

A practical inquiry into disordered respiration; distinguishing the species of convulsive asthma, their causes and indications of cure / [Robert Bree].

Contributors

Bree, Robert, 1759-1839.

Publication/Creation

London : M. Swinney for T.N. Longman and O. Rees, London, 1803.

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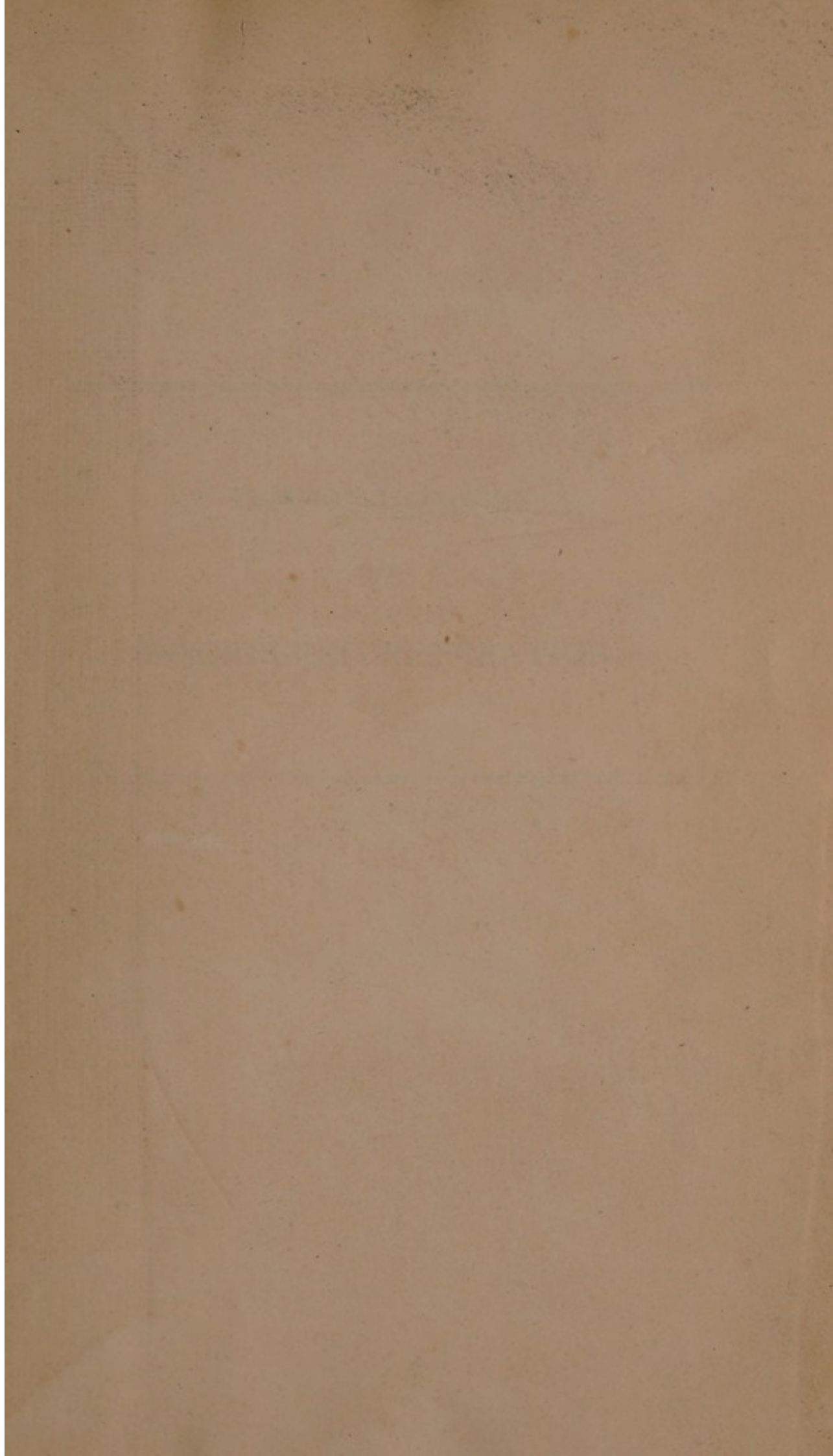
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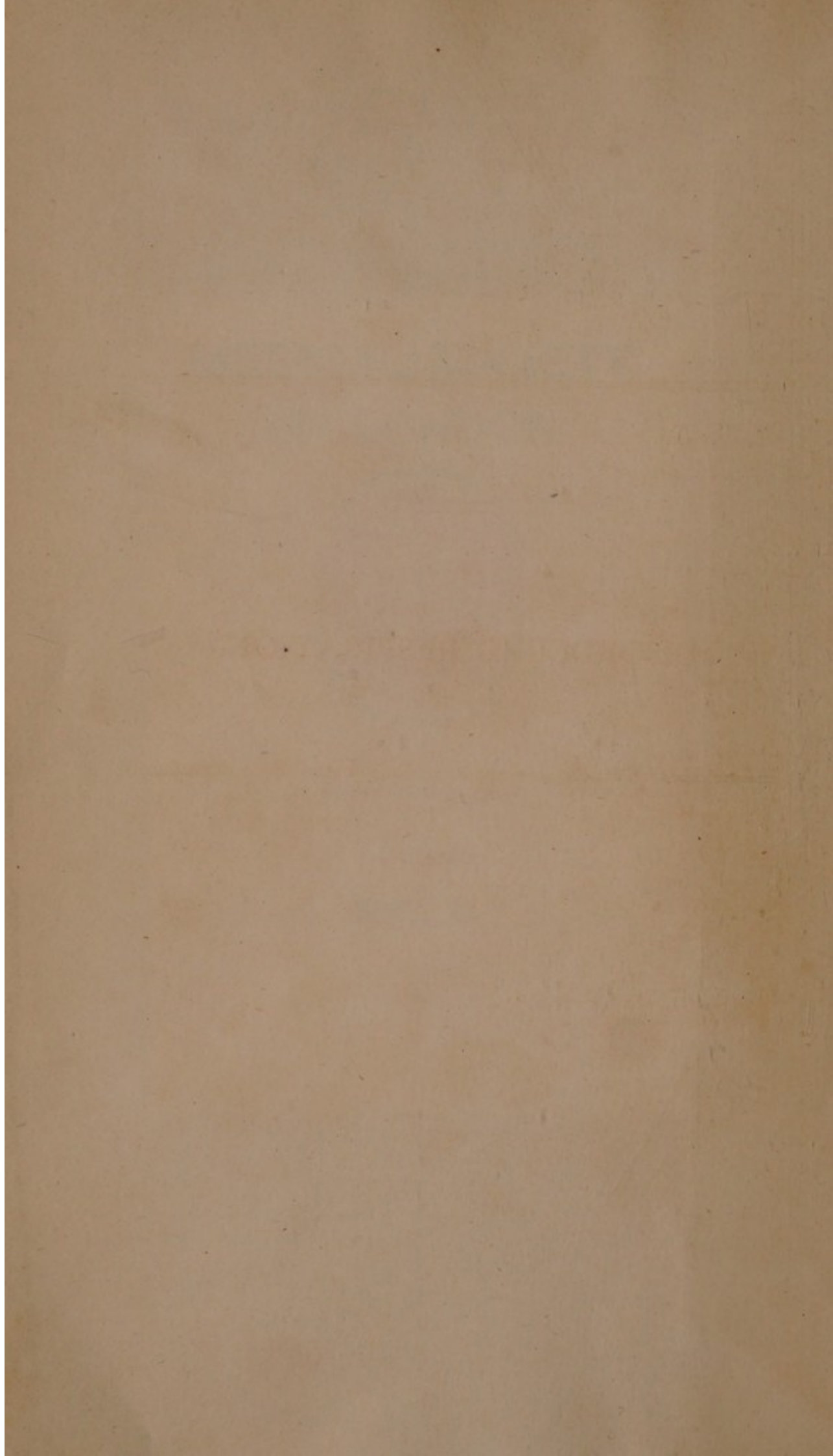


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PRACTICAL INQUIRY
INTO
DISORDERED RESPIRATION.

