

Description of a small muscle at the internal commissure of the eyelids / by W.E. Horner.

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DESCRIPTION

OF A

SMALL MUSCLE

AT THE

INTERNAL COMMISSURE OF THE EYELIDS.

BY
KING'S COLLEGE HOSPITAL

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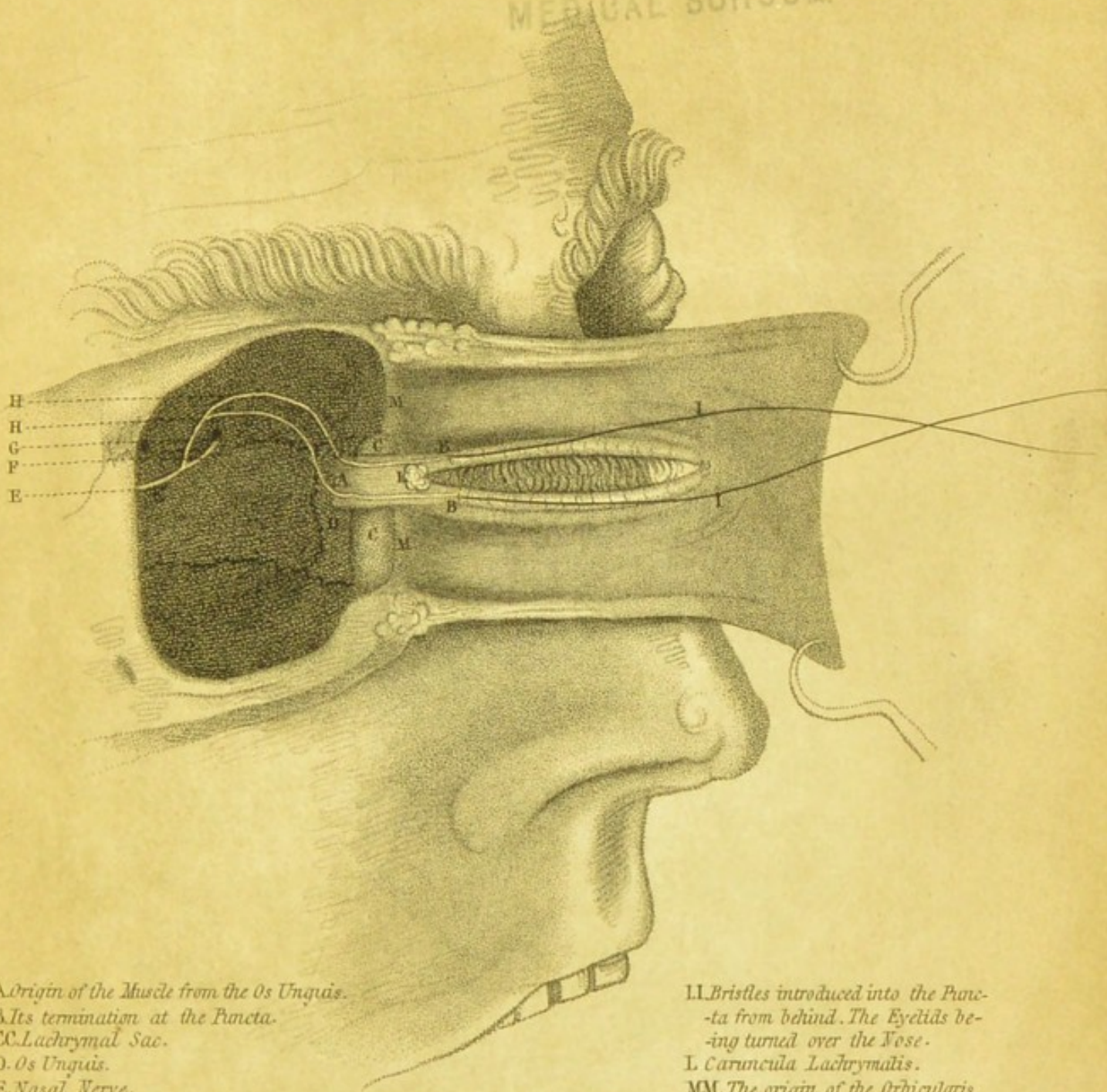
