instances, proved unavailing, it becomes an imperative duty to endeavour to remove that opprobrium which this epidemic has affixed to the science of medicine.

ART. III.—*Observations on the separate and combined Actions of the Orbicularis Palpebrarum.* By EDWARD HOCKEN, M. D., M. R. C. S. L.

DIFFERENT observers, at different periods, in the extensive field of physiology, have taken different views regarding the action of the orbicularis palpebrarum, as also of the other muscles of the eye and its appendages: one party assert its strictly voluntary action, and again, another as loudly claim for it the title of a sphincter. The author will endeavour to show that its single and combined actions are peculiar, and that it may or may not be linked by unity of effort with other muscles or sets of muscles, according to the condition of the lids and the state of the feelings or emotions. Every muscle in the body possesses its proper antagonist, which it either controls, modifies, or limits in its sphere and manner of action; in the instance before us, the levator palpebræ holds this relation to the orbicularis. These two muscles possess an alternate and peculiar action: the relaxation of one is invariably, during health, followed by the contraction of the other; which seems to be voluntary, or nearly so, as we are always conscious of the act. I will now mention the exceptions. There is a medium at which the lids are uninfluenced by other muscles, in which they hold a relation to each other occasioned by the mere influence of gravity; in this state, the upper lids fall over the globe in its upper two-thirds, covering the front of the cornea, and hiding the iris, so that nothing but the conjunctiva, and subjacent tunica albuginea, “the white of the eye,” are visible, constituting the lower third. The opportunities of seeing this absence of contraction in either muscle are comparatively few; some people during sleep thus expose their eyes, but this is rare. When, however, the

influence of the brain is removed by disease or death, we learn the fact I am now endeavouring to prove. Those who have carefully observed the dead body, cannot fail to have remarked the relation which the upper and the lower lids hold to one another in and after death, whilst the eyeball is slightly rotated upwards and outwards; and again, we see the same condition in some severe cases of concussion or compression; or where from cold, or other causes, the orbicularis palpebrarum is paralyzed, and the patient is rendered incapable of closing the eye.

As it is clear, that the eyelids only assume this partly closed condition by mere unaided gravity, it will be obvious that something more is required to close these organs completely, and we find, in truth, that such is the case. But here the questions arise—how is this ulterior action effected? and by what powers are the lids retained closed, during sleep, and under other circumstances? The closure of the lid is a voluntary act, preceded by relaxation of the levator palpebræ, and attended by a corresponding contraction of the inferior oblique muscle of the orbit; hence as we close the eyelid, so in proportion is the eyeball rotated obliquely upwards, and inwards, and finally upwards and outwards. If the fingers be gently pressed on the globe whilst the lid is being closed, and after it is closed firmly, we may feel those movements, and convince ourselves of their reality; but a more convincing proof is found where the globe is affected with staphyloma, under which condition the motions of the eyeball can be followed by the eye of the observer, and the touch clearly detects the oblique position of the cornea, directed obliquely upwards and outwards, when the lids are fully closed. Whilst the lids are closed the eyeball continues to hold the same relation, as the observation of a good case of staphyloma clearly shows, and the sleeping eye, where the lids are quickly separated, shows the same fact: taking the eye of a sleeping infant as an illustration, if we gently but quickly separate the eyelids, we invariably find the eyeball thus obliquely rotated. The advantage of this combined action in

winking (suddenly contracting the orbicularis palpebrarum and then suddenly relaxing it) is quite obvious, to wipe the front of the globe, and uniformly diffuse the moisture destined to supply that organ ; but the advantage of retaining the globe in its oblique and protected situation, during closure of the lid, is quite as useful although not at first sight so apparent, it is to insure the complete exclusion of light during sleep, &c., and thus greatly to aid the operation of the imperfectly translucent curtain—the lid.

The closure of the eyelids is voluntary, since we are always conscious of the act, and if we attend to our sensations during its closure, we may become conscious of a preparatory relaxation of the levator, and a gradual contraction of the orbicularis, whilst the eyeball itself undergoes those movements which contraction of the inferior oblique originates. The power by which the eyelids are maintained closed, after a voluntary effort has closed them, is exactly the same in nature as that by which the eyeball is maintained in its raised and everted position, after it has been rotated upwards and outwards by the inferior oblique. Little or no force seems to be exerted in maintaining this position of the globe and lids, little, in fact, beyond mere tenacity ; since, where the lids are not maintained in contact by a voluntary effort, or by involuntary spasm, as during quiet sleep, little or no force is required to raise and separate them, the eyeball still maintaining its direction. When the levator palpebræ is voluntarily contracted, the orbicularis undergoes relaxation, and the lid is raised, whilst the oblique is also relaxed, and the eyeball assumes its straight position.

The orbicularis and levator show their antagonism of action as muscles of expression ; the raised lid, the protruded eye, the partially closed lids, and contracted brow, are each of them intimately connected in action with other muscles, and sets of muscles which manifest similar passions, feelings or emotions. But it is not my intention to enter on these points at present, and in this place.