THE ALBANY

DISORDERED REFORMATION

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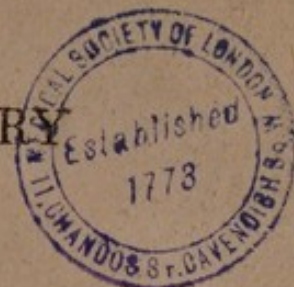
THE

DISORDERED REFORMATION

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A
PRACTICAL INQUIRY
INTO
DISORDERED RESPIRATION;
DISTINGUISHING,
THE
SPECIES OF CONVULSIVE ASTHMA,
THEIR
CAUSES AND INDICATIONS OF CURE.



BY ROBERT BREE, M.D.
PHYSICIAN TO THE GENERAL HOSPITAL, AND DISPENSARY,
AT BIRMINGHAM.

THE THIRD EDITION,
Corrected and enlarged.

WITH AN
APPENDIX.

—❦—
“ Quis diu expirat? Omnia corporis aut incommoda aut pericula per me
transierunt; nullum mihi videtur molestius. Quid ni? Aliud enim, quicquid
est, ægrotare est; hoc est animam agere. Itaque, medici hanc meditationem
mortis vocant.”

Seneca de Suspirio, Epist. LIV.

PRINTED FOR T. N. LONGMAN AND O. REES, PATERNOSTER-ROW,
LONDON,

BY M. SWINNEY, BIRMINGHAM.

1803.

“ Porro observandum, quoties hujusmodi distinctionem morborum exponere conati fuerimus, id commodi oriturum, quod hujus distinctionis vel defectus, vel errores, facillime percipientur, et cum percepti, vel ad observationes jam factas accuratius considerandas, vel ad observationes postea diligentius faciendas, ducent.”

CULLEN PROLEGOMENA.

INTRODUCTION TO THE SECOND EDITION.



THE first Edition of this INQUIRY was published with some precipitation, but though it had the faults of diffuseness, and want of perspicuity, it obtained the sanction in this country, and abroad, of names long celebrated in science.

After having been translated, upon the Continent, and noticed, with approbation, by the Professor of the Practice in the Edinburgh University, in his public lectures, it seemed to be entitled to improvement in a Second Edition, which had been much demanded.

It may, however, be remarked, that, in the copiousness of the first Edition, there are authorities, which, if I had not adduced, I might have expected the charge of assuming

too much ; as, by adducing them, I hazarded that of writing too much. Opinions on *ASTHMA* were so established, that facts which opposed them might have been denied, if full evidence had not been given in their support.

On this account I saw, with indifference, that the *INQUIRY* would be considered tedious by many readers who were not likely to assent to my method of proof, or to pursue an object which might invalidate a theory they had found agreeable, because readily practised upon.

I purposed to inquire, what had been really done by any Author, at any time, upon the subject of *ASTHMA*? In such a retrospect, repetition could scarcely be avoided ; but it seemed to be necessary, in opposing with success, the obstinacy of modern prejudice. Ancient description corresponds with the present state of the disease, although modern observation very slightly acknowledges the resemblance. In our times, the principal feature in the most considerable

Species of the Disease is a subordinate object of attention; and if it were proved to be a cause by every other mode of evidence, demonstration would be still demanded before a material excretion, obvious to the senses, would be preferred to the theory of an invisible action that had rivetted the attention of the Schools.

I therefore took the aid of dissections, to which I owe a part of the facts leading to a conclusion.

It may be said, that the appearances in these dissections did not belong to cases of Convulsive Asthma, or that they were effects of the disease: but compare them with the description of CÆLIUS AURELIANUS, and afterwards with that of Dr. BEDDOES, in the instance of Mr. BAYNTON's patient, and the identity will be manifest. Will the objectors to minute inquiry see no advantage in this coincidence in character and description? and, if they do, is it a matter of indifference that the antients should be examined for the purpose of recovering a

natural record that had been suppressed or lost?

Thus the most copious effusion may happen, in one Species of Asthma, and the patient may recover; and the effusions that were found by dissection were not necessarily *effects* of disease, and still less probably the consequences of death.

That diseases alter by time or climate may be an argument against going out of our country, or looking beyond the present period for information. But it can scarcely be considered probable, that one of the strongest features of a disease of so peculiar a character, should be erroneously described in every age; or, if truly described, that it would suddenly disappear in this age, and in the meridian of Edinburgh.

But the doctrine that ASTHMA existed *without a manifest cause, or any attendant disease*, superseded demonstrated facts, and was calculated to produce the worst effects in practice.

I must, however, disclaim the intention of depreciating the high reputation which is due to the memory of Professor CULLEN. I confine my objections to his theory on ASTHMA; nor do I offer them with satisfaction. I respect and value his labours, which have been so conducive to the interest of medicine. Were his successor to deliver a doctrine, that I had found questionable and productive of uncertainty or inconvenience in practice, I should not hesitate to give an opinion, opposing its influence. But for Dr. GREGORY, I have a friend's regard, united to a pupil's gratitude, and respect matured by long reflection on his talents. A contest, with a view to perpetuate posthumous fame in every particular of an extensive system, is more than the late Professor ever meditated upon: and it will be an arduous task to maintain it. "Rational Practitioners," says a liberal and judicious writer, "disdain to rank themselves as "implicit followers of any dogmatist, how-
"ever celebrated;" yet others more captious would preclude the questioning of tenets they had themselves received; or the ex-

amining, with impartiality, the opinions of the dead.

In a friendly intercourse and correspondence with Dr. BROWN, principles were discussed rather than dictated. I never observed his kindness to cool in consequence of my opposition to particular points, which I thought his ardour carried too far.

His system is not more prejudicial to industry than the Spasmodic theory, as it regards ASTHMA, seems repugnant to investigation. It affords a constant resource to the indolent or incurious from the trouble of tracing a cause, really existing in some material to be removed, or some injured function to be restored.

The usage and authority of a few years made it necessary to go back for ages into the history of ASTHMA, whilst the *onus probandi* should have been sustained by those who gave the disease a new character. I endeavour to prove the negative of their proposition, affirmed in defiance of all former

observations, and which they offered no evidence to support.

But the most valuable object in recovering the original history, is the means it supplies of explaining the principle of other species, where the cause is less clear.

It has been said that citations of authors are not a certain proof of learning; but if an acquaintance with these authors were essential in an important inquiry, I think that before it were attained, the inference from the want of it would be determined to be a just, or a fallacious one.

Having experienced the bad effect of reading, I had not applied to medical books for a considerable period, and was not gratified by the perusal of ZOONOMIA till the year 1796, when it had been some time published. I had previously satisfied my mind as to the principles of the disease I had suffered; and I then saw, with great emotion, that they were supported by the pathology of that admirable work, whilst

my views were enlarged by the rich assemblage of natural facts that it contains.

It is no uncommon thing to contemplate a fact newly proved, without surprize, though its existence had previously been disputed, or even considered impossible. Some carry this apparently artless, and incurious manner to a great length. They do not assent to a position, nor oppose it; but, when convenient, embrace it, as a portion of established knowledge, which having been long acquired, had become familiar.

If the Public were possessed of the causes of the Species of ASTHMA before my INQUIRY appeared, it must have happened by accident.

No one had looked at the external signs as effects from which causes could be traced; the signs themselves were not clearly understood, and still less their indication.

It is easy to assert causes, but the method of induction can alone establish their value

and truth. The result may be called theory; but a collection of inferences drawn from facts, is entitled to practical confidence, and a sanction which can never be given to any theory founded on mere hypothesis.

But inferences, from facts, will not always be the same; and I am far from assuming that mine are infallible. I have attempted a method that is apparently proper, and it has produced me a portion of success on which I reflect with satisfaction.

