together the immense recent literature on neurology, has necessarily given rise to certain defects. There is a lack of balance and an inco-ordination of parts which renders it somewhat difficult for those not well versed in the subject. The beginner wants a guide to those simpler facts which he can see and verify for himself. Yet this book deals mainly with investigations and theories which can be repeated and verified, if at all, only by special investigators in well-equipped laboratories. On the other hand, the advanced worker in biology and the well-grounded physician will find the book of the greatest value. It is a work which all who are deeply interested in the structure of the nervous system should be glad to have at hand. Nowhere else can one so readily become acquainted with much of the more recent neurological literature. The usefulness of the book is greatly augmented by good illustrations, by full and careful references to original sources and by a most excellent index. While the nomenclature used throughout the book is certainly the best now in use, it would probably be more useful and attractive to those accustomed to the nomenclature used in the English anatomies were either the old terms added in brackets in the text or a glossary given at the end.

In conclusion we wish to congratulate the author upon the success with which he has carried out a most difficult undertaking.

C. R. B.

The Physician's Visiting List (Lindsay and Blakiston's) for 1900. Forty-ninth year of its publication. Philadelphia, P. Blakiston's Son & Co., 1012 Walnut St. Sold by all booksellers and druggists.

This book contains a calendar for 1900 and 1901; an account of the metric system of weights and measures, prepared by Oscar Oldberg; a table for converting apothecaries' weights and measures into grams; a dose-table for 1900, prepared by Dr. Geo. M. Gould; a brief account of asphyxia and apnoea; a comparison of thermometers; and a table for calculating the period of utero-gestation; followed by blank leaves for a visiting-list, memoranda, addresses of patients, etc. The book is compact and well arranged and can be commended to those of our readers who require such a memorandum-book.

Marriages of the Deaf in America: an Inquiry concerning the Results of Marriages of the Deaf in America. By EDWARD ALLEN FAY. Published by the Volta Bureau, Washington, D. C., 1898.¹

Few books on the inheritance of human faculties are more important than this volume, which gives the results of researches which have been carried on by the Volta Bureau, which was established by Alexander Graham Bell, "for the increase and diffusion of knowledge relating to the deaf."

Professor Bell has shown that marriages of the deaf are more common

¹ The substance of this review was presented to the Scientific Association of the Johns Hopkins University, December 23, 1899.

in America than in Europe, that they have increased at a higher rate of progression during the present century, that the probability of deaf children is much greater among the deaf than in the community at large, and that deafness—not mere hardness of hearing, but what is called “deaf dumbness”—is also increasing among us, and that we are threatened with a deaf variety of the human race. At the same time, it is clear that the probability of deaf children is not equally great among all deaf persons who marry and have children. A person who has lost hearing by accident or disease, at however early an age, may possibly be in no more danger of transmitting the peculiarity than one who has lost an eye or an arm. It is therefore highly important, in the interest of the deaf as well as in the interest of the community, to determine the conditions which are favorable and those which are unfavorable to the hereditary transmission of deafness.

This report contains more than three hundred and fifty pages of statistical information, giving, for 4471 deaf persons who have married, data regarding the origin of their deafness, the hearing or deafness of the partner in marriage, the date of marriage, the number of children, the number of deaf children, a record as to the hearing or deafness of brothers and sisters, and information as to the existence of other deaf relatives. These tables, which contain a record of the marriages of the deaf far larger than all previous records put together, are of great interest to all students of inheritance, but their motive is philanthropic rather than scientific.

The work was undertaken, and has been carried on, we are told, “in the hope that it might be of service to the deaf and to society by settling definitely the question whether or not the deaf are more liable than hearing persons to have deaf children; and, if it should appear that, notwithstanding the numerous instances to the contrary, they are more liable to this result, by ascertaining whether or not the liability is increased by the marriage of the deaf with one another; also whether certain classes of the deaf, however married, are more liable than others to have deaf children; and, if this should prove to be the case, by determining how these classes are respectively composed, so that, as the result of the conclusions reached, in many instances deaf persons might be advised to follow the choice of their own hearts in marriage, with no restrictions whatever except such as should influence all right-minded persons in this important matter; while, in cases where the deafness of the parent was unquestionably more liable than in others to reappear in the offspring, the persons interested might be effectively warned in time of the danger incurred.”

The tables of facts regarding the deaf are accompanied by a thorough and exhaustive analysis, which shows that this practical philanthropic purpose has been attained; and that Professor Fay is now able to give to those deaf persons who contemplate marriage advice which has the value of scientific demonstration.

While deaf persons are much more likely to have hearing children than

to have deaf children, they are much more likely than ordinary normal-hearing persons to have deaf children. Less than one-tenth of one per cent. of all the children of normal parents are deaf, but if one or both parents are deaf, nearly nine per cent. of all the children are deaf. In other words, a normal-hearing pair have no reason to fear that a deaf child will be born to them unless they have more than a thousand children; while if one parent or both are deaf, and they have eleven children, they may, on the average, expect to have one deaf child.

The probability of deaf children is not, however, equally great for all deaf persons, since it depends upon the character of the parental deafness. Marriages of the congenitally deaf, that is, of persons who have never, at any time in their lives, shown evidence of hearing, are far more likely to result in deaf offspring than marriages of the adventitiously deaf, that is, of those who have once heard and have subsequently lost their hearing. Of 526 marriages between a congenitally deaf person and a congenitally deaf or a hearing partner, 111, or 21 per cent. resulted in deaf offspring; and 20 per cent. of the children, or one in each five, were deaf; while of 1155 marriages where one partner was adventitiously deaf and the other adventitiously deaf or hearing, only 40, or 3½ per cent., resulted in deaf offspring; and only 2 per cent. of the children, or one in each fifty, were deaf.

