race, and omitting the individualities. This also explains the common fact that resemblances among members of a family are more patent to strangers than to the relatives.

The individuals entering into these composites were all photographed in the same position. Two points were marked on the ground glass of the camera; and the instrument was moved at each sitting to make the eyes of the sitter exactly coincident with these points. The composites were made by my assistant, Mr. B. T. Putnam, who introduced the negatives successively into an apparatus carefully constructed by himself, and essentially like that designed by Mr. Galton, where they were photographed by transmitted light. The arrangements of the conditions of light, etc., were such that an aggregate exposure of sixty-two seconds would be sufficient to take a good picture. What was wanted, however, was not an impression of one portrait on the plate, but of all the thirty-one; and to do this required that the aggregate exposure of all the thirty-one should be sixty-two seconds, or only two seconds for each. Now, an exposure of two seconds is, under the adopted conditions, too short to produce a perceptible effect. It results from this, that only those features or lines that are common to all are perfectly given, and that what is common to a small number is only faintly given, while individualities are imperceptible. The greater the physical resemblances among the individuals, the better will be the composites. A composite of a family or of near relatives, where there is an underlying sameness of features, gives a very sharp and individual-looking picture.

It would be difficult to find thirty-one intelligent men more diverse among themselves as regards facial likeness than the academicians entering into this composite. They are a group selected as a type of the higher American intelligence in the field of abstract science, all but one or two being of American birth, and nearly all being of American ancestry for several generations. The faces give to me an idea of perfect equilibrium, of marked intelligence, and, what must be inseparable from the latter in a scientific investigator, of imaginativeness. The expression of absolute repose is doubtless due to the complete neutrality of the portraits.

Fig. 3 contains eighteen naturalists and thirteen mathematicians, whose average age is about 52 years. Fig. 1 contains twelve mathematicians, including both astronomers and physicists, whose average age is about $51\frac{2}{3}$ years. Fig. 2 is a composite of sixteen naturalists, including seven biologists, three chemists, and six geologists, with an average age of about $52\frac{1}{2}$ years.

I may mention, as perhaps only a remarkable coincidence, that the positives of the mathematicians, and also of the thirty-one academicians, suggested to me at once forcibly the face of a member of the academy who belongs to a family of mathematicians, but who happened not to be among the sitters for the composite. In the prints this resemblance is less strong, but in these it was observed quite independently by many members of the academy. So, also, in the positive of the naturalists, the face suggested, also quite independently to myself and many others, was that of a very eminent naturalist, deceased several years before the sitting for this composite.

There is given also a composite (fig. 4) of

a differently selected group. It is of twenty-six members of the corps of the Northern transcontinental survey, — an organization of which I had charge, and the object of which was an economic survey of the north-western territories. It was a corps of men carefully selected as thoroughly trained in their respective departments of applied geology, topography, and chemistry, and having the physique and energy, as well as intelligence, needed to execute such a task in face of many obstacles. The average age of this group was thirty years. RAPHAEL PUMPELLY.

MORTALITY EXPERIENCE OF THE CONNECTICUT MUTUAL LIFE-INSURANCE COMPANY.

THERE is a popular superstition, almost universal among our transatlantic cousins, and widely spread in our own country, that Americans are shortening their days by hard work, and inattention to the laws of healthy living. Our readers may remember, that, when Mr. Herbert Spencer first arrived in this country, he immediately began lecturing us on this subject. No surer test of this question can be found than that of mortality statistics, because those who insure their lives belong principally to the very class, who, according to the superstition, are most actively engaged in their own extermination. The tables recently published under the above title are therefore of great interest. The fulness of detail, and variety of form, in which the results are presented, facilitate their discussion. It therefore seems worth while to point out the most interesting results obtained. The fact thus brought out is, that at the very ages when mortality from over-work should most powerfully show itself, namely, from thirty to sixty, the American mortality is more than one-third less than the English, as shown by the combined experience table, and is constantly diminishing.

There are, however, reasons why we should not expect the death-rate shown by the experience of a life-insurance company to coincide with the rate amongst the community at large. Insured lives are not taken at random from the community, but form a select body. Only a limited class possess the foresight and interest in the future which would induce them to insure their lives. Out of that limited class, the insurance company selects only those whose viability is free from serious doubt. This selection, of course, tends to result in the insured class having better lives than the community at large. There is, however, a tendency in the opposite direction, which may be operative to a limited extent. A person who has reason to suspect his viability will have a stronger motive to get insured than one who does not. There is, however, no evidence that this cause has resulted in the lowering of the standard among the insured generally.

One result of the selection exercised by the company is obvious, and has frequently been pointed out by writers on the subject. Out of the class of men with good constitutions, the company selects only those who are, for the time being, in good health. With those who are going to die, symptoms of disease frequently appear weeks, months, or even years before actual death. The probability of a healthy person dying within the year following his examination by the life-insurance company is therefore less than the probability that he will die in the second year; and this, again, is still less than the probability that he will die in the third year. It has commonly been supposed that three years would have to elapse after the examination, before the probability reached its normal point. It is remarkable that the table now before us exhibits this effect in a much smaller degree than usual. The death-rate during the first two years of insurance is less by perhaps ten per cent than the general rate at all ages. During the third year it is actually less than during the second. Instead of attaining its maximum at the end of the third year, it continues to increase, and it does not reach the regular curve until the sixth year. It would seem that while the company gains a certain advantage during the first five years, through its privilege of selection, that advantage is far less during the first year than would have been supposed, and far less than common experience has hitherto shown it to be.

Another remarkable result, which we wish had been explained more fully, is the extraordinary death-rate among the younger class. This is more strongly shown among natives of the United States than among the insured at large. From the age of twenty-one to ninety, the death-rate follows the table of mortality very closely, but is uniformly from fifteen to twenty per-cent less than the tabular rate. But among native Americans, between the ages of seven and twenty, the rate is forty per cent greater than that given by the American table. The actual number of those who died was forty-seven, while the table gives only thirty-three deaths. The case is rendered yet more striking by the consideration that the mortality of the American table at the early ages is greater