School Age.—There is a difference of opinion among experienced teachers as to the best age for sending deaf children to school. On the one hand, such children have so much to learn as compared with hearing children that their education ought to be begun as early as possible; on the other, there are obvious objections to taking them away from their homes—as in the great majority of cases is necessary in order that they may receive proper instruction—while they are still very young. The decision must depend largely upon the circumstances of the individual, and the facilities offered by the State in which he resides. Where the term of instruction afforded by the State is limited to six or seven years, and where children are surrounded by favorable influences at home, probably ten or twelve is the best age for them to be sent to school, since experience has shown that the six or seven years following that age are those in which the most can be accomplished for the physical, mental, and moral development of the deaf-mute; but where, as is the case in some States, there is no limit to the term of instruction, where proper provision is made for the care and teaching of the little children by kindergarten methods apart from the older pupils, and especially where the home influences are bad, it is desirable to send them as young as six years of age. From six to ten they will make less progress at school than from ten to fourteen; but if, in addition to those four years under ten, they remain six or seven years longer, they will be able to acquire a much fuller mastery of the language of their fellow-men, and to reach a far more advanced stage of education in all respects, than if their education had not been begun until the years of early childhood were passed.

Boarding Schools and Day Schools.—Within recent years laws have been passed in several States providing for the establishment of day schools for the deaf, the town or city desiring such a school providing the necessary room or rooms and the State paying a certain sum *per capita* for the children taught. This has the advantage of enabling the pupils to live at home while receiving instruction, but experience has shown that the education thus given is less efficient and successful than in boarding schools. The evil influences that surround many deaf children at home, the temptations of the street out of school hours, the danger of accidents in going to and from school, the interruptions to progress from tardiness and absence, and the lack of facilities for industrial instruction, make the results much less satisfactory than in the well-organized boarding school, where the influences of the workshop, the playground, and the evening study hour, all combine with those of the school room to promote the proper development and education of the child.

Private Instruction at Home.—It has been said that "the best deaf-mute school is a school of one pupil," but the statement is not to be received without some qualification. In order to attain a mastery of spoken or written language the more individual attention the deaf child receives the better, and in this respect private instruction at home has a decided advantage over class instruction at school. On the other hand, the child taught alone at home, and thus lacking the stimulus of association with others placed on an equal footing with himself, is apt to become listless in study and melancholy in disposition. The best advice, therefore, to be given to parents whose means enable them to provide a private teacher is this: Obtain a competent tutor or governess for your child at three or four years of age. Let the efforts of this teacher for seven or eight years be devoted almost wholly to giving the child language, articulation, and speech-reading by the natural intuitional method, which imitates as closely as the nature of the case allows the manner in which hearing children learn to speak, and let the teacher's efforts be heartily seconded by all the other members of the family. When the child is ten or twelve years old send him to school to pursue other branches of study and complete his education. The command of idiomatic language acquired by the home training is something that could not be imparted at school, while the moral and intellectual development received at school could not be attained at home.

Intelligent parents and friends, whose pecuniary circumstances do not allow them to employ a private teacher, can themselves do a great deal in the way of preparing their deaf children for school life by forming in them habits of order and obedience, and by teaching them the use of the pencil and pen, counting, and common words in their written forms. If the child already possesses speech gained before hearing was lost, great efforts should be made to retain the speech and to cultivate the habit of reading the speech of others. If any hearing exists, it should be utilized in practice, the aid of the hearing tube, trumpet, and akouphone should be tried, and whichever instrument proves most effective should be employed. In all cases the deaf child should be governed with the same firmness as his hearing brothers and sisters. While due allowance should be made for his inability to understand, and he should be protected as far as possible from the teasing of playmates, he can and should be taught strict obedience to parents, and due respect for the rights of others.