If it were possible to draw this line with rigorous accuracy, and to divide all the deaf into these two classes, all deaf persons with a marked probability of deaf children would be found in the first class, while the members of the second class, the adventitiously deaf, would have little reason to fear the transmission of their deafness to posterity; but, as a practical matter, it is not possible to draw this line with scientific exactness. Deafness is not usually discovered until the child has reached the age when children usually begin to talk; and it is difficult to determine whether the hearing has been destroyed during this period or has been deficient from the first. If the child has suffered from some disease which is known to frequently result in deafness, the case is regarded as adventitious, although it may possibly be congenital. If, on the other hand, no such disease has been observed, the case is likely to be regarded as congenital; but it is, perhaps, just as likely that hearing has been lost in consequence of some unnoticed inflammation of some part of the auditory apparatus, occurring at some time before the deafness was discovered. In fact, one who, having heard, afterwards becomes deaf as the effect of disease, may be an example of congenital deafness. When deafness is said to be inherited, it is not actual deafness, but some constitutional weakness or susceptibility to disease that is transmitted, and a child who has heard and has afterwards lost its hearing may, while regarded as a case of adventitious deafness, have the same significance in inheritance as one born deaf.

The term "congenitally deaf" usually means "supposed to be congenitally deaf," and "adventitiously deaf" often means "supposed to be adventitiously deaf." Some more accurate method of classifying the deaf

must be employed before we can clearly express the probability of deaf children in any given marriage of the deaf.

It is well known that deafness often prevails in families; that deaf persons often have deaf relatives; and the arrangement of the deaf-married persons, according to the existence or non-existence of deaf relatives gives results which are most instructive.

In 437 marriages of deaf persons where both partners in marriage had deaf relatives, more than 25 per cent., or one in four, resulted in deaf offspring; and more than 20 per cent., or one child in each five, were deaf. In 471 marriages where neither partner had deaf relatives, only $2\frac{1}{3}$ per cent. resulted in deaf children, and only one child in each hundred was born deaf ($1\frac{1}{4}$ per cent.). When we consider how few persons, especially in America, where changes of residence are frequent, are acquainted with the condition of all their relatives, it is not improbable that there were unknown or unreported deaf relatives in some of these marriages, and that marriages of this class are even less likely to result in deaf offspring than the tables indicate.

Indeed, Prof. Fay is led to the conclusion that even when deafness is congenital, it should not be regarded as a bar to marriage if neither of the partners in marriage has deaf relatives, since the tendency to transmit deafness, if it exists at all, is very slight. On the other hand, the marriage of a deaf person to a hearing person with deaf relatives is much more hazardous than the intermarriage of deaf persons without deaf relatives. In fact, careful study of the tables indicates that the marriage of two hearing persons who have deaf relatives is just as likely to result in deaf offspring as the intermarriage of two deaf persons who have deaf relatives. Taking all the marriages of a year's standing or longer of which the results have been reported, where both the parents had deaf relatives, more than 25 per cent. of the marriages resulted in deaf offspring, and the proportion of deaf children born to them is 20.9 per cent.; where one of the parents has deaf relatives while the other has not, the proportion of marriages resulting in deaf offspring is 6.6 per cent.; where neither of them had deaf relatives only 2.3 per cent. of the marriages resulted in deaf offspring; and the proportion of deaf children born therefrom is 1.2 per cent. The actual percentage of marriages resulting in deaf offspring, and the number of deaf children born therefrom, when neither of the parents has deaf relatives, may be even smaller than these figures indicate; for in some cases the statement that neither parent had deaf relatives is not well authenticated, and in all of them there is the possibility that there may have been deaf relatives who were unknown to the person who filled out the record-blanks. Prof. Fay is led to believe, from the study of the records, that the probability of deaf children, where neither parent had deaf relatives, is very slight, perhaps no greater than in ordinary marriages.

The marriages of the deaf most liable to result in deaf offspring are those in which the partners are related by consanguinity. Thirty-one such marriages are reported in the marriage records, and of these 14, or

45.1 per cent., resulted in deaf offspring. One hundred children were born from these thirty-one marriages, and of these 30, or 30 per cent., were deaf. It is therefore exceedingly dangerous for a deaf person to marry a blood relative, no matter what the character or degree of the relationship may be, and no matter whether the relative is deaf or hearing, nor whether the deafness of either or both or neither of the parents is congenital, nor whether either or both or neither of them have other deaf relatives.

The student of inheritance will, no doubt, be disposed to state this conclusion in more general terms, and to assert that the consanguineous marriage of one who has *any* constitutional infirmity or defect is imprudent and inadmissible, and that since no one can be sure that both parties to a contemplated marriage are constitutionally sound in all respects, no consanguineous marriage is permissible.

The writer of this review prepared, by request, some twelve years ago, an essay on the conditions which are necessary for the production of a deaf variety of the human race, which was printed in the Report of the Royal Commission on the Blind, the Deaf and Dumb, etc. London, 1889.

In this essay he gave reasons for holding the only necessary condition to be that successive generations of persons—either deaf or hearing—*with deaf relatives* should marry and have children.

This opinion was so much opposed to the views on inheritance which were current at that day that none of the eminent men of science—seven in number—who prepared essays upon the same subject, gave it any support, or even took it into consideration. Most of them, indeed, held that a deaf variety of the human race may be expected to result from the intermarriage of successive generations of deaf persons.

Professor Fay's thoughtful and exhaustive analysis of the data afforded by the records of some 4500 records of marriages of the deaf shows that the view of the matter which was reached by the writer twelve years ago, on theoretical grounds, turns out to be a fact so soon as it is submitted to a practical test.

W. K. BROOKS.