Theories, built upon hypothetical foundations, are one cause of the turn for quackery that infests this country: and an authoritative delivery of principles that are confuted by nature, may be as injurious to the credit of physic here, as the tenets of blind bigotry in other countries have been to the professed objects of morals and religion.

And yet it is to be lamented, that useful research in medicine is frequently disdained; and, that copious as the *materia medica* is, the high-sounding praise of some new article,

is more countenanced than a just distinction of diseases, which can alone insure it a successful application.

The experienced and the grave are confounded, or abashed into silence, by the confident assertions of the bold and superficial; and, when the bubble bursts, they too often permit the author to escape from his own recollection of what he had promised. Are not these practices so nearly allied to plain empiricism as to deserve contempt and reprobation, instead of credit and protection? But if Physicians yield to the impulse, we cannot be surprized that a credulous Public should follow their example.

In fact, empiricism seems to infect all ranks, and to meet with so little opposition from the adherents of science, that the former seduces multitudes to her standard, while the latter, by a sort of negative connivance, seems to favour the desertion.

The predisposition to this mania is man's ignorance of his own body, and the natural

laws that regulate its motions. It is of general interest to know, that the external muscles re-act in a convulsive manner to relieve the internal functions from injury or interruption: and that Convulsive Asthma is a muscular re-action to accomplish this object.

If true principles, exertion, and disinterestedness, be neglected, we may at length be mortified by that state of public opinion which prevailed at Rome when the books of HIPPOCRATES were contemned, and the nostrum of Mithridates was enquired for with solicitude.

JUNE, 1800.



PREFACE.

IF the first merit of a Book be "the making itself read," it must be allowed that the following Inquiry has been distinguished by the Public, and by professional Men.

The two first editions have been exhausted in less time than is usual for the sale of works of Science, and the Third is now offered with more confidence, as it has been greatly demanded.

It may be satisfactory to the Reader to view the outline of the work, before he enters upon it. He is therefore referred to page 275, where he may find a summary recapitulation of the Facts and Inferences.

Birmingham, July 1, 1803.

PRactical INQUIRY

INTO

Disordered Respiration, &c.

PART I.

SECT. I.

Asthma a general name for disordered respiration.—Violent muscular action indicates IRRITATION; as in the stomach, gall duct, bowels.—Irritation in the pulmonary organ.—DIFFICULTY OF BREATHING, this term does not explain the natural fact; always to be referred to IRRITATION.—A more precise idea of the instruments of convulsive respiration.—Analogy of the perception of IRRITATION in the lungs, and in the rectum and bladder.—Motus Medicati of Gaubius.

ASTHMA, in its original meaning, long continued to embrace all the cases of difficult respiration: but nosologists have lately confined the term to a peculiar form of this general affection. If we go back to the time of WILLIS, we shall not find in the period which has elapsed since his writings appeared, much improvement in the pathology or treatment of this disease. “Asthma,” says this author, “dicitur ab ἀσθμαίνεiv, (quod est “anhelare, sive difficulter respirare) et describi

“ potest quod sit *respiratio difficilis, crebra, et anhe-*
 “ *losa, cum magna pectoris agitatione, et plerumque*
 “ *citra febrem*”*

FREDERIC HOFFMAN gives the same latitude to the term in the following description:

“ Hoc vero (Asthma) secundum nostram sen-
 “ tentiam nihil est, quam *impedita et laboriosa*
 “ *admodum respiratio, cum ineffabili anxietate, et præ-*
 “ *cordiorum angustia juncta, liberum sanguinis per*
 “ *pulmones circuitum turbans, a variis causis suborta,*
 “ *periculi suffocationis non expers.*”†

These authors adopted the Greek word as the head of a class of specific forms, and afterwards distinguished the several causes which, according to their observations, were productive of that uniform apparent effect “difficult respiration.”

If it be necessary to define the disease, I would say, agreeably to the principles in this Inquiry, *Asthma is an excessive contraction of the muscles of respiration, usually called difficulty of breathing without acute fever, excited by some irritation in one of the viscera which these muscles serve.*

* THOMÆ WILLIS Opera Omnia. Genevæ, 1680. Tomus Posterior, caput. xii. de Asthmate.

† FREDERICI HOFFMANNI Medicin. Rationalis Systemat. tom. III. sect. II. cap. II. § II.

Under this generic definition are comprehended all affections not febrile, attended by uncommon action of the muscles used in respiration. The influence on these muscles being the same in kind, though distinct by situation and quantity of force, as it may exist in some of the lower viscera, or in the lungs. In the species commonly termed *convulsive or spasmodic*, the muscles are contracted with more violence than in any other, but the contractions, in this case, do not obey any law, nor assume any form which is not common to the action of the same muscles in milder instances of dyspnœa.

The difficulty of assigning to a disease its true origin, will be considerably encreased by neglecting a strict observation of its characteristic symptoms; but Asthma has been more subjected to the caprice and hypothesis of prevailing theories, than any others whose appearances could be as distinctly traced to a material exciting cause.

Spasmodic contractions of the alimentary canal, excited by particular irritations, have been considered by all physicians as clear evidence of the impatience with which the animal system suffers the slightest interruption of its functions. It is agreeable to reason and philosophy to infer that such actions, in whatever organ they occur, are

exerted by nature for some salutary end. If a material stimulate the stomach, by its quality or quantity, so far as to impede the digestion of food, it must be ejected by vomit for the safety of the body. If a gall stone, by stopping the duct, prevents the discharge of bile into the bowels, the animal motions are increased, and the excess of muscular action is intended to remove the obstruction. If scybala be included in the cells of the colon, there is no regular peristaltic motion after the inconvenience has been felt. Convulsive contractions will come on, and continue till the offending matter be discharged.

ALEXANDER MUNRO, senior, has stated the nature of muscular exertions for the relief of the body, as follows: "Whenever the uneasy sensation, pain, is raised by the too strong application of objects, a sort of necessity is, as it were, imposed upon the mind, to endeavour to get free of the injuring cause, by either withdrawing the grieved part of the body from it, as one retires his hand when his finger is pricked or burnt; or the injuring cause is endeavoured to be forced from the body, as a tenesmus excites the contraction which pushes acrid feces out of the rectum. In both these operations, a convulsive contraction is immediately made in the lesed part, or in the neighbourhood of it; and

“ if the irritation is very strong or permanent,
“ the greater part of the nervous system be-
“ comes affected in that spasmodic or convulsive
“ way.”*

The cause and object of these convulsive motions are also strikingly delineated by the author of *Zoonomia*. Convulsions naturally follow the irritation of a fibre, and may be justly considered as evidence of some injury to be repelled, or some offensive matter to be discharged.†

But if these natural laws have been applied in some instances of violent muscular contractions, yet irritations seated in the viscera of the thorax or abdomen which may produce the convulsions of Asthma, have been much neglected: though any irritation in these cavities may cause the associated actions of all the muscles of respiration in conformity to the above principles; and though there be clear evidence in many cases that they occasion effects which are common to all the species of Asthma.

If a vomica, or some other inconvenience equally oppressive, exist in the lungs, the cause is

* ALEX. MUNRO, senior, on the nerves, 66. k.

† Vide *Zoonomia*, vol. I. sect. VIII. and X. 2.

so clear as to preclude dispute, but even here it has not been usual to refer to the principle by which it offends. Physicians have spoken vaguely of a mechanical obstruction, instead of attempting the discovery of a common cause by which the effect may be explained, agreeably to the simplicity of natural laws.

Asthma is said to be distinguished by difficulty of breathing. "*Spirandi difficultas*,"* but it is necessary to understand in what sense the expression is to be taken; since terms may have been long applied to a disease and received by prescription as a proof of its character, when examination may shew the fallacy of the conclusion.

It is certain, that when no unnatural irritation exists, the functions of the lungs are carried on in the calmest manner, and there is neither an excitement to full inspiration, nor a necessity of renewing, by one effort, the whole measure of air which filled the cavities of the organ. Respiration has frequently been so imperceptible in some conditions of the body, that observers have been uncertain whether life were extinct or not.

