muscular exercise. The former produces exhaustion and possible permanent harm; the latter may weary the child mentally if continued too long; but the symptoms of this are obvious to the teacher, and no permanent damage is done. Sewing should certainly be abolished as an item of the infant curriculum. Most of the teaching should be done by means of objects, figures, and letters which are large in size, and placed at a distance from the pupils. All writing and drawing by the pupils should be on a large scale, and consequently any ruled paper which is used should be as widely spaced as possible. Further, I would deprecate the use of small multi-coloured squares of cardboard, with which I have seen children building up patterns, to merely look at which caused discomfort in the eyes. I am confident that good might be done by the institution of competitive games, which would involve the use of the eyes for distances of 20 ft. and over. Objects or pictures could be momentarily displayed to a class, then descriptions asked of what was seen. The complexity of the picture or object would vary according to the ages and progress of the children, also the time of exposure. On such a principle a great variety of games might be arranged and an improvement in two most important attributes—namely, sharpness of distant vision and quickness of observation—would result, which would amply justify the trouble involved.

So much for trying to counteract the visual disability of poorer city children in so far as it results from their habitual limited range of vision. The other causal factor which is suggested by my observations is the general nutrition of the child. This must be largely dependent on the atmosphere in which the child lives and the nature of the food which he receives. Most teachers of experience are decided in the opinion that it is not the amount of food received by the children of the poor which is so much at fault as the nature of it. The same money might be spent so much more judiciously.

I do not wish to deal with the administrative question of how to feed the necessitous poor school children, but I would like to record an observation of the apparent effect of feeding on vision.

There are two kinds of industrial schools in Glasgow. The one is the day industrial school, which is situated in a central part of the city and to which the children go in the mornings from their own homes, and remain till the evenings, receiving their three meals in school. The other is the residential industrial school, which is situated in the country. All these industrial school children are well and amply fed, and they are drawn from the poorest social stratum. I examined them in the same way as I did the Board School children, and compared the results. I found that while defective eyesight due to physical causes was very common, defective eyesight for which no physical cause could be found—that which I have referred to as functional defect, and which I have found so markedly associated with residence in crowded and poor districts—was much less common in the industrial than in the poorer city schools. This result is all the more striking in that every industrial school child has come from a poverty-stricken home, but in even the poorest Board school there is a proportion of well-fed children. Surely it cannot be doubted that the good feeding of the industrial school child and his visual superiority over his social brother fed at home stand in the relationship of cause and effect.

In conclusion, let me recapitulate. The poorer city school children are liable to have functionally defective eyesight—that is, a defect of sight which is not due to any physical abnormality of the eyes, but seems to be due partly to want of training and partly to malnutrition. The effect of the want of training might be, to some extent at least, neutralized by certain modifications of the infant department curriculum at school, notably by abolishing sewing and all forms of work which require close poring over, and by instituting suitable visual exercise games. The effect of malnutrition might be combated by proper feeding during school life, as I have found it to be in the industrial schools which I investigated.

THE French Minister of Public Instruction has accorded to Miss Alice H. Brunton, the daughter of Sir Lauder Brunton, the diploma of Officier de l'Instruction Publique, in recognition of her services to the recent Second International Congress on Hygiene.

SYNERGIC MOVEMENTS OF THE EYELIDS AND MOUTH.

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THE accompanying illustration shows the ordinary appearance of a case of congenital ptosis with epicanthus. The breadth between the inner canthi of the two eyes is very marked, and the flattening of the bridge of the nose is conspicuous. The child is 9 months old, and when the photograph was taken her attention was attracted by some means. In trying to raise her eyelids her mouth is opened, and it shuts again as soon as she gives up attempting to use the eyes.

Such cases of mouth and eyes acting in unison are very common, especially in children who have some difficulty in opening the eyes, either from congenital disease or from acquired conditions, such as photophobia. Some years ago I recorded a similar case,¹ and other allied ones show that under certain circumstances there are associated movements of the ocular and oral muscles. This association is no mere pathological curiosity of rare occurrence, for it is to be seen in the ordinary expression of the emotion of surprise by gaping, although it is not, I think, associated with yawning.*

But associated action of eyes and mouth are not confined to the expression of surprise alone, for any

exaggerated attempt to open the eyes would seem to be accompanied by an opening of the mouth. This is frequently observed by surgeons in children suffering from photophobia, who commonly open their mouths in straining to open the eyes. The tendency of mouth and eyes to open together may be readily tested by putting a finger between one's own teeth and gripping it firmly. If the eyes are now widely opened a relaxation of the grip will be experienced. Or if the mouth be slightly opened and then the eyelids are opened to their widest extent, we shall see if we look in a mirror that there is an inclination for the mouth to open still wider.