I have stated, that during quiet sleep, little comparative force is exerted in maintaining the lids in a state of apposition, for we find that, to a certain extent, they can be separated without any apparent opposition, until the impression on the trifacial induces a reflex action through the seventh, and the consequent involuntary closure of the orbicularis. It is evident, that this is a condition for maintaining the organ in a state of tranquillity, and protecting it from the influence of light, co-operating with the position of the globe in this particular.

When the whole muscle is put in action to close the lid, it is a voluntary effort, and not the mere involuntary contraction of a sphincter; whilst, however, the levator remains relaxed, and the eyelids closed, its continuous effort, if any such exists, is evidently a sphincter-like condition, although it differs not from the continuous and combined efforts of the inferior oblique, which, although continuous and involuntary, no one would call that of a sphincter. But there are a few fibres of this muscle spread over the front of the tarsal cartilages, to which the title of "*ciliaris*" is applied, and which are capable of an independent action. We see them used, or, in fact, only one, to give a slight but meaning movement to the tarsus, a wink of doubt or slyness, or on the approach of any foreign body near the eye, which may or may not extend so as to affect the other portions of the muscle.

Painful impressions on the retina, as the influence of powerful light, occasions a spasmodic closure of the orbicularis, especially when the retina is morbidly irritable, as in strumous ophthalmia, retinitis or hysterical amaurosis: impressions on the conjunctiva produce similar effects; the introduction of small bodies under the lids is followed, as is too well known, by most painful photophobia and blepharospasmus, and the propagation of irritation to the schneiderian membrane, producing sneezing in strumous ophthalmia, shows that the conjunctiva takes no important part in occasioning the excessive intolerance of light, and spasmodic closure of the lids.

When from any cause the retina is insensible, we learn how much is dependent on the reflex action alone; for, under these circumstances, the finger may approach the organ to within the smallest possible distance, without actual contact, and still occasion no movement in the lids at all; but if now the lid be touched, or the cilia disturbed, then the lids are immediately closed, distinctly showing the excito-motory function of this muscle. When, however, the retina retains its sensibility, the approach of the finger, as I have before remarked, occasions a sudden contraction and relaxation of the orbicularis palpebrarum, which is a valuable test in feigned blindness, and should by no means be overlooked among the diagnostic points.

This muscle is extremely subject to involuntary spasmodic action, and in individuals whose bealths are deranged, or who suffer from excitability of the general nervous system, nothing is more common than a troublesome and frequent winking of the eyelids of one or both eyes. But we see a still more unpleasant and annoying affection which occasionally originates from deranged digestion, or some morbid condition of the primæ viæ, consisting in paroxysms of constant twitching and partial contractions, which constitutes what is termed "morbid metitation," an affection which, in general, readily yields to an active aperient.

The orbicularis palpebrarum is employed conjointly with the two orbital obliqui, and with the four recti muscles, among other changes effected to adopt the organs of vision for near and distant sight, and for the scrutiny of large, and also very minute objects. When the eyes are adapted for near-sight, being elongated by the conjoint action of the obliqui, besides other changes, the eyelids are partially closed, and this also is one of the actions employed when near-sighted persons endeavour to discern distant objects; with the recti conjointly it is employed, when the globe is retracted and flattened by their operation, and otherwise fitted for use on distant bodies; here, when the sight is strained to discern something ill-defined, the

brows are contracted, and the lids partially closed. These actions are combined moreover with another muscle, the “*corrugator supercilii*,” by which the brows are contracted, being drawn downwards and inwards towards the middle line. Besides the combined contractions of the orbicularis with the inferior oblique, for the purpose of diffusing moisture and wiping the eye ; and again, for thoroughly protecting the organ from light, they are employed when superabundant moisture exists, as in weeping, to bring the edges of the lids together to form that triangular canal, by which the tears are conveyed to the puncta lachrymalia, and thence through the lachrymal sac to the nose ; and in this operation the orbicularis cooperates with the tensor tarsi, which stretches over and compresses the sac. A little observation will readily convince us that the orbicularis and the levator palpebræ possess each of them a combined action, the first with the rectus inferior, and the second with the rectus superior: if we depress our eyes by the contraction of the inferior recti, or if we observe this action in others, we can in the first place feel, and in the second see, that in proportion as the eyeball is rotated downwards, so is the lid proportionately lowered by the contraction of the orbicularis palpebrarum, and that in like manner as the eyeball is rotated upwards by the contraction of the rectus superior, so is the lid elevated by the levator palpebræ.

