

of their functions, and consequently, to break off abruptly the sleep into which they were thrown.

Let us pursue this train of reasoning, and it will lead us to account, if I mistake not, for some of the most extraordinary facts that are connected with the recondite subject of sleep and dreaming.

I have just observed that the stimulus of our ideas in dreaming is often sufficient to rouse the external senses generally, and to awake us all of a sudden. But this stimulus may also be of such a kind, and just such a strength, as to excite into their accustomed action the muscles of those organs or members only which are more immediately connected with the train of our dreams, or incoherent thoughts, while every other organ still remains torpid. And hence, the muscles chiefly excited being those of speech, some persons talk; and others, the muscles chiefly excited being those of locomotion, walk in their sleep, without being conscious on their waking of any such occurrence.

Whatever be the set of fibres that have chiefly become exhausted from the labour or stimulus of the day, the rest, as I have already noticed, partake of the torpidity from a habit of association; exhausted in some degree, also, themselves, by the share of sensorial power which, as from a common stock, they have contributed towards the support of the debilitated organ. But it sometimes happens, either from disease or peculiarity of constitution, that all the organs of external sense do not associate in such action, or yield alike to the general torpor of the frame: and that the auditory, the optical, or some other sense continues awake or in vigour while all the other senses are become inert; as it does also that such particular sense, like the muscles of particular members, as observed just above, is awoke or restimulated into action in the midst of the soundest sleep, by the peculiar force and bent of the dream, while all the rest continue torpid.

If the organ of external sense thus affected with wakefulness be that of *hearing*, a phenomenon may occur which has often been noticed as far back, indeed, as the times of the Greek and Roman poets, but which has never hitherto, I believe, been satisfactorily explained; the dreamer may in this case hear a by-stander who speaks to him; and if, from a cause above specified, he should also have happened to talk in his sleep, so as to give the by-stander some clew into the train of thoughts of which his dream is composed, a conversation may be maintained, and the by-stander, by dexterous management, and the assumption of a character which he finds introduced into the dream, may be able to draw from the dreamer the profoundest secrets of his bosom; the other senses of the dreamer, instead of hereby rousing to detect the imposition, being plunged into a still deeper torpidity, from the demand of an increased quantity of sensorial power to support the exhaustion which the wakeful or active organ is, in consequence, sustaining. This, however, is a case of rare occurrence, though it seems to have occurred occasionally.

If the wakeful organ be that of *sight*, and the dreamer, from a cause just adverted to, be accustomed to walk instead of to talk in his sleep, he will be able to make his way towards any place to which the course of his dream may direct him, with perfect ease, and without the smallest degree of danger. He will see more or less distinctly, in proportion as the organ of sight is more or less awake; yet from the increased exhaustion, and of course increased torpor of the other organs, in consequence of an increased demand of sensorial power from the common stock to support the action of the sense and muscles immediately engaged, every other sense must necessarily be thrown into a deeper sleep, or torpor, than on any other occasion. Hence the ears will not be roused even by a sound that might otherwise awake him; he will be insensible, not only to a simple touch, but to a severe shaking of his limbs; and may even cough violently without being recalled from his dream. Having accomplished the object of his pursuit, he may safely return, even over the most dangerous precipices, for he sees them distinctly, to his bed; and the organ of sight, being now quite exhausted, or there being no longer any occasion for its use, may once more associate in the general torpor, and the dream take a new turn and consist of a new combination of images.

The view we have thus taken of sleep and dreaming will explain a variety of other curious phenomena in natural philosophy, which have usually been supposed of very difficult elucidation.

What is *REVERY*? It is the dream of a man while awake. He is so intently bent upon a particular train of thought, that he is torpid to every thing else: he sees nothing, he hears nothing, he feels nothing; and the only difference between the two is, that in common dreaming, the sensitive and irritative power of the external senses is exhausted progressively and generally, while the will partakes of the exhaustion; and that in revery the whole is directed to a single outlet, the will, instead of being exhausted, being riveted upon this one point alone; and the external senses being alone rendered torpid from the drain that is thus made upon them to support the superabundant flow of sensitive and irritative power expended upon the prevailing ecstasy.

It was my intention to have cited a few singular instances of this wonderful aberrancy of the mind; and to have followed them up with a momentary glance at those interesting subjects so closely connected with it, nightmare, delirium, madness, idiotism; but the time will by no means allow me, and I hasten to close with a few observations upon winter-sleep and the revivification of certain animals after their appearing to be dead.