* CULLEN. Nosolog.

The quantity of air inspired is also different in different men, and in the same man at different times: hence philosophers have varied in their accounts of the measure of air taken in at each inspiration.

BORELLI* makes the quantity to be from 15 to 20 cubic inches in one ordinary inspiration, whilst Dr. GOODWIN says, the greatest quantity received in the same effort, is 12 cubic inches, expanded in the lungs to 14.

The quantity usually expired is equal to 40 cubic inches, as stated by Messrs. JURIN, HALES, HALLER, SAUVAGE, MENZIES, &c.

Dr. GOODWIN† informs us, that the air remaining in the lungs after complete expiration, is 109 cubic inches, and that the proportions of the dilatation of the lungs, before and after a healthy inspiration, are as 109 to 123.‡

But according to Dr. MENZIES,|| the dilatation of the organ in the same circumstances, is in the proportion of 179 to 219.

* On the Motion of Animals, p. 119, 133.

† Connection of Life with Respiration, p. 27.

‡ GOODWIN, p. 37.

|| MENZIES on Respiration, by SUGRUE, p. 32.

There is, therefore, in health, no determinate quantity of air consumed in respiration; and in disease, if an organ of the breast or belly be not irritated by some extraneous matter, the respiratory muscles are not forced into any unusual action, though the difference between the efforts of "an *ordinary* and *full* inspiration, is as 14 to 200 "cubic inches."*

The *difficulty* will then be said to consist in obtaining, at each inspiration, a measure of air equal to 12 cubic inches, which is sufficient for the system in ordinary health: yet it is not shewn with how small a proportion of atmospheric air life may be sustained, whilst its purity remains at the usual standard. In sleep the inspirations are very infrequent, and sometimes without any perceptible elevation of the breast. But some animals pass their winters in sleep,† and emerge from it in spring with increase of fat.

Divers in the pearl fisheries are said to remain under water half an hour or longer. DIEMERBROECK‡ relates an instance of a diver remaining in the sea that length of time under his observation.

* Vide Dr. GOODWIN, p. 32, note.

† HALLER Element. Physiolog. I. 39.

‡ Anatomes, lib. II. p. 464.

A rustic appeared to die of the plague, and after three days discovered no signs of respiration, but on being carried to the grave recovered, and lived many years afterwards.*

Instances of apparent death from drowning are numerous, and consequent recoveries since the establishment of the Humane Society are authenticated beyond suspicion or doubt, to the honour of that invaluable institution.

Many curious histories are extant of persons roused from the tomb of death by accident or design, and may be seen in DIEMERBROECK, Lib. II. JOANNES MATHÆUS, Quæst. Med.—PHILIP. SALMUTH. Cent. 2. Obs. 86, 87, 95.—HILDANUS, Cent. 2. Obs. 95, 96, and other writers.†

It would appear from these circumstances that the animal œconomy will admit of great latitude preserving the exercise of its functions, though the quantity of air inspired be much smaller than it is possible to ascertain.

* DIEMERBROECK Tractat. de peste. lib. 4. hist. 85.

† Add to these facts, the curious relations of the discovery of living toads in the stems of elm and oak trees, by the Academy of Sciences of Paris, 1719, 1731.

HALLER attributes to the act of expiration, such a condition of the lungs as even obstructs the circulation of the blood through them.

“ In expiratione vero pulmo undique urgetur,
“ et in multo minorem molem comprimitur:
“ vasa ergo sanguinea breviora quidem fiunt cum
“ retractis bronchiis, eademque angustiora nunc
“ sunt, siquidem pectus secundum tres suas
“ dimensiones arctatur.”*

In this state of collapse recurring at every expiration, we should, at all events, experience great distress alternating with the inspirations, if the freedom or difficulty of breathing were to depend very critically on the portion of air measured out of the atmosphere, and received in the cavities of the lungs. This nicety is not essential to the œconomy of the pulmonary system in its simple and healthful arrangements, but as soon as the organ feels the inconvenience of unnatural compression, the muscles are excited into more or less energy of action. If the compression be external to the air cavities of the lungs, the labour will not be so great as if the cavities themselves were obstructed, and the precise symptoms of Periodic Convulsive Asthma may not all be present, but *Continued Asthma* or *Dyspnœa* will.

* HALLER, lib. VIII. sect. 4.

Whenever, then, a compression, or some organic derangement irritates the lungs, the effort which has been commonly called *Difficulty of Breathing*, is excited. In the instance of hydrothorax, the compression arising from an extraneous material, there is considerable dyspnœa, but in the expiration of HALLER the compression being a natural operation of the system, is not attended with uneasiness, and scarcely with conscious perception.

It may, therefore, be concluded, that this popular term, *Difficulty of Breathing*, can only relate to such extraordinary contractions of the respiratory muscles, as are designed to remove offence; there being no data in existence to prove that the functions of the animal system will be stopped by the atmospheric air being diminished to any specific measure, however small, in ordinary respirations.

But besides this mistake, respecting the final cause of extraordinary respiration, some confusion of ideas has prevailed, as to the means of relief employed in Asthma. The instruments which nature can alone call into action when the lungs are injured or oppressed, are the muscles which act externally in expanding or compressing their

cavities, for the purpose of inspiring or expiring air.

The convulsions are, therefore, external to the lungs as far as any appear. It is not, however, wonderful, that a mistake should have occurred, as to the proper instruments of relief, since almost all the motions called *spontaneous*, are performed without our consciousness; in some, not only the muscles employed, but the effects of their actions are unknown.

The muscles of respiration are susceptible of spontaneous actions, and the constant repetition of such actions introduces paroxysms, frequently without a perceptible interval between their excess and common standard. When the excess becomes considerable, it brings on associated contractions of other muscles, and the irritation, which they are to discharge from the cavities of the breast or abdomen, is so acutely felt as to turn the patient's attention entirely to the seat of the cause. There may be the additional cause of this sensation in constrictions of the bronchia corresponding with the external contractions, but of this state there has yet been no proof.

The subject is illustrated still more by an irritation in the intestinum rectum. All the

attention of the patient is then turned to the execruciating tenesmus, but it is certain that the violent peristaltic action above the rectum, and the strong contractions of the abdominal muscles and of the diaphragm, are the instruments employed to evacuate the offence, and also very materially occasion or increase the pain in the portion where it rests.

In the discharge of urine the chief perception of irritation is in the bladder, but if the muscles which have been stated to act in expelling feces, did not contract with great effort, the perception could not be so strong, since the propelling of the contents of the bladder towards its neck must precede the relaxation of the sphincter. Yet the attention of the animal rests upon the effect, and the particular seat of the cause of these efforts, although no motion be at present performed by the bladder. Afterwards by the uniform and steady contraction of its own muscular coat the urine is expelled.*

Exactly this degree of perception of stimulus incites the actions of the respiratory muscles when the lungs are to be relieved. And the mind seems to have the same degree of consciousness of

* MONRO on the Nervous System, chap. XXVIII.

the effect to be produced whenever the irritation may be said to create *anxiety* and *stricture about the sternum*.

We have hitherto supposed that the irritating cause of Asthma may chiefly exist in the lungs, but the definition of this disease implies that it may also exist in some of the abdominal viscera: a position which may be defended by the most certain principles of physiology, and which I hope to establish in the progress of this Inquiry.

The contractions of the respiratory muscles are really *motus medicati*, as GAUBIUS terms them in the following just description.

“ Multifariæ autem, quibus corpus vivum pol-
“ let, vires motrices, quum rebus nocivis irritatæ
“ semet exserunt, præcipuum præstant vitæ ac
“ sanitati præsidium.—Inde profluunt motus auto-
“ matici, irregulares quidem multimodis, at sæpe
“ beneficentissimi, certaue determinatione ad sa-
“ lutarem finem tendentes; etiamsi mente nec
“ imperante, nec conscia, et vel invita quoque,
“ fiant, hujusque adeo consilio nequaquam tribui
“ possint. His si careret homo, nulla vel sanitati
“ constantia, vel morbo medela foret.”*

* GAUBII Institut. Patholog. Medicin. 640.