Sphincters maintain a state of permanent and involuntary contraction* under all ordinary circumstances ; but when the functions of other parts of the economy require the relaxation of those apertures which they are destined to close, the efforts of expulsion originated under these circumstances are always attended by relaxation of the appropriate sphincter, which also occurs without any knowledge on the part of the individual, or any voluntary action whatever on the part of the muscles ; and

* Hunter remarks, that sphincter muscles remain always above three parts contracted.—Works, vol. iii. p. 154.

again, as soon as the effort of expulsion ceases, then the sphincter resumes its contraction, quite without any volition on the part of the person concerned. The efforts for closing the aperture are always appreciable, and afford considerable resistance to their dilatation, under all other circumstances than those mentioned, with the exception of the voluntary power, both of contraction and relaxation, which we possess over them. Hunter remarks, that they should be called muscles, with power of occasional relaxation. In these particulars, the orbicularis palpebrarum presents many striking differences from ordinary sphincters, relaxation being the ordinary, and contraction the occasional condition of this muscle; besides, its closure is not involuntary, and when closed, little, if any active power of contraction is exerted to maintain the eyelids in apposition, although the excito-motory function presides over this aperture, as it does over the other orifices of the body. It also always cooperates with another muscle, during closure of the lids, the inferior oblique, in protecting the eye from the influence of light, a muscle which seems to possess a function peculiar, but similar in this respect to the orbicularis; whilst it (the orbicularis) also possesses a distinct antagonist similar to the strictly voluntary muscles; although it is fair to consider, that as the sphincters placed on the middle line of the body, were originally composed of two separate halves, that each half is the proper antagonist to its fellow portion, whilst other muscles antagonize them in function; thus the muscular fibres of the rectum, antagonize the sphincter ani, the passive condition of one corresponding to the active contraction of the other, as is the case in the instance of the orbicularis palpebrarum and the levator palpebræ.

Mr. Hunter's observations tend to confirm my opinions of the peculiar actions of the orbicularis. He remarks,* that although many circular muscles may not have the mixed contraction of sphincters, as the orbicularis palpebrarum, yet that

* Works by Palmer, vol. iii. p. 147.

muscle has a disposition to contract peculiar to itself. Its relaxation is to be reckoned of the active kind, which may be called the relaxation of watchfulness; and it is, when tired of this species of action, that it contracts, which, on the contrary, may be called the contraction of sleep; or it may be considered as an elongator muscle to the levator palpebræ, with a disposition to remain relaxed while that muscle is contracted, but contracting when the elevator is tired. The natural contraction of the orbicularis muscle is involuntary, the relaxation, both natural and occasional, is involuntary, but it has likewise a voluntary contraction and relaxation, which can be made to exceed the involuntary, resembling what is inherent in all the sphincters. To the remarks of John Hunter, Mr. Palmer, in his edition, has appended a note, stating that he sees no reason for supposing that the orbicularis is different from the other sphincters, or that it has a disposition to contract peculiar to itself: it is only peculiar in being antagonized by the levator palpebrarum, which is a common voluntary muscle. On this point I have already fully expressed my opinion, and I trust proved the peculiar action it certainly possesses, both as a simple and combined effort, agreeing with John Hunter as to its peculiar disposition, although not in the details of its peculiarity.

A good article on this subject will be found in the Dublin Medical Journal, by Mr. Gabriel Stokes,* who clearly proves that the closure of the eyelids is not a merely passive condition from relaxation of the levator palpebræ, as taught by Bichat, but that muscular agency is employed in its accomplishment. An interesting case is there narrated of paralysis of the portio dura occasioning lagophthalmos, in which, as in similar cases, by no means so very uncommon, the upper eyelid assumes that position in which the force of gravity, unaided by muscular effort, would place it, and which I have already remarked. With Sir

* Vol. xviii. p. 70, No. for Sept. 1840.

C. Bell he remarks, that during sleep the eyeball is turned up, whilst the affected eye remains open ; in fact, the lower third of the eyeball is exposed in these cases by the dropping of the upper lid over the two upper thirds, and the white of the eye alone shows from the more or less complete action of the inferior oblique. Mr. Stokes considers the muscle as a true sphincter for the reasons that it presents all the anatomical and physiological characters peculiar to such muscles, viz., a mixed function ; the voluntary power being employed during a state of wakefulness, the involuntary during sleep ; regarding the orbicular and palpebral portions as but one muscle possessed of a similar mixed function. In a former part of this paper, I have given my own opinions on this subject, and my reasons for adopting them, and therefore need only remark that, if correct, my views tend to prove that there is much truth and some inaccuracy in these statements.

ART. IV.—*Observations on Adhesions and Strictures in the Vagina, existing during Pregnancy and Labour.* By RICHARD DOHERTY, M.D., Honorary Member and Secretary of the Dublin Obstetrical Society, &c.

[Read before that Society 7th December, 1841.]

MR. PRESIDENT AND GENTLEMEN,—The attention of this Society has been most usefully directed, on two or three occasions, to the consideration of the difficulties which attend labour, complicated with certain encroachments on the space through which the fœtus must pass during delivery. To Dr. Beatty we are indebted for many excellent practical remarks on a case, wherein the obstruction was caused by a fibrous growth, which, springing from the posterior wall of the uterus, descended into the cul de sac of the peritonæum, and projected into the vagina ; and we are under obligations to Dr. Dwyer for an able elucidation of an equally interesting example of that more common complication, morbid enlargement of the ovary. It is my in-