Higher Education.—The standard of education in schools for deaf-mutes at the present day corresponds in general to that of the common schools—an education fitting the pupil for intelligent citizenship. But there are some among the deaf who are capable of advancing beyond this standard and preparing themselves for scientific and literary pursuits. The United States makes provisions for the wants of this class in Gallaudet College, established by Congress at Washington, D. C., in the year 1864, through the efforts of Edward M. Gallaudet, Ph.D., LL.D., who has been its president from the beginning. This college affords a course of training corresponding to that of American colleges in general, with such modifications as seem desirable in view of the peculiar needs of the deaf, and confers upon its graduates the usual academic degrees. Of the students who have been connected with the college a large number are now engaged in teaching, several are editors and publishers, others are in the civil service of the Government, one is a lawyer practising in the Supreme Court of the United States, one is at the head of large assaying works in Chicago, several are clergymen preaching to the deaf, and nearly all are occupying positions of a higher grade than would have been possible without the educational advantages conferred by the college course.

Religious Work for Adults.—The moral and religious instruction given in most of the American schools for the deaf is of an unsectarian character, the pupils being advised by their teachers to connect themselves during their vacations, or after leaving the schools, with the churches to which their parents belong. Adult deaf-mutes, however, can derive much more pleasure and profit from special services in the sign language than from ordinary religious exercises, and in places where their numbers are sufficiently large to form a congregation, the holding of such services is entirely practicable. The Rev. Thomas Gallaudet, D.D., of New York, established a church for deaf-mutes in that city in 1852, and through his efforts and those of other friends of the deaf, arrangements are now made by which religious services in the sign language are held weekly in several cities of the United States, and at less frequent intervals in many other places. The Episcopal Church, with which Dr. Gallaudet is connected, has been by far the most active in providing for the religious welfare of adult deaf-mutes, but other churches have also had a part in the work. There are now several ordained clergymen in the United States who are themselves deaf, and there are a large number of deaf laymen who assist in missionary work. In connection with the religious organizations there usually exist benevolent and relief societies, and in some cases literary and social unions. *Edward Allen Fay.*

DEAF-MUTES: The Language of Signs, and the Combined System of Instructing Deaf-mutes.

I. The Language of Signs.—The French philosopher Condillac begins his treatise, "Grammaire générale et raisonnée," as follows: "The means of which men first made use to communicate their thoughts were gestures, movements of the countenance, and inarticulate sounds. The combination of these may be called *the language of action.*" This view of Condillac's as to the origin of language may have "no sufficient support from observed facts," as the distinguished English anthropologist Edward B. Tylor asserts; but it may certainly be accepted as a plausible hypothesis, for the overthrow of which no "observed facts" can be adduced. It is, however, foreign to the purpose of this article to inquire what was the primitive language. The aim will be to show that there is a true language of gestures; that it is as natural and may be as complete a vehicle of expression as speech; that this language has great utility among people who hear; that in the humane and scientific education of the deaf it is indispensable; that its judicious use by deaf-mutes is a source of great benefit and pleasure during the entire period of their lives; and that among this interesting and intelligent class of the community nothing can be found that will take its place.

That there is a true language of signs, history gives abundant evidence. Quintilian, the Roman orator and teacher of rhetoric in the first century of our era, says: "Amidst the great diversity of tongues pervading all nations and people, the language of the hands appears to be common to all men." In the days of Quintilian the language of signs was an important feature in public amusements, the mimics or pantomimists of the time of Augustus carrying the art to the highest degree of perfection. The famous actors Pylades and Bathyllus expressed in mimic language the greatest variety of scenes and incidents, including even the history of illustrious men. Amusements of this character were maintained for more than five centuries, when they had become so gross and indecent that Charlemagne put a stop to them in the name of morality.

The language of gestures has been employed in very many instances by persons of widely differing nationality and race, and utter strangers to each other up to the moment of resorting to this means of communication. At the time when the Amistad Africans were in prison in Hartford, Conn., awaiting their trial before the United States District Court, a visit was paid to them by the Rev. T. H. Gallaudet, then principal of the Institution for Deaf-mutes in that city. Having no means of communicating orally with these negroes, Dr. Gallaudet found no difficulty in carrying on conversation with them by means of expressive action, which elicited various information respecting the families they had left in Africa, besides some particulars of their own recent history; all of which they imparted with the peculiar pleasure resulting from this unexpected facility of communication with a stranger.