For the further advance of this object of restoring health or averting evil, sympathies are established in the animal œconomy, which rapidly excite a unity of effort in muscles which at first are intended for separate duties. “Accedit
“partium facultatumque consensus ac conspi-
“ratio qua mutuam sibi opem ferunt, aliæ alia-
“rum vice funguntur, sanæque pro afflictis in
“motus medicatos ruunt; ut horum junctis viribus
“tanto minus resistere imminens præsensve mor-
“bus possit.”*

It is very convincing that the muscles of respiration may be so habituated to the operations of this sympathy, as to contract from various and apparently dissimilar species of stimulus. Thus the diaphragm and abdominal muscles naturally support three functions, viz. of *respiration*, and of evacuations from the *intestines* and *bladder*. They are then instruments of relief common to these three functions, when disturbed by too much irritation. Such a communication creates some alliance between them and other muscles which are not common to the three functions, but which are rather appropriated to the separate duty of serving one.

* GAUBII Institut. Patholog. Medicin. 642.

A repetition of contractions produces the habit and facility with which these muscles, from an irritation in any one of the three systems, unhappily proceed to excesses of involuntary action, influencing at once, respiration, digestion, and urinary excretion.

SECT. II.

The nature of the IRRITATION in Asthma; frequently manifest; sometimes obscure.—The CONTINUED ASTHMA of Floyer from MANIFEST IRRITATION.—Cases of irritation producing Asthma, assented to by medical authorities from their evident offence.

IN some cases of excessive respiratory labour, the nature of the irritation may be discovered by symptoms which admit of no doubtful pathology, but in many others physicians have declared their uncertainty by resorting to conjecture and theory, which have been ingeniously built on the basis of hypothesis, but which experiment has not yet confirmed, nor dissection ever defended.

The cases of manifest material irritation are enumerated by Dr. FLOYER as one species of the Asthma, which he calls *continued*. He considers it as dependent on a primary disease, which must be removed before the Asthma will submit.

In my opinion, his causes of the continued Asthma strongly support the following proposition, that, "*the excessive contractions of the muscles of respiration indicate an injury or irritation in some organ which those muscles serve.*"

For this reason a general view may be taken of such manifest and undeniable irritations as have been observed by practical authors, before we pursue the other parts of the subject.

Hydrothorax occasions Asthma by an external compression of the air vessels of the lungs,* and it is also too often the consequence of Asthma, when that disease is inveterate. Vide CAROL. Piso de Morbis ex sero p. 217.—BAGLIVI Praxis, p. 107.—GOODWIN on animal life and respiration, where is an example of this cause of Asthma, artificially produced. Also BONETI Sepulchret. Anatom. tom. i. p. 515, 516, et insequent.—Mr. CRUIKSHANK on the absorbent system, p. 116.—MORGAGNI, lib. ii. epist. xvi.

Similar to this cause of Dyspnœa is the Hydrops Pericardii. MORGAGNI, lib. ii. epist. xvi.

An Empyema, abscess, or large tubercle: steatomatous tumour, &c. in the substance of the lungs or on their investing membranes.

Vide JACOB WEPSE, exerc. de apoplexia. BONETI Sepulchret. Anatom. Mangeti. tom. i. p. 352, 353, 498, 499, 500, &c.—COLUMBUS, lib. xv.

* Vide HALLER, ad BOERHAAV. Prælect. § 102. not. 17.

—CAR. Piso de morbis a sero, sect. iii. cap. 4.—
BAILIE's morbid anatomy, p. 46, et inseq.

In the instance of a vomica* there is no distinction to be observed, between the manner in which nature attempts to expel it from the lungs, and her efforts in a paroxysm of spasmodic Asthma, whatever the cause of this disease may be.

T. W. has been seized with these symptoms at the approach of two successive winters, and they terminated by the rupture of a vomica, which, in the first illness, was many weeks before it broke; in the second not so long, nor was the discharge so large: in the interval he was in his usual health. In this case the difficulty of breathing commenced after exposure to violent heat, and to the vapour of aqua fortis in refining gold; a slight cough, but interrupted and useless, attended the dyspnœa; in a few days he perceived an increase of dyspnœa, and great flatulence of the stomach: then a paroxysm of laborious respiration, preventing the continuance of sleep, returned every night with the regularity of a fit of periodic Asthma, from which an ordinary observer could not in the

* TULPII observat. med. lib. ii. cap. x.—JODOCI Lommii
Medicin. Observat. lib. ii. HIPPOCRAT. lib. iv. epid. 6—4.

least distinguish the disease, though the difference might be found by attention to collateral symptoms; the pulse was full and hard as in other inflammations, and a pain, not pungent but oppressive, was felt where the disease lay. In the progress of the disorder the expectoration of fetid pus, in large quantity, declared the nature of the inconvenience which irritated the lungs.

BARTHOLINE* gives a very fortunate instance of the cure of a secret vomica exciting Asthma, and wearing away the body. The patient was wounded by a sword, the point of which passed between the ribs, and opened the sac. The effusion of pus was attended to, and the patient was restored to health.

A brave officer was shot through the lungs at the battle of Quebec, and was cured of his wound, and an Asthma at the same time. It is probable some organic derangement was removed, as in the case related by BARTHOLINE.

Polypous concretions in the ventricles of the heart, and pulmonic vessels, are considered by HOFFMAN as a frequent occasion of difficulties of breathing. In his Consultations he appears to

* Histor. Anat. 14. Centur. 6. Vide FERNELIUS Patholog. lib. v. cap. x.

extend the influence of this state much farther than the general result of Asthmatic Paroxysms will justify. However, dissections have proved that this condition often prevailed, but in some instances, if not in all, it may be suspected to have been rather the consequence than the cause of Asthma. See TULPIUS, lib. i. cap. 27.—RIVERIUS, Centur. i. obs. 82.—BARTHOLIN de Lact. Thoracic. cap. xiv.—MALPIGHIIUS de polypo dissertat.—BONETUS,* tom. i. p. 128, 130, 527, 528, et inseq.—WILLIS de Affect. Hystericis et Hypochondriacis.—MORGAGNI, epist. xv. xvii. xxiv. xxvi.

Aneurismal enlargements of the heart and of the aorta; ossifications, earthy depositions and alterations of its structure, are treated of in Dr. BAILLIE's morbid anatomy of the human body. MORGAGNI, epist. xv. xvii. xxiv. xxvi.

Calculous concretions in the trachea, and in the substance of the lungs, have been met with; also earthy and bony substances.—BAILLIE's morbid anatomy, chap. iv.—MORGAGNI, lib. ii. epist. xv. et inseq. epist. xxiv.—DIEMERBROECK anatom. lib. ii. p. 443.—BARTHOLIN. anatom. reform. l. ii. c. ix.—KERKRINGIUS, Obs. Anat. xxvii.—BONETI Sepulch. Anatom. tom. i. p. 485, 501, 502.—

* BONETUS Mangeti, Lugduni, 1700.

FABRIC. HILDANUS, cent. ii. observ. 29.—Miscell. Curios. Anni. 1671. observ. 181. In this latter instance there is the remarkable assertion that respiration was not affected. PLATERUS Pract. lib. i. sect. 2. c. 4.—SCHENKIUS Obs. Med. rar. lib. ii.—BOERHAAVE Prælect. in Institut. § 835.—MORTON. Phthisiolog. lib. iii. cap. 6.

Bones, and other hard substances, have passed down the trachea, and created certain Asthma. TULPII Obs. lib. ii. cap. 7.

Concretions have been coughed up of different kinds, so large as to create astonishment in the relaters. KOEHLERUS* speaks of them as very large. MORGAGNI saw one expelled by cough as big as a peach stone. ÆTHÆUS† describes one as large as a walnut, coughed up by a girl of fourteen.

Carcinomatous tumours have been dissected from the trachea. BONET. Sepulc. Anat. tom. i. p. 485.