This association of eyelids and mouth is recognized in the post-operative treatment of cataract, when it is usual for some days not to allow patients food which requires biting.

The tendency for mouth and eyes to act together may be tested conversely to find out whether closing the eyes is associated with closing the mouth. Again, on putting the

* The distinction between gaping and yawning would seem to be that the latter is accompanied by a deep inspiration, and is usually a sign of fatigue, either mental or physical. The drooping jaw of fright is probably a form of temporary paresis akin to relaxation of the sphincters under similar circumstances. A gape is defined in Murray's dictionary as an "open-mouthed stare"; and to gape is to "stare at with open mouth, to gaze upon in curiosity or wonder." Dryden has the same idea in "Cymon and Iphigenia":

"The fool of Nature stood with stupid eyes,
And gaping mouth that testified surprise."

Darwin, in the *Expression of Emotions* (p. 278, 1872 edition), says: "Attention is shown by the eyebrows being slightly raised; and as this state increases into surprise they are raised to a much greater extent, with the eyes and mouth widely open. The raising of the eyebrows is necessary in order that the eyes should be opened quickly and widely; and this movement produces transverse wrinkles across the forehead."

finger between the teeth, or partially opening the mouth we find, I think, a decided tendency in the direction of closure of the mouth when the eyes are firmly shut. If, again, the eyes are tightly closed when the fingers are placed over the masseters we shall feel these muscles contract, and there is at the same time a tendency for the angles of the mouth to rise. If the eyes are kept closely shut by placing the fingers firmly on the lids, and then an attempt is made to open them against the resistance, we shall find that there is a tendency in the direction of relaxation of the closing muscles of the mouth.

The muscles of expression would seem to be the ones which are most easily put into action, and associated movements of them are common in other directions, especially in the young and in the inexperienced, who have not yet gained full control (and perhaps never may) of their muscles. The grimaces of the novice at billiards, less frequently seen in the professional player; the working of her face in unison with her scissors by the apprentice, seldom seen in the deft action of the dressmaker; the extruded tongue of the schoolboy learning to write; the facial contortions of the page-boy attempting to insert a corkscrew, or to draw a cork, are cases in point. Ordinarily, as the neophyte gets more experienced and reaches a higher stage of development he gains more control over his muscles and uses them more purposefully.

The developmental side of the question is gone into in a very able paper in the *Transactions of the Ophthalmological Society*, p. 356, vol. xxiii, by Mr. Bishop Harman, and the clinical appearances lend support to his theories.

In children we should expect to find atavistic evidences of ancestral habits more commonly than in adults, and we have Darwin's authority for saying that the young show less signs of modification, and that they more resemble ancestral types than adults.² It is probable that the grimaces which are so characteristic of the quadrumana and of the lower races of bipeds are the result of a less highly developed specialisation of muscular action.

In the majority of cases of associated movements of the eyes and mouth which have been published, the patients have been children or young people. What becomes of them in later life? In Sinclair's cases the ages were 18, 17, "a child," 3, 7, 34, and 22; Eales's 19, Browning's 46, Phillips's 3 and 7, Pflüger's 18, Parkes's 9, Nettleship's (two) 6, MacLehose's 10 and 4, Bull's 16, Hubbell's 7, Friedenwald's 11 and 17, Fuchs's 29 and 45, Snell's 17, Gunn's 15, and Miller's 9. That is, of 26 cases only 4 were over 22 years of age, and one of these (Fuchs's), a syphilitic man, aged 45, was cured by treatment, and probably does not belong to the class we are considering. The juvenility would seem to suggest that associated movements tend to disappear as development progresses. This is to be expected, for, as Darwin tells us,³ "the embryo in the course of development generally rises in organization."

If in these cases there were an abnormal innervation we should expect that innervation to be lifelong, and the consequent associated movements lifelong. In one of Kraus's patients,⁴ who was watched for several years, the movements of the eyelids became less vigorous, and in another patient they ceased altogether; but Blok records a case in which the symptoms became more marked.

In my first case an operation for the ptosis cured the mouth-opening, but in none of the levator palpebrae and pterygoid group, which are probably not on all-fours, does an operation for the drooping lid appear to have been done.

