

THE FACIAL EXPRESSION OF VIOLENT EFFORT, BREATHLESSNESS, AND FATIGUE. By R. TAIT M'KENZIE, M.D., *Professor of Physical Education, U. of P., late Lecturer on Anatomy, McGill University.* (With illustrations from masks modelled in clay by the author—PLATE XIV.)

THE cinder-path and the campus offer a rich field for the observation of certain forms of facial expression which have been hitherto but little studied and ill understood.

It is impossible for a runner in the fierce struggle of a hundred-yard race to wear the look of indifference when he is trying by the use of every muscle, however weak and indirect its action may be, to increase, even by the smallest fraction, the length of his stride or quicken the speed of his movement. This effort is mirrored in his face with unfailing accuracy.

At the start of a hundred-yard dash the runner catches his breath, and usually holds it during the entire race if closely pressed. During this time the body is under stress of the most violent action, the great muscle masses of the legs are in powerful alternate contraction, and the torso is pulled and compressed by the vigorous action of the arms. The shutting of the glottis gives a more solid *point d'appui* for the muscles of the arms and shoulders, but it increases enormously the pressure on the heart and lungs. This increase in blood-pressure shows in the purple and swollen face and the red suffused eyes, in the lips retracted from the clenched teeth and the muscles of the neck fixed in contraction. This peculiar characteristic expression is also seen in jumpers, hurdlers, hammer-throwers, and football players. It indicates the acme of any violent effort.

From the study of many instantaneous photographs of athletes at work, and the observation of men in action at many athletic gatherings, the typical expression has gradually shaped itself in my mind, somewhat as appears in the accompanying mask (fig. 1). In modelling it, no one man or photograph has been exclusively followed, the endeavour being to combine what was characteristic in many, so as to show the typical face of violent effort.

In this face there is a general converging of the lines to the root of the nose, the transverse wrinkles at that point marking the action of the

pyramidalis nasi. The frowning brows are drawn down, and the palpebral fissure is narrowed to a mere slit. The outer angle of the eye shows the crow's-feet that accompany the strong action of the orbicularis palpebrarum. The sneering expression of the nose, caused by the action of the compressor nasi, is like the snarl of a dog, while the levator anguli oris exposes the canine tooth and increases the effect. The nostril is distended, the upper lip is raised from the teeth, and the direction of the naso-labial fold is altered. The lower lip is drawn tightly across the clenched teeth, except at the corners of the mouth, where it is pulled away by the platysma, leaving little pouches at each angle. The general impression of the face is repulsive. Hatred, menace, and rage predominate, with a feeling of distress about the strained mouth and neck.

In his description of rage, Darwin says, "The lips are much more commonly retracted, the grinning or clenched teeth being thus exposed. The appearance is as if the teeth were uncovered, ready for seizing or tearing an enemy, though there may be no intention of acting in this manner."

The drawing called "Rage," in Sir Charles Bell's classic work on expression, shows a face that corresponds closely to strain. The bent brows, wrinkled nose, and swollen eyelids, the snarling nose and cheek and lifted lip-angle, all suggest violent effort; the lower lip is also drawn down and the teeth exposed, but the staring eyes in his drawing are in contrast to the narrowed eye-opening characteristic of effort, while the raising of the upper lip-angle in Bell's drawing is unaccompanied by the strong retraction of the lips, that always marks embarrassed respiration.

Hogarth, one of the keenest observers of the human face in all its moods, is rich in studies of curious expression. In his picture of a cock-fight, he shows the face of a man on whom snuff has just been sprinkled from the open box of a spectator seated above him. He is raising his handkerchief to his nose, his face shows unmistakably that a sneeze is imminent, the lines converge to the root of the nose as in the mask, the action of the orbicularis being well shown in the tightly shut eyes.

This shutting of the eyes in all violent effort, such as shouting, sneezing, crying, or laughing, is explained by Bell as a protection against increased intra-ocular blood-pressure, which might rupture some of the more delicate of the distended vessels. Undoubtedly the runner would shut his eyes if he could, and the hammer-thrower occasionally does so at the moment of the greatest effort; but the runner must keep his course, and so the eye-openings are merely narrowed as much as possible.

The expression of the mouth is due to the drawing up of the lip and to the action of the platysma. The action of this muscle is very constant

in all forms of effort when the breathing is impeded, and it often springs into action when delivering a blow of the fist, or even in testing the grip by a hand dynamometer. It intensifies such an expression as surprise to astonishment or horror, of pain to torture, and of dislike and hatred to rage and fury. It might appropriately be called the muscle of emphasis.