Ossifications of the pleura, vide BAILLIE'S Morbid Anat. p. 40.

* *Commerc. Litter. A.* 1741.

† Vide SCHENKIUS *ad loc.* cit.

The rings of the trachea have become more or less ossified, the cartilage being converted into bone. In this case, says Dr. BAILLIE, "the mucus will not be so readily expelled by coughing, as the expirations cannot be so forcible."* See MORGAGNI, epist. xv.—Tumours in the trachea have been often remarked.

Fat or a tumour of the thymus gland. The thymus has been known, in some instances, not to diminish as the subject advanced in years; in others it has even increased from disease.—BONETI Sepulch. Anatom. tom. i. p. 486, 504.—BAILLIE'S Morbid Anatomy, p. 73.

Gibbosity is a well known cause of difficult respiration. This irritation being permanently and rigidly fixed, either in the sternum or spine, the disease remains inveterate as the cause.† LOMMIUS‡ says, if a person become gibbous before puberty, in consequence of Asthma, he dies; in which he follows the prognostic of HIPPOCRATES aphor. 46,

* Morbid Anatomy, p. 59.

† Mr. CHESHIRE, of Hinckley, in Leicestershire, by the adoption of just principles, and careful deductions from experience, has attained astonishing success in treating many hopeless cases of gibbosity.

‡ JODOCI, Lommii Obs. Med. lib. ii. p. 140. MILLAR on the Asthma, p. 114. GLISSON de Rachitide.

sect. 6, but it is highly probable that Asthma may be the consequence of the gibbosity, or at least of such an alteration of the structure of the spine or sternum, as may disturb the function of the lungs in several ways, before it be observed, and acquire the term of gibbous. These authors have, in that case, substituted cause for effect.*

An ulcer in the sternum, from a removal of an excrescence, has been followed by Asthma. See HOFFMAN de Asthmate et Consult. et Resp. Med. HILDANUS Cent. 6, Obs. 74.

Adhesions of the lungs to the diaphragm, pleura, and pericardium, have been frequently found by dissection; these are consequent to inflammation, and it is obvious that Asthma may attend this organic alteration. BONETUS, tom. i. p. 509, 512.—BONTIUS, Med. Indor. Observ. vii.—WILLIS Pharm. Rat. part ii. sect. 1, c. 8.—

* The aphorism of HIPPOCRATES creates considerable confusion in its ordinary interpretation.—SEVERINUS (lib. de abscessibus), proposes a reading which clears the difficulty and makes the sense more consistent with the opinion above delivered, and with the probable meaning of HIPPOCRATES. For ἐξ read ἐξω and the passage will stand thus, ὀξόσοις ὑπὸ ἐξω ἄσματος, ἥβητος γίνονται, &c. ἐξω signifies *præter* as well as *extra*. The sense will then be, "qui præter anhelationem et tussim gibbi quoque fiunt, eos ante pubertatem mori." See BONET. de Gibbositate.

HIPPOCRAT. lib. ii. de morbis pulmon. &c.
MORGAGNI, epist. xvi.

These adhesions are said, by DIEMERBROECK, to be found in one third of the subjects opened. TULPIUS affirms that the lungs, in very few bodies, are entirely free from such appearances.

The straining of the lungs, by running, is mentioned by FLOYER, by which injury may happen to the membranes or fibres in the interstices of the air cells.

Flatus in the colon and stomach are seldom absent in the spasmodic Asthma, and if such a state of those viscera be attended with continued dyspnœa, the disease may still be accounted a variety of the other species, in which it will appear that the periods of intermission are very uncertain, and sometimes lost in the advanced stages of the complaint, or when it is complicated.

Tumours of the lower viscera, schirrous, hydropic, steatomatous, or flatulent, produce Asthma by exciting an excessive action of the thoracic and abdominal muscles, intended to assist the functions which these tumours distress. Instances are numerous, in practical authors, of the inconvenience

of such causes. The gravid uterus is a very general occasion. Ascites and Tympanites produce the same effect. Dr. FERRIER* has a curious instance of tympanites, in which the omentum was found lying in a sac formed in the diaphragm, on the right side of the thorax; Asthma was an inevitable symptom of such a situation of the viscera.

Fat and steatomatous tumours have adhered to the diaphragm.—Vide VESLINGIUS Syntagma. Anat. cap. 9.—KERKRINGIUS Obs. Anatom. 89.

And also to the pleura and mediastinum. BONETI, tom. i. p. 533, et inseq.

The liver has been found of an enormous size by many practitioners. BONET. tom. i. p. 537, et inseq. Asthma is very frequently symptomatic of the diseases of this viscus and of the spleen.

The diseases of the mesentery and omentum, especially if they give occasion to an altered state of the liver and stomach are causes of Asthma. JOH. RHODIUS, Cent. 2. Observ. 25.—GUERN. ROLFINKIUS, Dissert. Anat. lib. i. cap. 13.

* Med. hist. and reflect. vol. i. p. 41.

The liver has been united, by adhesion, to the diaphragm and lungs. DIEMERBROECK, Anat. lib. i. c. 13.

An hydropic patient was opened, in my presence, and the liver was found to contain a large sac of hydatids, which was connected, by adhesion, to the ductus communis; before this person swelled in the abdomen, he had been for some time asthmatic, and the bile was not passed regularly into the duodenum. Flatulence of the stomach was predominant, and the disease was attended by most of the symptoms of spasmodic Asthma. Worms have been found, by anatomists, in different situations, in this viscus.*

The absorbent glands, in the posterior mediastinum, are subject to enlargement from scrofula. When this affection is considerable, it necessarily produces difficulty of breathing, by pressure on the lungs and trachea.† The same glands near the trachea are occasionally converted into bony or earthy matter, and press the passage.‡

DIEMERBROECK || relates, that he saw a live worm coughed up from the lungs of a woman;

* Vide LIEUTAUD, tom. i. p. 194.

† BAILLIE'S morbid anatomy, p. 71.

‡ BAILLIE'S morbid anatomy, p. 72.—|| Lib. ii. p. 442.

and that he had observed these animals, by dissection, in the vesiculæ of the lungs. He infers, that they must have been bred in these cells, for if they had inhabited the bronchia, suffocation would have been the consequence, and the most violent cough and Asthma. If they had been inhabitants of the cells at the extremities of the bronchia, it must be believed that Asthma would have been equally inevitable, though, perhaps, not so acute.

Asthma has certainly proceeded from hydatids in the substance of the lungs, on the pleura, diaphragm, and even on the surface of the heart. The sudden rupture of these hydatids has produced immediate suffocation.*—CAR. Piso de morbis a sero sect. 3. cap. 7.—BONETI Sepulchret. Anat. tom. i. p. 498, 499.

For a curious case of the dilatation of the lower part of the pharynx, by which a pouch was gradually formed, stopping the passage of the œsophagus, see Med. Observat. vol. 3, p. 85.

The sternum and the cartilaginous ends of the ribs have become osseous, and not under the

* Vide OTTONEM HEURNIUM obs. 18.—BARTHOLINUM, Cent. ii. obs. 61.

controul of the muscles of inspiration. BONET. tom. i. p. 533, and PLATERUS Praxis, lib. i. cap. 4. Here is a case of Asthma analogous to any other form of gibbosity.

The malformation of the ensiforme cartilage, by being turned inwards as if artificially depressed, is productive of hepatitis and chronic affections of the stomach, and also of Asthma. DIEMERBROECK has particularly noticed the inconveniencies from this cause. Lib. ix. cap. xiv.

BARTHOLINE* alledges the effusion of chyle to be a cause of asthmatic affection, in this case he supposes the rupture of a duct.

An extreme dryness of the parenchyma of the lungs has been well ascertained. RHODIUS† asserts that it has been occasioned by the profuse use of the decoction of guaiacum wood. AVICENNA had remarked such a condition to arise from the hot vapour of furnaces and metallic fusions.

HEURNIUS‡ saw the lungs of a printer so altered as to almost appear like a dried apple.