We do not find that the same muscles are associated in all these anomalous movements of the eyelids and mouth. In some the openers of the eyes act with the openers of the mouth; in others the levator of the lid acts with the external pterygoid in lateral movements of the jaw in grinding, or the same muscle may be associated with the act of swallowing. Gunn, to whom we are indebted for first calling attention to these curious anomalies, records⁵ a case in which the eyelid nearly went up out of sight when the child sucked, and in Blok's case, quoted by Sinclair,⁶ when the cheeks were blown out—that is, almost the opposite action—the same effect on the lid was produced.

In other cases associated actions of the eyes alone have been observed, such as movement of the eye inwards, with contraction of the orbicularis and retraction of the globe; and, to go further afield, in Debove's case,⁷ in which the patient suffered from paralysis of the facial nerve as the result of a kick, he could only speak by shutting the

eyes, and the angles of the mouth rose when the eyes were energetically closed.

The association of winking with movements of the cheek, the angle of the mouth, and the wing of the nose has been referred to by Mr. Bishop Harman.⁸

The intimate connexion of the oculo-facial muscles with the elevators and depressors of the mouth has been noticed by anatomists, and the fact that there are exceptionally associated actions in muscles that do not normally act together is not surprising. Exceptions and variations from the standard may be either the starting-point for new developments in the evolution of the species, or they may be vestigial reminders of an ancestral function long since lost in the upward struggle; and whether we accept Mendel's view that the frontalis and the orbicularis palpebrarum are "eye muscles" and supplied from the oculo-motor nucleus, or whether we reject it, seems of little importance in the elucidation of abnormal associated actions. Whatever the nerve supply of the ocular and facial muscles, their fibres and their functions are so blended that exceptional co-ordination and association are to be expected. And when we have a ptosis as a starting-point it is not surprising to find that the excessive synergy, developed in trying to raise the lid, overflows in the direction of muscles which possibly in the early days of the species acted in association. Cases of associated movement have been cured by an operation to relieve the ptosis. It is not clear how this cure is effected, if we accept Mendel's hypothesis, but if the explanation of the associated movements is that it is due to an excess of impulsion, it is probable that when the excess is no longer called for there will be no overflow to cause an abnormal action. The ordinary normal associated movements of the eyes one with the other are regulated by the centres for associated movements in the cerebral cortex, and it may be that the associated movements of the eyes and mouth, which are now occasionally met with, but which in ancestral days may have been essential, were likewise governed in a similar way. In primæval types the animal probably watched its prey intently previous to springing upon it with open mouth. Palgrave says, "I gape as a beast dothe that intendeth to byte, which holdeth his mouthe open afore."

It is not easy, even if it be possible, for a person to shut the eyes energetically without some tendency to raise the angles of the mouth, although the facial movements vary very much with personal idiosyncrasies, and most facial movements when excessive are assisted by other muscles temporarily acting as accessories. Occasionally, too, we meet with people who have the faculty of moving the scalp, and less frequently others who have the faculty of moving the ears—both are vestigial reminders of our simian brotherhood, atavistic evidences of a musculature once useful but now out of date.

Although it is difficult to understand why, for instance, movements of the upper lids should be associated with movements of the horizontal recti muscles of the eyes in an apparently purposeless partnership, yet the conclusion I would draw is that associated movements of the eyes with the mouth are normal. And if from any congenital or pathological condition, such as ptosis, an increased stimulation is called for, there is a tendency, especially in children, to generate an excess of nervous energy in order to open the eyes. The discharge, owing to the lessened insulating power of childhood, overflows in the direction of muscles which in bygone ages were commonly associated; that is, into channels (nerves) which subserve the purpose of producing the epiphenomenon of opening the mouth.

These freak-like and apparently purposeless associated movements of all sorts are reminders of our antique, though humble, ancestry; mere echoes ringing down the files of time.

REFERENCES.

- ¹ *Lancet*, 1893, vol. i. ² *Origin of Species*, 1876 edition, p. 386. ³ *Ibid.*, p. 389. ⁴ *Ophthalmic Review*, vol. xiii, p. 309. ⁵ *Trans. Ophth. Soc.*, vol. iii, p. 283. ⁶ *Ophthalmic Review*, vol. xiv, p. 308. ⁷ *Arch. of Ophth.*, vol. xxi, p. 577. ⁸ *Trans. Ophth. Soc.*, vol. xxiv, p. 319.

A BRONZE replica of the marble bust of the late Mr. Henry Lee, F.R.C.S., executed by Mr. Thomas Brock, R.A., has been presented by his widow to St. George's Hospital, with which institution Mr. Lee was for many years intimately connected.