animal vigour is here meant not so much bodily strength, as its higher representatives—tenacity of purpose, industry and energy. Premature intellectual development is a sign of inferiority. For lower animals are almost born into the fulness of their mind, but it is chiefly automatic mind—instinct. The inferior races of man reach their development, such as it is, earlier, but never arrive at the development of the superior races. Again, precocious children are not those of whom a high kind of mental ability is expected in after years. Their higher qualities approach too much their lower, in the general sense of being more automatic; they show skill and cleverness, rather than varied ability and originality of view. Too early education, especially if rigidly kept to a few things, is narrowing, and tends to hinder the higher development of mind. There is some truth even in the exaggerated practice of Mr. Weller senior, who turned his son into the streets to pick up his education. Not the least valuable part of a man's culture is from that which he picks up for himself; and this is strikingly so in our profession, one which, indeed, is very valuable, in that its emergencies compel the idlest man to act and think for himself.

DEATH OF "MASTER MAGRATH."

By the REV. SAMUEL HAUGHTON, M.D. Dubl., D.C.L. Oxon.,
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No. II.

HAVING received communications from many correspondents in consequence of the publication of my account of Master Magrath, my first duty is to thank my friends for their kindness, and my next duty is to add such additional explanations to what I have already published as shall clear up one or two points which may have been left obscure.

I have to thank Dr. Pittcock of Ramsgate for an account of an examination recently made by him of a greyhound which died on the night following a coursing match, of a ruptured blood-vessel. Dr. Pittcock states that this animal, which was a valuable one, had tubercles in both lungs; and this I regard as an important confirmation of my own opinion respecting Master Magrath.

Dr. Clifford Allbutt of Leeds informs me that his experience of *post mortem* examinations of "puddlers", "strikers", and other workmen who earn their bread by extreme muscular exertion, proves that their hearts, although quite healthy, are greatly hypertrophied, weighing in some cases as much as sixteen ounces. Another correspondent reminds me that the heart of Eclipse weighed fourteen pounds, which is a remarkable size for a blood-horse.

Dr. Black, staff-surgeon, coincides with my opinion as to the possibility of the coexistence of pulmonary tubercle with great muscular exertion, and states that athletes and pedestrians are frequently affected by it. In reply to other correspondents I should add, what I find I omitted to state, that the stomach and bowels and their contents were carefully examined and found perfectly healthy and natural.

Two points are suggested to me by reading my correspondents' letters; first, as to the hypertrophied heart; and, secondly, as to the extent of pneumonic congestion in the lungs.

1. *Hypertrophied Heart.*—Many of my correspondents seem to consider that an hypertrophied heart is necessarily a sign of disease. No doubt it often is so, but it may be a condition produced by muscular training, and an indication of the maximum perfection of health. It is the balance between respiration and circulation that measures the degree of health; and, provided an animal possesses large and healthy lungs, the endowment of a large heart is a benefit instead of the reverse. But when lung-disease, even slight, occurs in such an animal, the power of the heart becomes at once an evil, and congestion of the right side of the heart and venous system quickly supervenes. The balance is destroyed, and death occurs more readily than in an animal possessed of a less powerful heart. Thus in medical experience we often see a patient, whose heart and lungs are both diseased, outlast a patient with diseased lungs and a healthy heart, for the simple reason that the balance between circulation and respiration is less disturbed in the former case than in the latter.

2. *Pneumonic Congestion in Carnivores.*—My experience in the dissection of carnivora that die of pneumonia leads me to the conclusion that a much less amount of consolidation will kill a carnivore than is necessary to the death of an herbivore, and that complete consolidation of even one lung is exceptional. I have found death caused in a full-grown lion or tiger by a nodule of pneumonic congestion in one lung not larger than a Seville orange; and I have no doubt that none of the larger carnivores could survive an attack of double pneumonia with or without consolidation. The explanation of this fact is to be sought in

the circumstance, that in the carnivores in general the balance between circulation and respiration is pushed (as was remarkably the case in Master Magrath) to the extreme limits compatible with health, so that even a slight disturbance in their equilibrium will rapidly prove fatal.

"Si quid novisti rectius istis,
Candidus imperti; si non, his utere mecum."

ON THE PRODUCTION OF ARTICULATE SOUND (SPEECH).*

By OAKLEY COLES, Esq.