To how great an extent the sign language has served as a means of communication among the aborigines of America is shown by Col. Garrick Mallery, U. S. A., in his admirable monograph on "Sign Language among North American Indians compared with that among Other Peoples and Deaf-mutes," published by the Government of the United States, under the auspices of the Bureau of Ethnology of the Smithsonian Institution.

Enough has been said to show that there is a true language of signs, and that it has been of great use among people who hear. But to discover the field of its greatest utility, and to find it in its fullest development as a vehicle of expression, one must become informed as to the service it performs in the intellectual and social life of the deaf.

A few isolated instances are recorded, previous to the eighteenth century, of deaf persons who, under favorable conditions, have developed for their own use a measurably complete language of signs. But it was only toward the middle of that century that this language was used by considerable numbers of deaf-mutes. Before describing this general use, however, it is important to consider, somewhat carefully, the limitations as to means of communication which absolute deafness imposes on those who suffer from it.

The means of expression possible to creatures of intelligence, by which information as to thought and feeling may be given and received, are five in number, corresponding to the senses. All expression—*i.e.*, all communication from one intelligent being to another—must, therefore, be either audible, visible, tactile, odoric, or palatal. The senses of taste and smell are addressed so rarely and with such difficulty, for the purpose of communicating thought, that they may be left out of view. The same may be said of the sense of touch, except that, in the case of persons both blind and deaf, it becomes the main channel of communication, and may be made useful under certain conditions with such as are only deaf; as, for example, in the dark, or when it is desirable to address the deaf without diverting the eye from some object—such as a landscape, a passing pageant, or spectacle.

Visible expression employs a great variety of forms in the accomplishment of its purpose, but these forms may be grouped in two perfectly distinct classes: the *gestural*, which produce their effects only from moment to moment, having no enduring quality, and the *graphic*, which are more or less permanent.

Audible expression, almost infinite as it is in variety, is susceptible also of division into two great classes, *articulate* and *inarticulate*, the former comprising all forms of word utterance, and the latter including cries, moans, sighs, music, percussions, and explosions.

Among all these possible means of transmitting intelligence from one to another, it will readily be seen that the three principal means of communicating thought and feeling made use of by man are: (1) *Articulate speech*, addressed to the sense of hearing; (2) *gestural;* and (3) *graphic expression*, presented to the sense of sight.

By gestural expression must be understood all positions and movements of the body or any of its members, including the countenance, and all noiseless signals such as are made use of in military or engineering operations, on the sea, on roads, or on rivers; in short, all devices for communicating information through the eye of man, which are not in any manner recorded or made permanent.

Graphic expression will then include all forms of writing and printing, all productions in the fine arts, all marks of whatever character that are in any degree permanent, and are designed to communicate information or to express thought and feeling. And the range of this form of expression is wide enough to embrace at one extreme the Duomo of Milan, or Milton's noblest poem, and at the other the cattle brand of a Texan cowboy, or the blaze of a backwoodsman's axe in the primeval forest.

In determining the value of gestural expression to the deaf, it is necessary to keep constantly before the mind the fact that, where hearing does not exist, no mental impressions can be received through the means of articulate speech. In other words, that he who would communicate with the deaf is limited to gestural and graphic means. Even in cases in which a deaf person retains the power of speech, or is taught to speak and to understand the speech of others by watching the motion of the lips, such motions are to him nothing other than a certain form of gestural expression. The peculiar element of sound, the perception and understanding of which enable a hearing person to comprehend speech *without* seeing the vocal organs of the speaker, is wholly wanting to the deaf. And so essential is the possession of hearing to the free use and enjoyment of articulate speech as a means of communication from man to man, that to the deaf this can be no more, at its very best, than what an artificial leg is to one who would walk, or run, or dance. Serviceable, no doubt; far better than no leg at all, but never an equivalent for the missing member.

Have the deaf, then, no means of expression that can be as free and as perfect as speech is to their more favored brethren?