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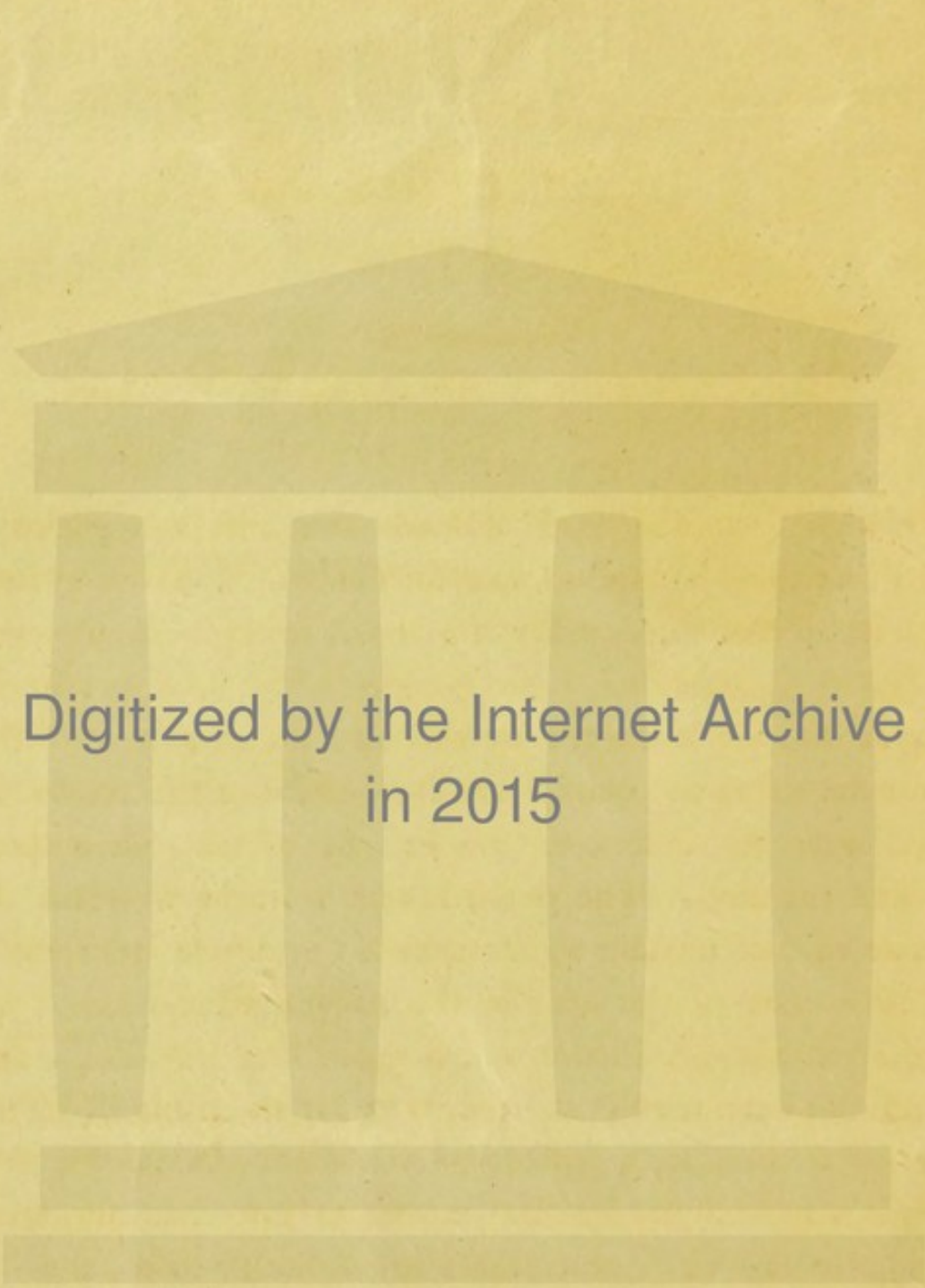
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A. Origin of the Muscle from the Os Unguis.
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DESCRIPTION, &c.