SOME brief explanation is perhaps necessary as to the origin of the present paper. Two or three years ago, when paying special attention to the treatment of defects of the palate, I first found the difficulty of teaching those whom I had treated, to speak correctly, or to put their organs in such a position that articulation should be possible. Much care with my pupils led to much vexation. I could find no book that gave such information as was necessary for such cases; and a mere repetition of instructions was very confusing to the patients. Added to this, I was in doubt in many instances as to the way in which certain sounds were produced. Beyond this, no small difficulty seemed

Reduced drawing of one of the diagrams shown at the reading of the paper. The parts on the palate, tongue, lips, and free border of the soft palate, that are shaded in cross lines, indicate those portions of the mouth which are brought into contact for the articulation of the letter *s*. The cross lines take the place of the red surface on the diagrams.

to exist as to the parts that were involved in the production of the elementary sounds.

After thinking the facts of the case carefully over, I determined on

* Read before the Odontological Society, Feb. 5th.

the following plan of ascertaining more accurately the physiology of speech. With this view, I took an impression of my upper jaw, extending to the posterior wall of the pharynx, thereby including the soft palate and fauces; also an impression of the lower jaw, with the tongue in a state of repose. These I had engraved on one stone, with a drawing of the lips below (as shown in woodcut). A number of these I had printed. Then my trial began. The mode which I adopted at this stage was to make a mixture of gum and flour, and paint over the whole of the hard and soft palate and the surfaces of the teeth of my upper jaw. I then sharply articulated a letter. On the upper jaw, where the tongue had come into contact, the flour was removed, and deposited on that part of the tongue which had touched it. These localities were then faithfully transcribed on to the engraved plate with red paint.

This I believed to be a great step in advance, reducing the physiology of this subject to more defined limits. One point of the utmost practical importance to be determined was, as to when there was complete separation of the nares from the mouth by means of the soft palate. This I decided by means of a very delicate test, shown to me by Professor Czermak of Leipzig, some two years since, when on a visit to this country. By placing a highly polished table-knife under the nostrils during the articulation of any sound, the escape of air through the posterior nares is made at once perceptible by the deposition of moisture on the cold steel. This mode of observation is most valuable, not only for this purpose, but also for ascertaining how far an artificial palate completely separates the mouth from the nose. It may also be used with advantage after the surgical operation for cleft palate.

Having explained the origin of this work, and the way in which I have carried it out, I will pass to the consideration of the subject itself.

To begin, we must clearly recognise the difference between voice and speech. It may be stated, broadly, that voice is produced in the larynx, but speech is produced in the mouth.

A few words may not be out of place on the production of voice as a necessary antecedent to articulate sound or speech. The special organ of voice consists of the larynx. The trachea, lungs, and upper part of the pharynx may, however, be regarded as accessories to it: the lungs, as the active agents in propelling, by their contraction, the air through the larynx; the trachea, by its increased or decreased length, as affecting the tone of the voice; and the upper part of the pharynx, as aiding in the same purpose.

The larynx is an elastic box, consisting of the thyroid, cricoid, and arytenoid, cartilages. These are bound together by a system of muscles and ligaments, admitting a large degree of movement, and yet of singular elasticity.

Situated about one-third from the highest level of this chamber—and inserted into the thyroid cartilage at one point, but passing backwards, and by their separation forming two sides of a triangle—we have the vocal cords, attached at their extremities to the arytenoid cartilages. By the movement of these cartilages the margins of the vocal cords may be approximated so as to come into actual contact. The arrangement of the cartilages is such that these cords are capable of variable tension as well as approximation; and it is by the vibration of these cords, produced by the rapid passage of air from the lungs through the trachea, that voice is produced.

The differences in the sound of the voice are the result of the difference in tension of the cords, and their relative position to each other, aided by the difference in the length of the trachea, and the configuration of the upper part of the pharynx, and the position of the epiglottis and soft palate. Sound having passed from the larynx into the region immediately above, may then be modified or articulated, and produce speech. It is this which is of especial interest to us as dental surgeons, since it is here that our domain of labour and observation in practice begins.

Speech is due to the manner in which the column of air is arrested, condensed, or thrown into vibrations by the organs of speech, which consist of the tongue, hard and soft palate, teeth, and lips; the cheeks also may be said to take a part in the production of speech, though they cannot be regarded as organs of speech proper. The pharynx and nares may be put into the same class as the cheeks.