* Specileg. 2 de Vasis Lymph. cap. 2.

† Cent. 2. Obs. xxi.

‡ De Morb. Pectoris. cap. iv.

Considerable deficiencies of substance have been discovered by dissection in the pulmonary system. Vide SENAC *Traité du Cœur*, l. iv. c. 3.—HALLER's *Opuscul. Patholog. Obs.* 17.

The mediastinum, and even the diaphragm with a large portion of the lungs, have been wanting. DIEMERBROECK *Anatom.* l. i. c. 13. This defect was imperfectly supplied by the adhesion of the liver to the only lobe of the lungs which appeared, and the subject arrived at his seventh year.

The account of the dissection communicated by the physician, D. WASSENAER, to DIEMERBROECK himself, would have been more satisfactory if the natural history of the boy had been more particularly detailed. We are only told that he was asthmatic all his life, and harrassed by violent and frequent cough from the slightest causes; a slow fever at length terminated his sufferings.

The conformation of this subject was not less curious than that of the celebrated blue boy, whose case is given by Dr. SANDIFORT.* Here

* Vide *Observat. Anatomico-Patholog.* Lugd. Batav. 1777, p. 11, also the Remarks of Dr. BEDDOES. *Observat. on Calculus, &c.* p. 63, et inseq.

the aorta arose from the right ventricle as well as from the left; the pulmonary artery was scarcely pervious to a small probe, and the difficulty of passing it from the heart to the lungs was greater than in the contrary direction. This patient was asthmatical from the second year of his life, which was extended, in a miserable series of sufferings, to 12 years and a few months.

The circulation through the lungs being impeded by any organic malformation, must be productive of Asthma; and it appears that if the current be diverted from the course of pulmonary circulation, the same effect, in a greater or less degree, must happen. HALLER says, that the arterious duct is found pervious in the second year, and the foramen ovale has been open longer by his own observation. *

BARTHOLINE† observed the *foramen ovale* open in *adults* more than once.

MORGAGNI relates the history of a virgin subject who attained her sixteenth year. She had been sickly from her birth, and affected with extreme weakness; her respiration was difficult,

* HALLER, tom. iii. 161, 162.

† Anatom. Reformat. lib. ii. cap. 8.

and her whole skin of a livid colour. The foramen ovale was found so wide as to admit the little finger.*

In these instances the blood cannot be exposed to the influence of the air inspired.

The heart cannot, therefore, be sufficiently stimulated, and the black blood in its cavities will give anxiety, and irritate the muscles of respiration.

Miners are said, by SENNERTUS,† to have been opened, in whose lungs metals were found of the kind in which their operations lay. HORSTIUS confirms the bad effects said to proceed from the metallic fumes to which artists are exposed, but fancifully asserts, that such complaints are only to be remedied by mineral medicines. See SENNERTUS Pract. lib. ii. p. 2. cap. 2.—BARTHOLIN. Cent. 4. cu. THEOD. SCHENKIUS, epist. 72.

Stone cutters and cleaners of feathers receive the matter which is suspended in the air into their lungs, and become asthmatic. DIEMERBROECK, lib. ii. p. 443.

* MORGAGNI de Causis, &c. epist. xvi.

† De Cons. et Dissensu, cap. ix. vide HORSTIUS, Obs. l. vii. Obs. 25.

According to SYLVIVS,* the parenchyma of the lungs is sometimes dense and corrugated, occasioning dyspnœa. He attributes this state to the restringent quality of the blood, but it may be assigned, with more reason, to preceding inflammation.

HOFFMAN describes the vesicles in this disease, "*Quasi carnea, crassa, rubicunda, substantia, infractas.*"

MORGAGNI† says, the matter filling the lungs is like the substance of the liver, and SENAC‡ confirms this description.

Dr. BAILLIE adds his testimony to the fact. He says, "The substance of the lungs has in this disease nearly the same solidity, and the same general appearance as the liver. When examined more minutely, the air cells appear to be filled with a brownish solid matter."§

Flatus have been said to distend the lungs, being carried there by the lacteals, &c. See Reg.

* SYLVIVS de la Boe. Praxis, lib. i. cap. 22. § 17. 18.

† De SEDIBUS, &c. epist. xxi.

‡ Traité du Cœur. l. iv. ch. 3.

§ Morbid Anatomy, p. 52.

de Graaf de Succo Pancreatico, cap. 9, and also FLOYER passim. A nobleman, says RODIUS,* died of a diarrhæa cum suspirio. The lungs were so swelled with wind as to fill the whole cavity of the breast.

SYLVIVS† assures us that flatus make their way every where. And Mr. J. HUNTER‡ coincides in his opinion, as we may presume from his account of the explosions from the vagina. Notwithstanding these authorities, it may perhaps be most prudent to believe, that the blood contains no detached masses of air.

The lungs are susceptible of a diseased growth, of which instances are well ascertained.§

I opened the thorax of an hydropic patient, and found his lungs of a monstrous size, very pale, and free from any other disease. The heart was, however, loaded with excessive fat; and these

* Observat. xxii. Cent. ii.

† Lib. ii. cap. 21. § 19.

‡ See Animal Œconomy. The phænomenon asserted by the ingenious anatomist is very plainly described by SYLVIVS (loc. citat.) Flatus.—“Observantur quoque excludi per Urethram; sic qui ad Uterum sunt delati, aut in ipso geniti per ipsius cervicem utramque observantur erumpere, atque foras exitum invenire!”

§ Sylvius Praxis, lib. i. cap. 24, sect. 12.

organs seemed to have robbed the liver of its nourishment, for that viscus was particularly small. The patient had laboured under dyspnœa for many years.

The suppression of evacuations of blood, as the menstrual or hæmorrhoidal flux ; by which the lungs are necessarily oppressed with the redundant fluid. See Floyer, p. 96. — Hoffman Consult. and Respon. Cent. i. — The difficulty of breathing, from this cause, is more entitled to the name of dyspnœa, and may precede either Asthma or Phthisis. Vid. Schneiderus de catarrh. lib. iii. c. 6.

Exanthemata repelled are a cause of Asthma, assented to by practitioners; there is no difficulty in supposing that the matter of those herpetic eruptions, which were manifest to the senses when seated on the external skin, may be deposited on the lungs or their investing membranes, when the external disease has suddenly disappeared. The same observation applies to other eruptions, whether attended by pyrexia or not. Phthisis follows their repulsion as well as Asthma. See Floyer, p. 100.

An instance of relief from the eruption of small tumours which appeared externally, is re-

corded by Dr. STARK. Clin. et Anatom. Observ. p. 44.

Similar to this cause of Asthma, the gout atonic or retrocedent may create that affection, and frequently does. See HOFFMAN de Asthmate et Consult. et Resp. Med. Cent. 1.

A viscid mucus secreted by the glands of the trachea and bronchia, and loading their follicles, necessarily impedes the free admission of air, and irritates the organ. This species of Asthma approaches by imperceptible shades of distinction to the character of periodic convulsive Asthma, but as depending on a cause which is sufficiently manifest to have received the assent of medical observers, it is classed with other cases of the continued or symptomatic Asthma of FLOYER, or Dyspnœa of CULLEN. The latter writer called it Dyspnœa Catarrhalis, and HOFFMAN Asthma Pituitosum. Vid. tom. iii. sect. ii. cap. ii. § 3. Also WILLIS Pharm. Rat. p. 2. sect. i. cap. 12.

Polypi of tenacious matter have been the occasion of asthma, when the air vessels were filled with this substance. Secretions of this kind induced some writers to speak of vascular tubes being discharged, but the case has been explained with great distinctness by Dr. WARREN in the

first volume of Transactions of the College of Physicians. Art. xvi. of the Bronchial Polypus.

A more particular account may be obtained of derangements of the thoracic and abdominal viscera, leading to, or inducing, difficulties of breathing, by consulting Morgagni and Bonetus.

There are also numerous detached facts in the different journals, foreign and domestic, which support the same conclusion.

