

Correspondence.

"Audi alteram partem."

MUSCULAR ACTION IN ROWING.

To the Editor of THE LANCET.

SIR,—The late contest on the Thames for pre-eminence in the power of propelling a boat from Putney to Mortlake, which resulted in favour of the Oxford graduates, has brought the subject of rowing prominently before the public. Although I did not witness the contest, I can bear testimony, from personal observation, to the skill and endurance that marked the training exertions of both the American and English gentlemen.

It may be interesting to some of your readers, whether professional or aquatic, and given to rowing exercise, to trace the various muscular actions of the body by which the act is accomplished.

I propose to analyse these actions, and to refer each movement to the especial agents that effect them. I am the more inclined to this, inasmuch as some errors prevail among rowing men as to the order, and even to the locality, of the muscles really engaged in the operation. It would perhaps be somewhat surprising were it otherwise, for even among professional men no branch of physiological knowledge is so little cultivated as that which relates to the action of muscles.

Presuming the rower to occupy his seat, and sitting upright, the handle of the oar being held or grasped by both hands, the first action is a compound one, and consists of two movements—first, of the trunk or body, and, secondly, of the entire upper extremity on the trunk: i.e., the body is drawn forwards to an angle of about 45° , allowing for the slight curvature of the spine, at the same instant that the arms are extended forwards to their fullest range in the same direction. The second action may be said to be simple or compound, in accordance with different systems or styles adopted by different authorities. It consists in the recovery of the trunk to the vertical position synchronously with, or to be immediately followed by, the retraction of the shoulder and the flexion of the arm at the elbow-joint. A supplementary action, consisting of rapid extension of the wrist, by the three extensors, for the purpose of feathering the oar, completes the movements engaged in the act of rowing so far as regards the trunk and upper extremities. At the moment which commences these movements, the muscles of the abdomen are brought into action, but for no other purpose than to steady the contents of the cavity—a function they perform on every occasion of shock to the trunk, whether present or immediately prospective. They cannot influence the position of the trunk itself in its relation to the lower extremities. The body is drawn forwards by the psoas and iliacus muscles, at least two-thirds of the exerted power being seated in the psoas magnus. When we consider that the full action of these two muscles is sufficient to raise the trunk from the horizontal, or lying, to the upright, or sitting posture, the power required to draw the trunk forward from the vertical or upright position is very slight. To this movement, in a secondary degree, the sartorius and tensor fasciæ muscles of the thigh contribute some slight power. Synchronously with this action is the extension of the arms to their fullest length, by the combined action of the serratus magnus, by which the scapula is drawn forwards from its position at rest on the back to the side of the trunk, with the pectoralis minor; the forearm is extended by the well-known action of the triceps and its small coadjutor the anconeus. The hands are slightly elevated, and the blade of the oar is lowered into the water.

All the above movements are made preparatory to those by which the boat is propelled, the major action of the whole circle. This is either simple or compound, or rather it consists of two movements that may be either simultaneous or consecutive. It is effected by the drawing back of the trunk, by the retraction of the scapulæ or shoulders, and by the flexion of the arms.

The first of these movements is generally referred to the muscles of the back. But this is an error. The muscles of the back, under the general name of erector spinæ, act upon a nearly inflexible pillar, and nothing more. The sum of their action cannot exceed in its range a greater length than from one to two inches, while the trunk has to move through a space equal to 45° , or the one-eighth of a circle. We must look, therefore, to other agency, to the influence of some enormous muscular power, that can directly influence the relations between the trunk and the lower extremities, and operate in drawing backwards the entire trunk from an angle of 45° to an angle of 90° , of restoring the body to its upright position, and something beyond it. This can only be effected by the great muscles of the buttock, attached between the trunk and the thigh, which sweep round between the back of the os innominatum of the pelvis and the thigh-bone, thus involving the hip-joint, or centre of motion, upon which the trunk glides. The great muscle of the rower is the gluteus maximus, by the agency of which the trunk is drawn backwards in the act of rowing, or is thrust vertically upwards, as in the act of rising from a chair. The Oxford principle or practice in rowing, whichever it may be termed, involves the primary actions of these two muscles as the great and prominent feature of the art. When they affirm that they row with the back, they in reality row with the buttock, or great glutei muscles, as indeed do all persons engaged in the art of rowing,—if it be an art. The second, and with some authorities the simultaneous, movement consists in the whole arm being drawn backwards with the shoulder. The scapulæ are replaced on the dorsal aspect of the trunk by the following muscles: the trapezius, latissimus dorsi, rhomboidei, aided in some degree by the pectoralis major. When the glutei have restored the trunk to the vertical position, and a little beyond it, the work is taken up by the flexors of the arm at the elbow-joints. These muscles are the biceps and brachialis anticus, which bend the elbow-joint to somewhat less than a right angle. As regards the relation of the elbow-joint to the side, I consider that greater freedom of action of the arm is obtained by the elbow being drawn slightly outwards from the body, than by being retained in close proximity to it. The handle of the oar is held in pronation of the forearm, and both pronation and rapid and powerful flexion of the forearm are facilitated by a slight elevation of the elbow-joint from the body.