DURING the winter of 1821 and 1822, while engaged in the dissections connected with the Course on Anatomy, and having at that time under my hands several sheep's eyes, intended to illustrate some points in the structure of the human eye—it occurred to me, that the known apparatus for conducting the tears from the surface of the eye to the nose, was insufficient to account for all the phenomena of this function. The desideratum was, to ascertain the causes of the constant application of the puncta lachrymalia to the surface of the eye, in the several conditions of extreme corpulency, emaciation, sleeping and watching. My mind had been previously prepared for the inquiry, by observing in an elderly acquaintance, a continual running over of the tears at the internal corner of the eye, apparently owing to the internal commissure being so loose, that the puncta were in some measure averted from the balls of the eyes. I had also observed, that in a sudden fit of fainting,

which had come on the late Professor Wistar during his last illness, and while he was sitting upright, the lower lids of his eyes had fallen from their balls, so as to leave a very conspicuous interval between them. Impressed with these facts, and actuated by the impulse of the occasion, I first sought for a new apparatus in the orbits of the sheep's heads before me, and not being satisfied with what I saw in them, in a minute afterwards I laid open the orbit of a human subject, and forthwith had the pleasure of finding a small muscle, which from its position and connexions, seemed well adapted to supply the defect in the known mechanism of the lachrymal passages. This first dissection has been so frequently and invariably confirmed by my own observations, by those of my associates, among whom I name the very distinguished and indefatigable anatomist, the late Dr. Lawrance, and by the observations of very learned and skilful anatomists in Europe, that though from the beginning I had no doubt of the accuracy of my own perceptions, additional weight will accrue from such testimony.

The muscle alluded to, lies on the posterior face of the lachrymal ducts and sac. It is oblong, being in the adult about three lines broad and six lines long. It arises from the posterior superior part of the os unguis, just in advance of the vertical suture between the os planum and the os unguis. Running forwards for three lines it bifurcates. One bifurcation is inserted along the superior lachrymal duct, and terminates at its punctum or near it. The other bifurcation is inserted along the lower lachrymal duct, and terminates at its punctum also, or near it. The base of the caruncula lachrymalis is placed in the bifurcation. The superior and inferior margins of the muscle touch the corresponding fibres of the orbicularis palpebrarum, where this latter is

connected with the margin of the internal canthus of the orbit—but they may be very readily distinguished from the orbicularis, by their running straight forwards. The nasal face of this muscle adheres very closely to that portion of the lachrymal sac which it covers, and also to the lachrymal ducts. The lachrymal sac rises about a line above its superior margin, and is seen in the orbit to extend four lines beneath its inferior margin. The orbital face of the muscle is covered by a lamina of cellular membrane, and between this lamina and the ball of the eye are placed the valvula semilunaris, and a considerable quantity of adipose matter. The bifurcated extremities of the muscle as following the course of the ducts, are consequently covered by the tunica conjunctiva. If the muscle be examined with the eyelids in situ, it will be seen forming a curve, the concavity of which is orbital, and the convexity nasal. The most satisfactory view of it may be got by making a dissection corresponding with the plate, and the distinction between it and the orbicularis palpebrarum, will be manifested, by the body of this muscle arising at least three lines behind any acknowledged origin of the orbicularis, and in such a way, that the attentive observer will scarcely confound the two into one. The superior fork, however, of the muscle, has a few of its fibres blended with the ciliaris.

A compend of the foregoing description was published two years ago, which having attracted the attention of the Italian anatomists, a very interesting observation has been superadded by the learned Dr. Joseph Trasmondi, Professor of Practical Anatomy in the Hospital of Consolation at Rome. This gentleman, on seeing the account of the muscle in the Medical Observer of Naples for June 1823, immediately verified its existence in a female subject of

seventy years. Having further satisfied himself by repeated dissections, he proceeded to investigate the nerves of the muscle, and in a pamphlet, which I have had the honour of receiving from him, he gives the following account of his researches. "We have found in fact by dint of patient and repeated observations, that two nerves coming from the external nasal branch, derived from the ophthalmic nerve of the trigemini or fifth pair, supply the muscle of Horner."*

"It is known that the ophthalmic nerve gives off, first, the branch to the lachrymal gland—secondly, the frontal branch—thirdly, the nasal branch. It is also known that this last is subdivided, first, into the internal nasal branch, to be introduced through the anterior and internal orbital foramen, and to be thence diffused in the cavity of the nose—secondly, into the external nasal branch, which until now was, by many, and among others by Bichat, thought to be the only continuation of the nasal branch, prolonged into the internal parietes of the orbit. This writer, in giving a description of the above mentioned branch, says that it is a continuation of the principal branch, and is prolonged into the internal parietes of the orbit—but that having arrived

* This gentleman has by mistake called me Hermer in his pamphlets, published in the Italian language, and for the translation of which, I am indebted to the politeness of Dr. Jno. Bell of this city.