When effort is prolonged to the point of breathlessness, as is seen in the continuous strain of a half-mile race, the facial expression becomes radically changed. The onset of this condition is marked by a quickening of the circulation, the eye becomes bright, the face ruddy, and the skin flushed. The breathing becomes deeper and more rapid, and a warm glow is felt throughout the body. As the waste matters accumulate in the circulation, the lungs begin to lag in their effort to throw them off, the breathing becomes more hurried, shallow, and spasmodic; a vague discomfort is felt, rapidly increasing to acute distress; there is a sense of constriction in the chest, murmurs and singing in the ears, flashes before the eyes, and mental confusion and even unconsciousness. When in this condition runners may swerve from their course, fall, run blindly into obstacles, or do other unaccountable things.

If we can believe the legend of Ladas the Spartan, we have at least one case of death from breathlessness, and it is not infrequent to have men faint at the end of a hard race; and even before the finish one occasionally sees the face become dusky and leaden, the lips blue and livid, the breathing shallow, and the man fall fainting before reaching the goal.

This respiratory madness, this distress of mind and body, is always pictured on the face of the struggling man.

In this mask (fig. 2) we have the typical face of the breathless man. The smoothness of the forehead is broken by wrinkles spreading out from the inner end of the updrawn eyebrows, where the general direction is just the reverse of that seen in violent effort; they are drawn upward and inward by the corrugator supercillii, the muscle of pain, which always acts in grief, mental distress, anxiety, and bodily pain. The differentiation of these various shades of expression will depend on the prevailing cast of the rest of the countenance.

The upper lids, in breathlessness, droop and half cover the eye, giving a look of great lassitude to the suffering expressed by this region of the face. The nostrils are widely dilated, the mouth gapes, and the lips are retracted in the mad struggle for air. The raised upper lip and the deepened and changed naso-labial fold add to the look of sorrow and pain, while the down-drawn mouth-angle, the tongue close pressed against the teeth, the cheek sunken into the cleft between the opened jaws, all go to increase the gasping, haggard look that is so characteristic of this state, in distinction

to mere bodily pain or mental suffering. The general pose of the head is backward, with the chin thrust forward and the neck usually convulsed by the sterno-mastoid and platysma and the other extraordinary muscles of respiration.

"In bodily pain," writes Sir Charles Bell, "conjoined with distress of mind, the eyebrows are knit, the pupils are in part concealed by the upper eyelids, and the nostrils are agitated."

Good examples of this condition are to be seen in Jean Paul Cortot's statue, "The Soldier of Marathon," in the Louvre; and in a drawing by Andrea Mantegna of the death of Antæus, the characteristic lines of breathlessness or suffocation are depicted in his face and neck as he gasps in the crushing embrace of Hercules, who holds him in mid-air.

The face of Laocoon struggling in the coils of the serpent has many of the characteristics of breathlessness in it. The swelling chest, the distended veins, and the swollen, contorted neck all combine to show that the struggle has left him breathless. Mingled with this there is pain and anxiety. The eyes are upturned, and the mouth is open and panting. He has been described by some writers as bellowing like a bull, and as crying out in his agony; but the knitted brows and the retracted lips, the extended head and the heaving chest, can be completely accounted for by the breathlessness of the strain and tug of the fight.

Breathlessness, as seen in the runner, would have mental anxiety associated with bodily distress, and the typical expression would correspond closely with the description quoted from Sir Charles Bell, with the addition of the gaping mouth and expanded nostrils.

With the re-establishment of the equilibrium between the production of waste and its elimination, the urgency of breathlessness passes off. The runner gets what is called his second wind, and the look of distress disappears from the face. The lungs feel as if they had regained their power to expand, and a crushing weight seems to be lifted from the chest. The head becomes clear again, and the muscles act with renewed vigour and elasticity. Soon after the relief felt by getting his second wind, the runner begins to notice a general sensation of lassitude creeping over him. His muscles become slower and slower in responding to the will, each effort requires greater and greater concentration of attention and force of will, and his lassitude gradually deepens. Group after group of muscles refuse to continue their work, until he staggers along with relaxed grip, yielding ankle, fallen jaw, and closing eye.