The prominent and distinctive feature of the Oxford system consists, I believe, in this, that the action of the glutei, in drawing the trunk backwards to something beyond the vertical line, is nearly exhausted before the agents of flexion of the forearm commence their work. The Oxford authorities consider that they row with their trunk, while others more prominently row with their arms. In truth, the muscular systems of both trunk and arms are indispensable in all cases, the only distinction being that in the case of Oxford oarsmen the greater part of the retraction of the trunk, by the action of the glutei, is accomplished with rigid unbent arms, while in other cases the retractors of the shoulder and the flexors of the forearm act somewhat more in unison, or rather, they share the time occupied in the former action.

Without expressing a very positive opinion on the relative excellence of the two styles of rowing, I am inclined to think that some advantage is obtainable from the two actions being rendered consecutive, inasmuch as the superior power of the retractors of the trunk, on which the great effort in rowing depends, should be exerted singly without the physical strength of the system being hampered by two actions at the same moment of time; for although it may appear obvious that time would be saved by their concurrent or synchronous contraction, yet I do not think the glutei would contract with that force and freedom of action which they would command if they acted singly and alone. How far this practice of the Oxford school is the product of instinct, or how far of education, I do not presume to decide.

An important adjuvant of good rowing is seated in the lower extremities, the muscles of which are brought into strong action. But to suppose that the muscles of the thigh and leg play a very prominent part in the act of rowing, as taught by the Oxford authorities, is a physiological error. A few words of explanation will, I think, render this statement clear. It will be observed from the description given

above of the influence exercised by the various muscles whose actions have been described, that the result of their contraction one and all is to approximate their extremities in a ratio with their form and magnitude generally to the extent of about 45°. The trunk is drawn backwards, and the arm is bent to nearly or to quite that extent. Now, the muscles of the lower extremities are attached between two points, which are all but motionless—the pelvis above and the foot below; the former being fixed on the seat, the latter strapped down to the stretcher or foot-board. The functions of these muscles can only be called forth when the limbs are freely subject to their influence in the acts of flexion and extension. In the act of bringing the body forward the extensor muscles of the knees—viz., the quadriceps, as well as those which constitute the calves of the legs, are slightly relaxed, and the knees bend a little outwards in the same slight proportion. Concurrently with the action of the glutei, the muscles both of the thigh and leg are brought into powerful contraction, for the double purpose of forming the leg into a firm inflexible pillar and pressing the foot immovably against the foot-board, forming, as it were, a fulcrum by which the body is enabled to retain its exact position on its seat during the powerful action of the glutei. Without this pillar the glutei would lose half their force. The sense of fatigue, the aching pain of the lower extremities, that follows active undisciplined rowing, is not evidence that these muscles, though indispensable to the exercise, play in it more than a secondary part.

Several small muscles, and those of minor importance, are engaged in all the above movements.

I am, Sir, your obedient servant,

Mount-street, Sept. 21st, 1869.

F. C. SKEY, C.B.

ST. BARTHOLOMEW'S HOSPITAL.

To the Editor of THE LANCET.

SIR,—In your last issue you imply that there exists some deeper cause for the discontent and angry attitude of the students of St. Bartholomew's Hospital than the antagonism of the non-professional executive, or the dismissal of Dr. Mayo. You do so with great reason, and are evidently well informed.