A distinguished scientist and philanthropist, justly honored and respected in the city of his adoption (Wash-

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ington, D. C.), who has long been interested in the education of deaf-mutes, but who has had little experience in teaching them, has said before one of the learned societies of Washington:

"Nature has been kind to the deaf child; man, cruel. Nature has inflicted upon the deaf child but one defect, imperfect hearing; man's neglect has made him dumb and forced him to invent a language which has separated him from the hearing world." "Let us then," says the learned writer, "remove the afflictions that we ourselves have caused." And after some eminently reasonable sugestions he adds: "And last, but not least, let us banish the sign language from our schools."

Nature has indeed been kind to the deaf child, in that she has left him capable of using as freely as his hearing brother the gestural and the graphic means of communicating thought; in that she has made it natural and easy for him to employ a method of expression in the use of which he is at no disadvantage as compared with his hearing brother, and which is beyond all dispute the *only* means of communication which can be to the deaf what speech is to the hearing as a vehicle of thought. And this "language of action," which philologists agree is the foundation of all human intercommunication, which is the acknowledged vernacular of the deaf, the distinguished theorist, and not a few others with him, would "banish from our schools." Of such an act of "kindness" proposed by certain teachers of the deaf on both sides of the Atlantic, one of the most eminent and successful oral teachers of deaf-mutes in Germany says: "If this system were put into execution, the moral life, the intellectual development of the deaf and dumb would be inhumanly hampered."

The founder of deaf-mute instruction in America, who is to be ranked among the most successful teachers of the deaf in the world, says in an article on "The Natural Language of Signs," written some years after he had completed his work for the deaf, and when he had had time to review his methods with calmness:

"My object is to show the intrinsic value and, indeed, indispensable necessity of the use of natural signs in the education of the deaf and dumb. . . . In attempting this, I wish I had time to go somewhat at length into the genius of this natural language of signs; to compare it with merely oral language, and to show, as I think I could, its decided superiority over the latter, so far as respects its peculiar adaptation to the mind of childhood and early youth.

"In what relates to the expression of passion and emotion, and of all the finer and stronger sentiments of the heart, this language is eminently appropriate and copious.

"So far as objects, motions, or actions addressed to the senses are concerned, this language, in its improved state, is superior in its accuracy and force of delineation to that in which words spelt on the fingers, spoken, written, or printed are employed."

This claim of the superior accuracy and precision of sign language, as compared with words, may perhaps excite surprise at first thought. But it is believed that its reasonableness will appear when it is remembered that the meanings attached to words are almost wholly arbitrary, very few giving the slightest hint of their signification in their shape or sound; while nearly every gesture used in sign language carries with it a plain suggestion of its meaning, and in very many instances gives a vivid and easily recognized portrayal of the idea to be conveyed.

Since experience has proved that sign language is natural to the deaf, that it is acquired and made use of by them more easily than speech is by the hearing, that it furnishes a full and adequate means for communicating thought and feeling, often surpassing speech in vividness and exactness, it is not strange that teachers of the largest experience and broadest view unite in approving its use in the education of the deaf.

At this point the question will naturally arise in many minds: "Does the sign language give the deaf in these respects *all* that speech affords to the hearing?"

The experience and observation of the writer lead him to answer the question with a decided affirmative. On many occasions it has been his privilege to interpret through signs to the deaf, addresses given in speech; he has addressed assemblages of deaf persons many times using signs for the original expression of thought; he has seen hundreds of lectures and public debates given originally in signs; he has seen conventions of deaf-mutes in which no word was spoken, and yet all the forms of parliamentary proceedings were observed, and the most excited and earnest discussions carried on; he has seen the ordinances of religion administered, and the full services of the church carried on in signs; and all this with the assurance growing out of his own complete understanding of the language, a knowledge of which dates back to his earliest childhood, that for all the purposes above enumerated gestural expression is in no respect inferior, and is in many respects superior, to articulate speech as a means of communicating ideas.

But the greatest value of the sign language to the deaf, when the whole period of their lives is taken into account, is to be found in the facility it affords for free and unconstrained social intercourse. And in this, as in the matter of public addresses, nothing has been discovered that *can* fully take its place.