Upon a general survey of the preceding observations, it should follow that every part of the animal system may safely sleep or become torpid except the vital organs, or those that act independently of the will; and that the moment these participate in the torpor the principle of life ceases, and the spirit separates from the body. Why the principle of life should even then cease we know not, for we know not what produced its union at first. There are various circumstances, however, which prove that this, though a general rule, is not a rule without its exceptions. We have all heard and read of such extraordinary occurrences as trances, or apparent absences of the soul from the body: we have heard and read of persons who, after having been apparently dead for many days, and on the point of being buried, have returned to a full possession of life and health; and although most of these histories are wrapped up in so much mystery and superstition, as to be altogether unworthy of notice, there are many too cautiously drawn up and authenticated to be dismissed in so cursory a manner. But let us proceed to a few facts of a similar, yet of a more extraordinary kind, and which are or may be within the personal knowledge of every one.

In cases of suspended animation by hanging, drowning, or catalepsy, the vital principle continues attached to the body after all the vital functions cease to act, often for half an hour, and sometimes for hours. In the year 1769, Mr. John Hunter, being then forty-one years of age, of a sound constitution, and subject to no disease except a casual fit of the gout, was suddenly attacked with a pain in the stomach, which was shortly succeeded by a total suspension of the action of the heart and of the lungs. By the power of the will, or rather by violent striving, he occasionally inflated the lungs, but over the heart he had no control whatever: nor, though he was attended by four of the chief physicians in London from the first, could the action of either be restored by medicine. In about three-quarters of an hour, however, the vital actions began to return of their own accord, and in two hours he was perfectly recovered. "In this attack," observes Mr. (now Sir Everard) Home, who has given an interesting memoir of his life, "there was a suspension of the most material involuntary actions: even involuntary breathing was stopped: while sensation, with its consequences, as thinking and acting, with the will, were perfect, and all the voluntary actions were as strong as before."

In the whole history of man I do not know of a more extraordinary case. The functions of the soul were perfect, while the most important functions of the body, those upon which the life depends absolutely, in all ordinary cases, were dead for nearly an hour. Why did not the soul separate from the body? and why did not the body itself commence that change, that subjection to the laws of chemical affinity, which it evinces in every ordinary case of the death or

inaction of the vital organs? Because in the present instance, as in every instance of suspended animation from hanging or drowning, the vital principle, whatever it consist in, had not ceased, or deserted the corporeal frame. It continued visible in its effect, though invisible in its essence and mode of operation.

Let us apply this remark to the subject immediately before us: it will serve as a ready clew to its intricacies. In many animals, then, and in most vegetables, the living principle often continues in the same manner to reside in and to actuate the organic frame; while the vital functions, as they are called, and, in conjunction with these, all the other functions of the system, remain inactive, not for an hour only, but for months and sometimes for years. It does so in the seeds of plants and the eggs of animals, so long as they are capable of germinating or pullulating. It does so in most animals, and perhaps in all vegetables, that sleep or become torpid during the winter-season; for though in a few hibernating animals, as the hedgehog and Alpine marmot, we trace a small degree of corporeal action from their appearing thinner on returning to activity in the spring, the greater number, like dormice and squirrels, exhibit no diminution whatever. It does so, in a more extraordinary manner, in the ears of blighted corn; which, though incapable of filling and fattening, and seemingly lifeless and effete, still contain a seed that may be rendered productive of a sound and healthy increase. It does so in various species of the moss; in various species of the snail, in one or two of the snake, in the wheel-polype, sloth, and tile-eel, and a variety of other animals and animalcules, that, like many of the preceding, have been kept apparently dead and in the form of dried preparations, totally destitute of irritability, altogether withered, and in substance as hard as a board for months and years,—in some instances as long as twenty years,—and have afterward been restored to life and activity upon the application of warmth, moisture, or some other appropriate stimulus.\*

These are extraordinary facts, and may be difficult to be comprehended: but they are facts, nevertheless, and may be proved at any time and by any person. But there is a fact still more extraordinary, and of infinitely higher moment; and one in which we are all infinitely more interested—a fact to which these remarks naturally lead, and which they may serve in some degree to illustrate; it is the termination of the sleep of death, the resurrection of the body from the grave.

### LECTURE VIII.

#### ON VOICE AND LANGUAGE; VOCAL IMITATION, AND VENTRILOQUISM.

LANGUAGE, in the fullest scope of the term, is of two kinds; natural and articulate or artificial. The first belongs to most animals; the last is peculiar to man: it is his great and exclusive prerogative. This also is of two divisions; oral or vocal, which constitutes *speech*; and literal or legible, which constitutes *writing*. The first of these divisions shall form our subject for the present study; the second we will examine in a subsequent lecture.