Intorno la scoperta di due nervi dell'Occhio Umano ragguaglio del Dr. Giuseppe Trasmondi, Professore di Anatomia Pratica nel Ven Ospedale della Consolazione. Roma 1823. Extracted from the Arcadica Journal, vol. XIX, p. 1, 1823.

Risposta del Dr. Giuseppe Trasmondi, Professore D'Anatomia, Pratica nel Ven Ospedale della Consolazione al sig. Professore Gaetano Flajani, intorno la scoperta del Muscolo D'Hermer e de 'Nuovi Due Nervi Dell'Occhio Umano. Roma 1823.

near and under the trochlea, it anastomoses with a filament of the frontal branch, and thence goes out from the orbit and is divided into several branches. The external of which are distributed, first, to the superior palpebra, where they meet the filaments of the frontal branch—secondly, to the inferior palpebra, where they are united to the suborbital filaments, and some of the facial—thirdly, to the lachrymal sac. The internal filaments are then spread, first, on the dorsum of the nose, where they sometimes anastomose with the subcutaneous filaments of the internal nasal branch, which pass from the interior to the exterior of the nose—secondly on the pyramidalis—thirdly, on the skin. If this most learned anatomist had had the slightest idea of the muscle of Horner, he would certainly have made more diligent researches, nor would the nerves belonging to this muscle have escaped his powerful mind.”

“It is now therefore evident from the ascertained facts, that the continuation of the external nasal branch, is not single, but that about six lines distant from the first division, there is a second one forming two ramifications. These are distributed to the cellular membrane, one under, and the other near the trochlearis muscle. From this point the upper one, after having anastomosed with a filament of the frontal branch, and after having given off all those small ramifications to the palpebræ, the dorsum of the nose, &c. turns away. Thence the inferior nerve, also taking its turn, they continue their course, during which they separate from each other, and are implanted into the muscle of Horner, to which they adhere by means of a cellular structure, and pass on to its extremities, and to the puncta lachrymalia, in such a manner that the ramification which had passed under the trochlea goes to the superior extremity, and the other to the inferior one.”

The existence of this muscle being fully established by observations which every anatomist can readily verify, it will be extremely useful to ascertain its agency on the motion of the eyelids, and its influence in conducting, or in assisting to conduct, the tears from the ball of the eye to the nose. It appears to me clear, from its origin and insertion, that its contraction in a moderate degree will tend to apply the puncta lachrymalia to the ball of the eye, and is therefore so far efficient in regulating the lachrymal passages, by keeping the puncta immersed in the tears that accumulate at the internal commissure of the eyelids. When the muscle contracts very forcibly, which it can be made to do by the action of volition in certain individuals, and of which I have seen two cases, one in a student of medicine and the other in a lady, it draws the eyelids towards the nose, and buries the puncta and the internal commissure under the fold of skin which is formed at the same time on the internal canthus of the orbit. I am indebted to Dr. Physick for a further suggestion in regard to its uses. He thinks that in cases of extreme emaciation, where the adipose matter around the ball of the eye is more or less absorbed, causing thereby the eye to sink deeper into the orbit, and consequently to retire somewhat from the lids, the effect of this muscle is to draw the eyelids backwards and to keep them applied on the ball.

Mr. Trasmondi has added so much to my own views of the subject, that I have great pleasure in quoting freely from his pamphlet. He says, that "we now understand how the lachrymal canals, being covered with moving fibres, may by a series of actions elongate—turn their extremities towards the eye—dilate—receive the tears—and then constrict and shorten themselves, so as to deposit them in the lachrymal sac." He also thinks that the compression exercised on the

lachrymal sac by the body of the muscle, may afterwards drive the tears into the nose.