Graduates of schools, from which the attempt has been made to "banish signs," have repeatedly testified that they could in no way attain to such pleasure in social intercourse as through the use of sign language, ability to employ which they readily acquire by mingling with those more favored deaf-mutes who have become familiar with it earlier in life.

"But," say those who urge that the use of signs is an injury to the deaf, "they can use that language only with their fellow-unfortunates, or with the very few others who learn it for their sake, and their use of signs tends to make them clannish, thus narrowing the sphere of their lives, and leading them to employ in excess a language other than the vernacular of their country."

It is admitted that, in the education of the deaf, injudicious teachers may allow, or even encourage, too free a use of the sign language in the schools,—that such teachers may suffer their pupils to go out from under their influence without being impressed with the importance of making special and persistent efforts to overcome the *tendency* to clannishness which is natural to the deaf, no matter what method of instruction is employed.

It is not disputed that in teaching the deaf, signs may be so employed as to affect unfavorably the acquisition by the pupil of verbal language, whether in its written or spoken forms.

But nothing is more certain, as proven by the experience of nearly three-fourths of a century in this country, than that the unfavorable results which some have charged upon the use of the sign language, are attributable in all cases to its *abuse* by injudicious, incompetent, or inexperienced teachers. Since 1817, when the first permanent school for deaf-mutes in this country was established, more than forty thousand children have been educated in a hundred schools now in successful operation, in all of which the sign language has been made use of. A majority of these persons are living to-day, and some of them may be found in every city, probably in every county of the land.

Among these, thousands could be named who, while associating freely with their fellow deaf-mutes, and deriving both profit and pleasure from such association, mingle readily with persons who hear; who are not clannish to any degree that would subject them to just criticism; who use the vernacular of the country with freedom and reasonable accuracy; who maintain themselves reputably and comfortably by their own labor; who are, in short, good and intelligent citizens, adding strength, wealth, and character to the communities in which they reside.

II. THE COMBINED SYSTEM OF INSTRUCTING DEAF-MUTES.—It is a matter of singular coincidence that schools for the deaf should have been first established in the three leading nations of Europe at about the same

period, and as the result of entirely independent effort. This occurred very near the middle of the last century.

The Abbé de l'Épée inaugurated in France what will be presently described as the manual method. Samuel Heinicke was the founder in Germany, as Thomas Braidwood was in Great Britain, of the oral method.

The promoters of these two methods were each earnest in urging the superiority of his own over the other, and for a full century the deaf-mute schools of the world were either manual or oral, with little thought in the mind of any one that there might be found a golden mean between the two extremes. Within the past twenty years, however, it has been proved possible, by many teachers of no little prominence in Europe and America, to appropriate the elements of greatest value in the two methods so long in conflict, and to secure, under what has been termed the combined system, all that is of advantage in the education of the deaf.

With such favor have the claims of the combined system been received in this country that on December 1st last (1899), out of 57 public institutions existing in the United States, 45 were being conducted in accordance with this system, as against 7 oral and 5 manual schools. In the 45 combined schools there were 9,863 pupils; in the 7 oral schools 685 pupils, and in the 5 manual schools 212 pupils. During the last ten years the number of pupils in the public oral schools has diminished, while there has been an increase of 40 per cent. in the number of pupils in the public combined schools.

The principal considerations which commend this system may be presented in a few words.

The experience of a century and a half of practical instruction of the deaf has established no conclusion more clearly than that it is impossible to teach all deaf-mutes to speak. Some are found to be lacking more or less in mental capacity; some have only a weak and inefficient imitative faculty; with others an infirmity of vision is discovered; others again have little quickness of tactile perception. And it is far from being true, as the eminent scientist to whom reference has been made has affirmed, that "nature has inflicted upon the deaf child but one defect—imperfect hearing."

In former times these doubly or trebly defective children were summarily dismissed from oral schools, with the unjust and inhuman condemnation that they were imbeciles. And even at the present they are often quietly dropped from such schools under one pretext or another, because the oral teachers are perfectly well aware that they cannot be educated under their method.

The essential defect in the oral method is, then, that it practically rejects a large proportion of the deaf as incapable of education,—that it fails with those who stand in greatest need of a helping hand.

