

**ELEMENTS OF PHYSICS, OR NATURAL  
PHILOSOPHY, GENERAL AND MEDICAL,  
EXPLAINED  
INDEPENDENTLY OF TECHNICAL  
MATHEMATICS, IN TWO VOLUMES,  
VOL. II- PART I: HEAT AND LIGHT**

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**NEIL ARNOTT**

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IN TWO VOLUMES.  
VOL. II.—PART I.  
COMPREHENDING THE SUBJECTS OF  
**HEAT AND LIGHT.**

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BY NEIL ARNOTT, M. D.,  
OF THE ROYAL COLLEGE OF PHYSICIANS.

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## ADVERTISEMENT

TO

VOL. II.—PART I.

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THE second part of volume ii., comprising the subjects of ELECTRICITY, MAGNETISM, and ASTRONOMY, and concluding the work, will be put to press after the publication of the present part. The first volume was originally published without the second, although the whole manuscript was prepared, because other works on Natural Philosophy were offered to public notice about the time. The delay of two years with respect to the second volume has occurred, because the author's very little leisure from the duties of his profession (than which perhaps none more interestingly absorbs the time and faculties) was completely taken up by attending to the repeated calls for editions of vol. i. A friend, however, has superintended the printing of the last edition, and has allowed him to proceed with vol. ii. These explanations are given as an apology to the many persons who have honoured the work by expressing disappointment at the tardy appearance of vol. ii.

The author, while preparing the fourth edition of vol. i., received a copy of a French edition, in which the translator, M. Richard, to fit the work for the general use of public schools and colleges in France, had

given in notes the common algebraical formulæ for the various cases described. The author, at one time, intended to have done this himself, but afterwards determined only to add a few remarks on the subject at the end of vol. ii. To this determination he still adheres. In one of the North American English editions of the work, there are also copious notes, but as the author has not yet been able to procure a copy, he cannot remark upon them.

In the present or fourth edition of vol. i., the subject of speech is still farther analyzed, by a complete explanation of the hitherto unknown nature of the defect called *stuttering* or *stammering*; and the discovery of its nature has suggested to the author an effectual remedy, so simple, that sufferers in general will be able at once to adopt it from the description now given.— That the purchasers of former editions may not be obliged to procure the last on this account alone, the chief additions to the section in vol. i. are here subjoined. They occur at page 610 of the fourth edition; and they should be inserted at page 565 of the first edition, at page 589 of the second, and at page 495 of the first American edition.

*London, November, 1829.*

## APPENDIX

### TO EARLY EDITIONS.

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“The most common case of stuttering, however, is not, as has been almost universally believed, where the individual has a difficulty in respect to some particular letter or articulation, by the disobedience, to the will or power of association, of the parts of the mouth which should form it, but where the spasmodic interruption occurs altogether behind or beyond the mouth, viz. in the glottis, so as to affect all the articulations equally. To a person ignorant of anatomy, and therefore knowing not what or where the glottis is, it may be sufficient explanation to say, that it is the slit or narrow opening at the top of the wind pipe, by which the air passes to and from the lungs—being situated just behind the root of the tongue. It is that which is felt to close suddenly in hiccup, arresting the ingress of air, and that which closes, to prevent the egress of air from the chest of a person lifting a heavy weight or making any straining exertion; it is that also, by the repeated shutting of which, a person divides the sound in pronouncing several times, in distinct and rapid succession, any vowel, as o, o, o, o. Now, the glottis, during common speech need never be closed, and a stutterer is instantly cured if, by having his attention properly directed to it, he can keep it open. Had the edges or thin lips of the glottis been visible, like the external lips of the mouth, the nature of stuttering would not so long have



remained a mystery, and the effort necessary to the cure would have forced itself upon the attention of the most careless observer; but because hidden, and professional men had not detected in how far they were concerned, and the patient himself had only a vague feeling of some difficulty, which, after straining, grimace, gesticulation, and sometimes almost general convulsion of the body, gave way, the uncertainty with respect to the subject has remained. Even many persons who by attention and much labour had overcome the defect in themselves, as Demosthenes did, have not been able to describe to others the nature of their efforts, so as to ensure imitation: and the author doubts much whether the quacks who have succeeded in relieving many cases, but in many also have failed, or have given only temporary relief, really understood what precise end in the action of the organs their imperfect directions were accomplishing.

“Now, a stutterer, understanding of anatomy only what is stated above, will comprehend what he is to aim at, by being farther told, that when any sound is continuing, as when he is humming a single note or a tune, the glottis is necessarily open, and therefore, that when he chooses to begin pronouncing or droning any simple sound, as the *e* of the English word *berry* (to do which at once no stutterer has difficulty) he thereby opens the glottis, and renders the pronunciation of any other sound easy. If then, in speaking or reading, he joins his words together, as if each phrase formed but one long word, or nearly as a person joins them in singing, (and this may be done without its being at all noted as a peculiarity of speech, for all persons do it more or less in their ordinary conversation,) the voice never stops, the glottis never closes, and there is of

course no stutter. The author has given this explanation or lesson, with an example to a person, who before would have required half an hour to read a page, but who immediately afterwards read it almost as smoothly as was possible for any one to do; and who then, on transferring the lesson to the speech, by continued practice and attention, obtained the same facility with respect to it. There are many persons not accounted peculiar in their speech, who, in seeking words to express themselves, often rest long between them on the simple sound of *e* mentioned above, saying, for instance, hesitatingly, "e I e..... think e..... you may,"—the sound never ceasing until the end of the phrase, however long the person may require to pronounce it. Now, a stutterer, who to open his glottis at the beginning of a phrase, or to open it in the middle after any interruption, uses such a sound, would not even at first be more remarkable than a drawling speaker, and he would only require to drawl for a little while, until practice facilitated his command of the other sounds. Although producing the simple sound which we call the *e* of *berry*, or of the French words *de* or *que*, is a means of opening the glottis, which by stutterers is found very generally to answer, there are many cases in which other means are more suitable, as the intelligent preceptor soon discovers. Were it possible to divide the nerves of the muscles which close the glottis, without at the same time destroying the faculty of producing voice, such an operation would be the most immediate and certain cure of stuttering; and the loss of the faculty of closing the glottis would be of no moment.

"The view given above of the nature of stuttering and its cure, explains the following facts, which to

many persons have hitherto appeared extraordinary. Stutterers often can sing well, and without the least interruption,—for the tune being continued, the glottis does not close. Many stutterers also can read poetry well, or any declamatory composition, in which the uninterrupted tone is almost as remarkable as in singing. The cause of stuttering being so simple as above described, one rule given and explained, may, in certain cases, instantly cure the defect, however aggravated, as has been observed in not a few instances;—and this explains also why an ignorant pretender may occasionally succeed in curing, by giving a rule of which he knows not the reason, and which he cannot modify to the peculiarities of other cases. The same view of the subject explains why the speech of a stutterer has been correctly compared to the escape of liquid from a bottle with a long narrow neck, coming—“either as a hurried gush or not at all:” for when the glottis is once opened, and the stutterer feels that he has the power of utterance, he is glad to hurry out as many words as he can, before the interruption again occurs.

“Should the author’s future experience enable him to simplify or render more complete the views of the nature and cure of stuttering, which he has given above, so as to facilitate the cure in every variety of case, he will not fail to publish his remarks.”