At the root of the tongue lies a minute semi-lunar shaped bone, which, from its resemblance to the Greek letter  $\upsilon$ , or *upsilon*, is called the *hyoid* or *u-like* bone; and immediately from this bone arises a long cartilaginous tube, which extends to the lungs, and conveys the air backward and forward in the process of respiration.† This tube is denominated the *trachea* or *windpipe*; and

\* Snails revived after being dried fifteen years and more.—Phil. Trans. 1774, p. 432.  
See also Mr. Bauer's Croonian Lecture "On the Suspension of the Muscular Powers of the *Vibrio Tricincta*."—Phil. Trans. 1823, Art. 1. He has revived this curious worm after perfect torpidity and apparent death for five years and eight months, merely by soaking it in water.  
† Study of Medicine, vol. 1. p. 457, edit. 1.

the upper part of it, or that immediately connected with the hyoid-bone, the *larynx*: and it is this upper part or *larynx* alone that constitutes the seat of the voice.

The tube of the *larynx*, short as it is, is formed of five distinct cartilages; the largest, and apparently, though not really, lowermost of which, produces that acute projection or knot in the anterior part of the neck, and especially in the neck of males, of which every one must be sensible. This is not a complete ring, but is open behind; the open space being filled up, in order to make a complete ring, with two other cartilages of a smaller size and power; and which together form the *glottis*, as it is called, or aperture out of the mouth into the *larynx*. The fourth cartilage lies immediately over this aperture, and closes it in the act of swallowing, so as to direct the food to the *esophagus*, another opening immediately behind it, which leads to the stomach. These four cartilages are supported by a fifth, which constitutes their basis; is narrow before, and broad behind, and has some resemblance to a seal-ring. The *larynx* is contracted and dilated in a variety of ways by the antagonist power of different muscles, and the elasticity of its cartilaginous coats; and is covered internally with a very sensible, vascular, and mucous membrane, which is a continuation of the membrane of the mouth.

The organ of the voice then is the *larynx*, its muscles, and other appendages; and the voice itself is the sound of the air propelled through and striking against the sides of its *glottis*, or opening into the mouth. The shrillness or roughness of the voice depends on the internal diameter of the *glottis*, its elasticity, mobility, and lubricity, and the force with which the air is protruded. Speech is the modification of the voice into distinct articulations, in the cavity of the *glottis* itself, or in that of the mouth, or of the nostrils.

Those animals only that possess lungs possess a *larynx*, and hence none but the first three classes in the Linnæan system, consisting of mammals, birds, and amphibials. Even among these, however, some genera or species are entirely dumb, as the *myrmecophaga* or ant-eater, the *manis* or pangolin, and the cetaceous tribes, together with the tortoise, lizards, and serpents; while others lose their voice in particular regions: as the dog is said to do in some parts of America,\* and quails and frogs in various districts of Siberia.†

It is from the greater or less degree of perfection with which the *larynx* is formed in the different classes of animals that possess it, that the voice is rendered more or less perfect; and it is by an introduction of superadded membranes, or muscles, into its general structure, or a variation in the shape, position, or elasticity of those that are common to it, that quadrupeds and other animals are capable of making those peculiar sounds, by which their different kinds are respectively characterized, and are able to neigh, bray, bark, or roar; to purr as the cat and tiger kind, to bleat as the sheep, or to croak as the frog.

The *larynx* of the bird class is of a very peculiar form, and admirably adapted to that sweet and varied music with which we are so often delighted in the woodlands. In reality, the whole extent of the *trachea* or *windpipe* in birds may be regarded as one vocal apparatus; for the *larynx* is divided into two sections, or may rather, perhaps, be considered as two distinct organs; the more complicated, or that in which the parts are more numerous and elaborate, being placed at the bottom of the *trachea*, where it divides into two branches, one for each of the lungs; and the simpler, or that in which the parts are fewer, and consist of those not included in the former, occupying its usual situation at the upper end of the *trachea*, which, however, is without an *epiglottis*; the food and other substances being incapable of entering the aperture of the *glottis* from another contrivance. The lungs, *trachea*, and *larynx* of birds, therefore, may be regarded as forming a complete natural bagpipe; in which the lungs constitute the pouch and supply the wind; the *trachea* itself the pipe; the inferior *glottis* the reed, or mouth-piece, which produces the simple sound; and the superior *glottis* the finger-holes, which

\* Pennant, Arctic Zool.

† Muller, Collect. of Russian Discoveries, vol. vii. p. 123.