The radical deficiency of the manual method is that it makes no provision for imparting the extremely valuable accomplishments of articulation and lip-reading to the large percentage of the deaf that is certainly capable of acquiring these great gifts.

The doors of the combined-system schools are wide open to *all* the deaf—to the weaker as well as to those more richly endowed with capacity for improvement. In these schools no method or appliance is rejected that can be shown to be of practical help to any number, however small, of the great class of the deaf.

The achievement of imparting speech to one who has it not comes so near to being a miracle that one is dazzled by the brilliancy of the triumph, and is apt to feel that everything else in the education of the deaf must be subservient to this. Parents and friends of the deaf need to be placed on their guard against this grave error, and to be advised that those schools and systems best deserve their confidence and support that seek to give the broadest and most valuable education possible to *all* the deaf.

Within the past decade the educated deaf-mutes in Europe and America have been demanding the general adoption of a combined system in schools for their class. This attitude on their part is, perhaps, most noteworthy in Germany, for in that country the oral method has been practised almost exclusively since the establishment of the first school for deaf-mutes more than a century and a half ago.

A petition signed by more than eight hundred deaf-mutes, all graduates of oral schools, was presented to the Government, setting forth the insufficiency of the oral method in many cases, and praying that a combined system might be generally introduced.

Many conventions of educated deaf-mutes in Europe and America have adopted, unanimously, resolutions strongly approving the combined system, but the most notable of these gatherings was one in Paris in August, 1900. The French Government invited the deaf-mutes of the world, with their hearing friends and teachers, to join in a "congress for the study of questions of education and assistance of deaf-mutes." This invitation was accepted by about two hundred deaf-mutes and one hundred hearing persons. The deliberations of the congress were carried on in two sections, each adopting resolutions as to methods of instruction. The hearing section voted in favor of the pure oral method, with opposing votes from the Swedish, Danish, German, Swiss, and American delegates.

The section of deaf-mutes voted unanimously in favor of a combined system. A large majority of the leaders among these deaf-mutes had been educated in pure oral schools. Nearly all these men are personally known to the writer of this article, who attended the Paris congress.

These orally educated deaf-mutes are men of much more than ordinary intelligence, and their testimony as to the insufficiency of the method under which they were educated should be given the greatest possible weight.

Edward M. Gallaudet.

DEAFNESS.—As blindness is the result of an alteration in any of the media through which light is transmitted, so deafness is the result of an abnormal change in the condition of any of the media through which sound is conducted.

What deafness is may be best understood when we comprehend what hearing is. To understand the philosophy of hearing, the converse of which is deafness, it is necessary first to consider the organ, or the machinery, by means of which hearing is effected. The auditory apparatus, exclusive of the sensorium, presents a series of agencies for the reception, conduction, and perception of the sonorous vibrations, which agencies stand in such nice relation to each other that if the function performed by one be interrupted, the operation of the whole is at once suspended.

The auricle concentrates the sound waves and directs them to the external auditory canal which, by reason of its peculiar conformation and the contained air, serves both to intensify the force of the sound waves and to regulate their impact against the drumhead. The impulsion thus received is conveyed to the foot plate of the stirrup (in the oval window) through the intervening ossicula auditus which span the cavum tympani. This impression, transmitted now to the labyrinth, operates in turn upon the labyrinthine fluid which delivers the oscillation to the expansion of the auditory nerve in the cochlea. Thus, we discover that the organ of hearing consists of an apparatus for the reception or collection of sound waves, another for their conduction, and a third which determines their final disposition, constituting the natural divisions of an *external*, a *middle*, and an *internal* ear.

Deafness, then, may be defined to be an interference with the auditory function in any of the three parts which are essential to its performance. The interference may lie at the periphery, or it may exist centrally. It may be consequent upon mechanical obstruction or referable to pathological changes.

An essential condition to normal hearing, and the one most liable to derangement, is a vibratile drumhead. This presupposes an unobstructed external canal and a pervious Eustachian tube, as an equal pressure of air on both sides of the membrane and an unaltered structure are indispensable to its vibratory function.