My acquaintance with this hospital extends over a period of more than ten years, and I am in a position to judge very accurately of the opinions of the students. With the desire to lay this question fairly before your readers, and to do what justice is due to the offending executive at present charged in the public eye with the whole blame of this disaffection, I wish to state that in no small degree it is attributable to the professional staff, although some recent arbitrary and, perhaps, unjust measures have opened it a vent in another direction. The following complaints are freely current among old and present pupils: That the staff have long exhibited an unworthy servility towards the administering body of the hospital, and so have allowed it gradually to assume a position of inordinate influence; that by their silence and apparent indifference, they give their countenance to all the abuses of the hospital practice, and leave it to the students to initiate every desirable reform and innovation, and then carry them out, but very tardily; that had they made themselves acquainted with the working of the various departments of the hospital and exercised their just influence on the governing body, there could have existed no cause for the protests of the house-physicians, house-surgeons, and dressers, and the scandal caused by Dr. Mayo's dismissal and pamphlet would have been averted; and last, but not least, that in spite of the high fees they pay for instruction, for dresserships and house-surgeoncies, the students receive but little assistance in their studies, and are not provided with any organised system of clinical instruction. Hence the singularity of a St. Bartholomew's name in the London University pass-lists.

Let me add, with regard to the pupils, that the feelings they entertain towards their teachers are those of respect and affection; for their shortcomings cannot cancel the influence of their uniform courtesy and high personal qualities. And with reference to the relations existing between the executive body and the professional staff, it would be difficult to

point out any instance in which the clearly and persistently expressed wishes of the latter have not been liberally responded to.

FAIRPLAY.

To the Editor of THE LANCET.

SIR,—One of the nurses in Faith ward, St. Bartholomew's Hospital, a few months ago, was attacked with typhus, and had a very narrow escape with her life. She was a rather stout and heavy woman of forty-four, and was a very unpromising case. It may interest your readers to know in what sort of a sleeping apartment this nurse lived, and still lives.

This elegant and commodious dormitory for one is situated under the stairs leading to the ward above. Its length is 7 ft. 6 in., and its breadth 6 ft. 8 in., while its height varies on account of the stairs from 9 ft. to about 4 ft. Its cubic contents, according to my reckoning, is 370 ft. There is no window nor chimney, but there are panes of ground glass towards the staircase, one of which opens, and the staircase windows are about 20 ft. distant. There is also a glass door opening into the ward. Any inconvenience that might arise from the peculiarities of this apartment is doubtless mitigated by the fact that the sleeper occupies it only two nights out of three, it being her turn to be up on duty every third night. The remuneration for these duties, and the risks attendant upon them, is partial board, and 8s. a week.

I am, Sir, your obedient servant,

Sept. 25th, 1869.

NEMO.

SURGEONS AND INSTRUMENT-MAKERS.

To the Editor of THE LANCET.

SIR,—Although I have no greater wish to enter upon a controversy with Mr. Gumpel than he with me, though perhaps from different motives, I must ask you to allow me space for a few lines, simply to put myself right with the readers of THE LANCET.

In the first place I find that the "friend" who called upon Mr. Gumpel to expostulate was Dr. Fox, who did so entirely *proprio motu*, without consulting me, but simply from what our patient told him. With regard to the account of the conversation between Mr. Gumpel and myself, I must entirely deny the colouring which he has affixed to it. My opening statement was merely—"I have called to complain of your having told Mr. A. &c." Upon this the denial which Mr. Gumpel admits, but which he himself proves to be fallacious, followed. My answer was: "But Mr. A. says you did." To which Mr. Gumpel replied: "Bring him here, and let him say so." Mr. Gumpel made no offer whatever to explain the circumstances; but, as I have already stated, having repeatedly denied that he ever made a statement, which he has since admitted, showed me the door in what I consider a most uncourteous manner. It is perfectly true that I have sent my patient to another maker; but it is not true that I have taken the trouble to call upon any patron of Mr. Gumpel's in connexion with the matter, though I have not hesitated to express my opinion of his conduct to my friends.

In taking leave of this matter I may say that my only motive in taking it up was to check, if possible, a system which is on the increase, and which is detrimental both to patient and surgeon—the usurpation by instrument-makers of a position to which they have no title, and the direct assumption of the charge of surgical cases, which they invariably treat by complicated and expensive apparatus.

I am, Sir, your obedient servant,

Cavendish-place, Sept. 29th, 1869.

CHRISTOPHER HEATH.

MR. BLANCHARD JERROLD.

To the Editor of THE LANCET.

SIR,—The advocates of an amended system of poor relief, both medical and general, are much indebted to you for calling public attention to the claims of Mr. Blanchard Jerrold to pecuniary assistance in the arduous and necessarily expensive work in which he is engaged.

The articles which have already appeared in your journal describing so graphically the admirable arrangements