The utility of this muscle being supplied by filaments from the ophthalmic nerve, Mr. Trasmondi thinks is thus manifested. A sympathetic connexion is thereby established between the lachrymal gland, the pituitary membrane, and the muscle. In proof of which, if a stimulus increase the secretion of the lachrymal gland, the action of the new muscle is augmented, by which the puncta, the canals, and the sac, quickly receive the separated fluid, and transmit it to the nasal duct. Or if any stimulus affect the pituitary membrane, similar phenomena occur in the rapid secretion and absorption of the tears.

Mr. Trasmondi, in his reflections on this subject, has thought it useful to inquire why the tears, having reached the lachrymal sac, remain there for some time before they are expelled. His conclusions are, that it depends upon the column of atmospheric air which is introduced through the naris into the lower part of the ductus ad nasum, and thus supports the column of tears above, according to a principle well known to the natural philosopher. That air is admitted into the lachrymal sac, under the common circumstances of respiration, he thinks proved by its issuing through the fistulous opening on the face, when one affected with fistula lachrymalis blows his nose. The disproportion between the cubic contents of the canals and the ductus ad nasum is so much in favour of the latter, that the principle is greatly assisted by the mechanism of the parts. Wherefore the tears, passing by small drops from the canals to the sac, will be sustained there till they are accumulated in sufficient abundance: they will then, assisted by the muscle of Horner, press down the column of air and be discharged into the nose.

B



In the ignorance of this muscle, anatomists have contrived many theories to account for the passing of the tears into the nose. M. Jourdan asserts that in a healthy state of the sac there is never an accumulation of tears in it, in consequence of the sac opening freely into the nose, by which the tears descend as fast into the nasal fossa as they are secreted. He considers it, therefore, perfectly unnecessary to admit of the existence of muscular fibres in the lachrymal sac, particularly as the most scrupulous dissection has not enabled him to find them. But if any fibres of the orbicularis are attached to the external coat of the lachrymal sac, from their being in front they would rather have a tendency to separate the anterior from the posterior part of the sac, than to obliterate its cavity, or to squeeze out its contents. It therefore results, that no other impulsive force than the tonicity of the parts determining the course of the tears, they descend by their own weight, and by adhering to the internal coat of the lachrymal sac. M. Jourdan, in another place, reasoning on this, after positively denying again the existence of muscular fibres on the sac, says: But how does it happen that the tears flowing into the lachrymal sac, (whose sides are of a very unyielding nature) continue to descend into it even when it is full, instead of running over on the cheek, and particularly as the lachrymal canals having but a small diameter, push the tears with but little force? This question is easily resolved by referring to the established laws of hydraulics. For in fact a liquid discharged into any cavity, by a pipe of a certain diameter, acts with the same force upon all the points of this cavity, whose diameters are equal to that of the pipe, in such manner that the force of impulsion is repeated or multiplied just the number of times that the surface of the cavity ex-

ceeds the diameter of the pipe. The tears, therefore, continue to flow from the canals into the sac, dilating it considerably at the same time.

Sabatier's mode of accounting for the passing of the tears into the nose is, that when they arrive near the puncta, they are easily introduced into them—but he is not certain whether this is done by the contraction of the orbicularis muscle, or whether the canals, whose extreme smallness allows us to consider them as capillary tubes, pump up the tears by a kind of absorption.

M. Boyer thinks that the lachrymal passages resemble a syphon, the sac being the long leg and the lachrymal ducts the short one, and that the tears are thus drawn from the surface of the eye. This theory might, perhaps, answer better if the body were always erect, for then we should have on our minds the idea of the long leg being constantly vertical, and of the preponderance of the fluid in it. But as we sometimes lie down, in which case, notwithstanding the principle of the syphon is destroyed, the tears do not overflow, it is therefore clear that M. Boyer is wrong.

M. Bichat says that the entire passage of the tears from the globe of the eye to the nasal cavity is effected through the influence of the vital properties, and not by that of the mechanism of inert fluids in syphons, as J. L. Petit and many others after him have asserted, in comparing the lachrymal canals, the sac and the duct to a syphon, the long branch of which is represented by the latter. He believes, on the contrary, that the absorption of the tears, which continual winking favours very much, occurs chiefly at the moment when the eyelids approach each other, and by turning their margins backwards, the puncta are applied to the sur-

face of the eye. This seems to be still more confirmed by the overflowing of the tears when we keep the eyelids open for some minutes. M. Bichat, also thinks it well ascertained that the tears continue in the lachrymal sac a certain time before they flow into the nose.