In this mask (fig. 3) we see the typical face of fatigue after the urgency of breathlessness has passed off. The eyebrows show a slight frown, and the eyelids are heavy as with sleep. The upper lip is still retracted

irregularly from the teeth, giving a slight look of pain to the cheek, which is otherwise relaxed and flaccid. The mouth is half open, and the lower lip hangs loosely from the parted teeth. The eyebrows have just such an appearance in deep thought, painful attention, as when listening to an indistinct speaker or watching a distant object in an uncertain light. The general effect is one of vacancy. Such a stupid, vacant look is well depicted by Hogarth in some of his pictures of drunkenness, notably one figure in "A Midnight Modern Conversation," the chief differences being that the drunken man has a vacant, silly smile about the mouth, which in the mask of fatigue is replaced by slightly retracted lips and a trace of pain about the mouth and cheek.

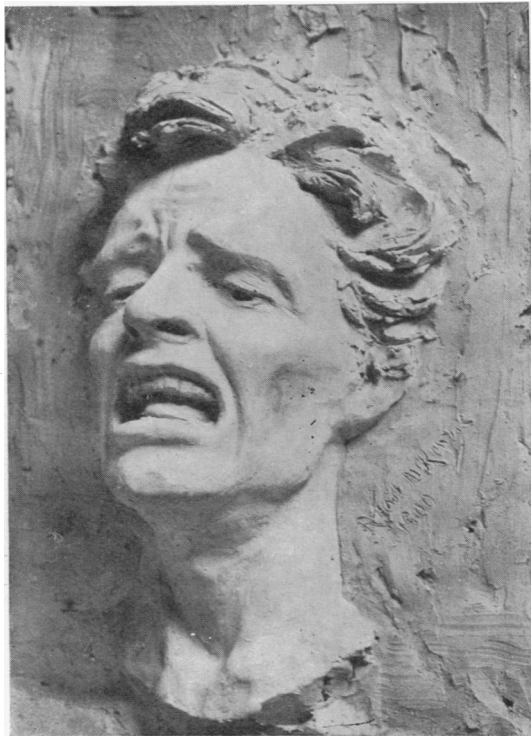
As fatigue becomes more profound, effort is centred in an endeavour to keep the eyes open, and the levator palpebræ superioris becomes weakened; the frontalis is put into action, giving the very characteristic and contradictory expression seen in this mask of advanced fatigue (fig. 4), which represents the runner in the last stage of exhaustion. The long doubly curved wrinkles across the forehead, with arched eyebrows, are usually associated with the expression of surprise and astonishment, but here they show the endeavour to raise the closing eyelid by this indirect means, since the proper muscle can no longer be made to act. The nostrils are dilated, and the lips drawn outward and downward by the platysma. This part of the face shows the distress of impeded respiration. The head is thrown backward and the chin thrust forward, as we see in all endeavours to balance the head upon the neck without muscular effort. This pose of the head is characteristic of fatigue. It is well shown in the "Sleeping Boy" by Van Dyck. Both pose and facial expression are characteristic of the last effort to fight off collapse, and are a warning of the near approach of complete breakdown.

When this last feeble effort is exhausted, the face gives mute expression to the final stage of fatigue, the muscles of expression cease to act, the countenance takes on a look of absolute apathy, the cheek hangs relaxed, and the gaping mouth completes the pathetic picture of helpless collapse.

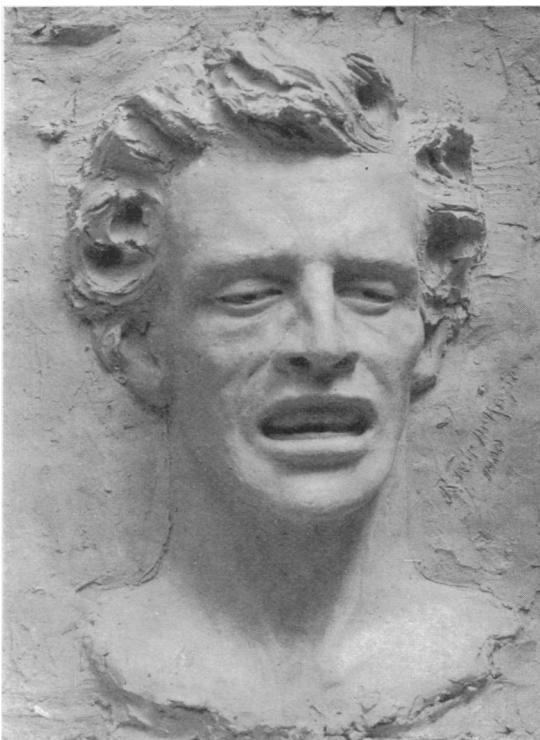
Few runners can or will push their powers to this extreme limit of endurance.



No. 1.—Violent Effort



No 2.—Breathlessness.



No. 3.—Fatigue.



No 4.—Advanced Fatigue.