An examination of the plates, which need not be more fully described, will show how frequently the nares are separated from the mouth by the action of the soft palate and the constrictors of the pharynx. This is a point of great practical importance and value, especially when we notice how frequently defects arising from this action are brought under our notice.

What is the practical use of the present paper? In the first place, to show, in a more satisfactory manner than has been hitherto done, the relative position of the parts concerned in the production of speech, and thus render the physiology of the subject more precise

in its nature. In the second place, to enable those who have been treated, by operation or mechanical appliance, for cleft palate, to acquire a more accurate knowledge of the different sounds in the English alphabet, and thus learn the means by which they may be combined to form words and sentences. In the third place, to enable the practitioner to determine what is the cause of any defect in utterance of a patient brought to him, by being able more accurately to fix upon the locality which is imperfect in action. And lastly, and by far the most important, and, to my own mind, interesting use of all—to help on the work of teaching to speak those who are unfortunately deaf mutes.

I shall shortly issue a complete monograph on the subject, with twenty-six plates, showing the precise position assumed by the tongue for the formation of each letter-sound, and indicating the movements which the deaf-mute must be taught to imitate for their production.

ON PARACENTESIS THORACIS.*

By G. H. PHILIPSON, M.A., M.D. Cantab., M.R.C.P. Lond.,
Physician to the Newcastle-upon-Tyne Infirmary, etc.

AMONG the valuable aids of surgery in the treatment of disease is the operation of paracentesis, and this no less in affections of the pleura than of the other serous cavities. Notwithstanding the division of opinion respecting the general advisability of paracentesis thoracis, unquestionably it has been sufficiently often completely successful, or it has been productive of such marked relief to distress and suffering, as to fully justify the procedure, even if an ultimate restoration cannot always be prognosticated. It is, however, in cases of empyema, and in inflammatory effusion, acute or chronic in nature, which threaten speedy suffocation unless relief be afforded, that puncture of the pleura is most appropriate and effective of good. The operation was had recourse to in the following case of chronic pleuritic effusion to avert threatening dissolution.

Thomas Baird, a seaman, aged 28, was admitted into the Newcastle Infirmary under my care on March 9th, 1871. He stated that he had been ill for sixteen weeks, and had suffered from difficulty in breathing, and from cough, and that at first he had severe and cutting pain in the right side of the chest. He was a strongly built man, and was not emaciated. Upon examination, there were marked dulness upon percussion over the whole of the right back, and a total absence of vocal fremitus, vocal resonance, and respiration. In front, there was dulness upon percussion from the right clavicle downwards to a line two inches below the umbilicus, the lower border of the liver being plainly felt at this line. There was an entire absence of vocal fremitus, vocal resonance, and respiration. The intercostal spaces on the right side were distinctly elevated. In deep respiration, the right side remained stationary. The percussion over the left side, front, and back was clear, and the respiration was slightly harsh. The heart's impulse was seen and felt about half an inch below the left nipple in the nipple line. The sounds of the heart were normal. The expectoration was small in amount, and consisted of thin frothy mucus. The right side, in the nipple line, measured twenty-one inches, and the left nineteen inches and a half. He was ordered a saline purge and a pill three times during the day, consisting of three grains of mercurial pill, a quarter of a grain of subchloride of mercury, and half a grain of opium.

March 11th.—He was in very great discomfort, and panting for breath. The respirations were 40 in the minute, and the pulse was 90. His lips and cheeks were livid, the skin clammy, and feet cold. It was decided to afford relief by paracentesis, which was performed by Dr. Page, the senior house-surgeon. A trocar about the size of a crow-quill was introduced between the sixth and seventh ribs, four inches to the right of the spine. After the escape of fifty ounces of clear straw-coloured serosity, the cannula was withdrawn, and the opening was closed with a pad of lint, strapping, and bandage. During the passage of the fluid, the breathing became slower and more tranquil, and the patient more than once expressed his relief and his gratitude.

March 12th.—Without solicitation, the patient expressed the relief he had experienced; and when interrogated, said that the difference in his feeling, before and after the operation, was to him as the difference between "night and day." The respirations were 30 in the minute, and the pulse was 96.

March 15th.—The duskiess of the face was much diminished, and the respirations were 28 in the minute; over the right scapula slight vocal fremitus was felt and harsh respiration was heard. The percussion note was comparatively clear from the spine of the scapula to its lower angle. The impulse of the heart was felt about a quarter of an inch

* Communicated to the Northumberland and Durham Medical Society.