M. Portal, after asserting that no muscular fibres are to be found in the lachrymal passages, advances the same opinion with Bichat, in those words. The absorption of the tears occurring only as the effect of a certain sensibility, as in the lymphatic vessels and ducts destined to this use, it is not to be doubted that if they lose this sensibility, the passage of the tears will be diminished, interrupted and suppressed—as the absorption of the tears would be embarrassed, or would not proceed in a convenient manner if this sensibility should become too great. Wherefore it may be established as a rule, that if tonic lotions are occasionally indicated, the reverse also happens where relaxing and demulcent washes, anodynes, and preparations of opium are far better.

The English anatomists do not seem to have studied this point so fully as the Continental—several of them (among whom is named with some surprise Mr. Pott,) do not allude to it. Mr. Charles Bell, whose book is more read in this country, than the systems of any of his countrymen, introduces in a general way the opinions already advanced, but does not put much confidence in them. He has, indeed, approached much nearer to the true principle of the passing of the tears into the nose, (though he has not exactly hit upon the appropriate apparatus) by asserting that the connexions of the orbicularis muscle over the sac, is of a nature to accelerate the passage of the tears, and even perfectly to compress the sac.

Richter, the celebrated anatomist and surgeon, not succeeding in finding a muscular apparatus, still felt the importance of its existence. Not having his book to refer to, Mr. Trasmondi's pamphlet furnishes the appropriate quotations. "The puncta lachrymalia have doubtless the power of contracting and of closing themselves, and it is very evident that the puncta, as well as the lachrymal canals, when the palpebræ are closed, contract and become shorter, which cannot take place without muscular fibres." Again, "without muscular powers the lachrymal sac cannot transmit the tears accumulated in it on to the nose, consequently the lachrymal sac is without doubt furnished with muscular fibres."

It appears to me that none of the opinions here introduced, will account for all the phenomena attending the course of the tears into the nose. It is much more probable, that the act is accomplished through the influence of the muscle which I have attempted to describe, aided by the elasticity of the sac. The attachment of the muscle to the posterior face of the lachrymal sac is such, that it draws the posterior parietes of the sac away from the anterior parietes, and dilates the sac, thus tending to form a vacuum, particularly as the nasal face of the sac is fastened to the bony fossa and cannot move. This dilatation is aided by the cylindrical curve of the muscle, whose concavity is orbital, and which curve is brought into a straight line by the contraction of the muscle itself. Now if the diminished diameter of the lower part of the ductus ad nasum with the presence of mucus in it, present a greater impediment to the introduction of air into the lachrymal sac from below, than to the entrance of tears from above, through the lachrymal ducts—it is clear that while the vacuum is thus

formed in the sac by the muscle, the puncta lachrymalia, being bathed continually in the tears collected at the internal commissure of the eyelids, will rapidly transmit the tears to fill up this vacuum. But when the muscle ceases to act, the elasticity of the lachrymal sac will drive the tears into the nose, as the mechanism of the passages is such, that it allows a fluid to pass more readily from the eye to the nose, than from the nose to the eye.

If this explanation of the functions of the muscle be correct, it will enable us to understand why, in perfect obstructions of the ductus ad nasum, the sac fills itself to distention, and on being emptied through the puncta by pressure, it will fill itself again. It also suggests the probability of some cases of epiphora, depending only on an atony* of this muscle, and consequently to be removed by such remedies as strengthen it. It is scarcely necessary to say that these cases are indicated by an overflowing of the tears, where there is no proof by examination of the passages being obstructed. And that such cases do occur, the writings of surgeons much experienced in the treatment of fistula lachrymalis will sufficiently attest, notwithstanding the very general assertion of the systematic authors, that the foundation of this disease is always laid by a stricture in the ductus ad nasum.

* Mr. Trasmondi has taken a different view of the actions of this muscle, but also believes that a paralysis of it will produce epiphora—a case of which kind then under his care he cites.