These causes have been assented to as inducing Asthma by obstructing the action of the lungs or diaphragm.

They must, however, be considered as *irritations* exciting the respiratory muscles to relieve the organs in which they were seated.

SECT. III.

DYSPNŒA of Dr. Cullen comprizes cases of continued Asthma of Floyer.—Under this name the disease preserves its character in a milder form.—Anhelation an acute case of Dyspnœa, proceeding from violent or rapid exercise.—The muscles of locomotion and respiration do not readily increase their actions at the same time.

DR. CULLEN closely follows Sir J. FLOYER in the idiopathic species of Asthma, but deserts him in his *continued species* of symptomatic Asthma, by excluding most of the cases of this species from the genus Asthma, and placing them, with many others, under the genus Dyspnœa:* but a new name will not alter the arrangements of the animal œconomy, nor disguise the appearances of nature in her distress.

In dyspnœa, the species still depend on some cause which irritates an organ by its obstruction or acrimony. Under that head in the nosology the cause is frequently made to distinguish the varieties by a trivial addition, shewing the impropriety of attributing degrees of the same affection to essentially distinct origins.

* Nosol. Method. G. iv. and L. vi.

Whenever there is a difficulty of breathing there is an excess of respiratory actions occasioned by irritation, the force of which may be probably compounded of quantity and quality, in degrees not always to be ascertained;* still we must not forget that “*Majus aut minus non variat speciem.*”

Dyspnœa is considered by HOFFMAN as transitory and without danger.† It attends commonly on the corpulent, fat and plethoric, who feel it most when the body is put in motion.

In such subjects the structure of the lungs being lax, and the contractions of the pulmonary artery weak, the blood passes with difficulty to the left side of the heart, occasioning a compression of the air vessels.

If in this state the circulation be accelerated by an accidental cause, the accumulation in the

* The cause is here supposed to be applied to a habit in which the standard of nervous sensibility is moderate and common to subjects not advanced far in the disease. Accumulated irritability produces, or is attended by, increased sensibility to stimuli; and habits of morbid contractions of muscles are a disorder when the primary irritation is removed.

† Opera tom. 3. Sect. 3. cap. 2. § 3. Willis Pharm. Rat. Part II. Sect. 1. cap. 2.

pulmonary vessels will be intolerable, yet as they are not thin and tender, but dilatable, rupture may not take place.

It has already been stated that suppressions of customary evacuations of blood, materially lead to this condition of the vessels of the lungs.

That suffocative sensation which is brought on by rapid exercise is a more acute case of Dyspnœa, called by nosologists *Anhelation*. Its immediate cause is similar, though the remote ones had not been applied.

When a person is said to be "*out of breath*" from violent exertion, the blood has been accelerated from all parts of the body to the heart; that organ is stimulated to discharge it through the lungs to its left side, and its contractions are quick in proportion to the frequency with which this stimulus is renewed. Inspirations of air are then eagerly attempted, but the exertions of the locomotive muscles seem to check those of the muscles of inspiration; and to prevent the respirations being increased in the customary proportion to the pulsations of the heart and arteries. If 70 pulsations be usually accompanied by 18 respirations, 140 pulsations

should be attended by 36 respirations, but it is certain that this balance is lost in violent exercise.

When the action of the locomotive muscles is suspended, that of the respiratory muscles is increased, and the blood being more readily passed through the lungs, because the organ is more perfectly expanded, a sense of suffocative irritation is removed.

HALLER points out this irritation as the efficient cause of the whole process of respiration in a moderate and natural degree, but if a sense of suffocation originally excited the act of breathing, and if that function continue to be supported through the habitual, and, therefore, imperceptible operation of the same cause, the extreme case of too violent a repletion of the vessels may be well supposed to excite a proportionate action of the respiratory muscles for the same end.

This distress from violent exercise is, however, most oppressive to those who have not been in the practice of it, for habit will not only enable a person to use his locomotive muscles with greater vigour, but to accompany their exertion with more respiratory action. From

habits of exercise the vessels will not be so subject to partial dilatation, and the fluids contained will be more equally disposed of through the superficial capillaries of the body: but where is the instance to be found of education or habit having entirely overcome the influence and consequence of some irritation from this cause?

SECT. IV.

THE FIRST SPECIES OF CONVULSIVE ASTHMA FROM THE IRRITATION OF EFFUSED SERUM IN THE LUNGS.

The progress made in this Inquiry.—Asthma from IRRITATION not so apparent as in the continued species.—The PERIODIC FLATULENT of Floyer; the SPASMODIC ASTHMA of Cullen.—The disease described.—Its proximate cause investigated.—The path which was followed in the Inquiry after the cause of the continued species pursued in treating of this.—Symptoms and indications generally the same.—Sir John Floyer's case.

IT has been shewn that violent contractions of the respiratory muscles may be excited by the irritation of some organ which these muscles serve.

The disorder of respiration has even been traced both in Dyspnœa and Asthma to a material, which could not fail, by its offending properties, to occasion it. In many instances of successful effort to eject this material, the respiratory labour has ceased, nor would it ever continue after the cause was removed, but from secondary inconveniencies which are referable sometimes to the laws of muscular association and habit, at others to the alteration of structure which it may have occasioned in some organ.

But there is a distinction made by *Sir JOHN FLOYER which separates the affection occasioned by a manifest inherent cause, from that whose cause is not so obvious. The latter he calls "the Periodic flatulent Asthma." †WILLIS terms it "Asthma Convulsivum." ‡HOFFMAN and §CULLEN, Convulsivum et Spasmodico-flatulentum, or, Spasmodic Asthma.

The last author places three idiopathic species under this genus, of which the first is *spontaneous* "sine causa manifesta vel alio morbo comitante." The second is *Asthma Exanthematicum*, which may be properly classed with other cases already noticed under the Dyspnœa of CULLEN, and the Continued Species of FLOYER.—The *Asthma Plethoricum* arises from a suppression of usual evacuations of blood, or from a spontaneous plethora. It is true that such a state of the pulmonary vessels may exist, as, by compressing the vesiculæ and bronchia, may prevent their perfect expansion, but I have taken the liberty of calling such affection Dyspnœa, or a slight Asthma, because, unless it produce effusion of serum from the exhalents, it does not periodically excite the convulsive paroxysm.

* Floyer, chap. 1.

† Willis Pharm. Rat. p. ii. sect. i. cap. 12.

‡ Hoffman, iii. 94.

§ Nosolog. Method. G. lv. Practice of Physic, MCCCLXXIII.

THE attack of a paroxysm of *Periodic or Convulsive Asthma* is preceded very generally by Dyspepsia, and the circumstances which occur to a relaxed habit. This condition of the body may have prevailed for months or years before it takes the additional form of Asthma, but when that disease appears, Dyspepsia never fails to be aggravated, and to shew itself with violence before the fit. The symptoms are flatulence and distention of the stomach and bowels; a heavy pain over the forehead and eyes; eructation of wind, with water which is sometimes insipid, at others sour. When the evening approaches this weight over the eyes becomes more oppressive, and the patient is very sleepy. Occasionally, if particularly animated by company and conversation, the drowsiness does not take place, but a shortness of breath is perceived, and soon after much anxiety of the præcordia, with great restlessness. The presence of company then becomes irksome, as it seems to increase a certain heat of the body, a want of free respiration, and an irritability which repels the most cautious attentions of friends. Frequently at this period there is a tingling and heat in the ears, neck, and breast, and a motion to expel the contents of the bowels is attempted

with some violence, and with great uneasiness of the abdominal muscles. When an asthmatic feels these warnings he may be convinced that his enemy is at hand.

At some uncertain hour before midnight the patient becomes suddenly sensible of the increased violence of the disorder; most frequently after a slumber in bed he awakes with great difficulty of breathing, and feels the necessity of a more erect posture of his body. Inspiration is performed with great effort of the muscles, but is never perfectly deep, and the diaphragm seems to descend with great difficulty against an opposing force.

There is now a desire of free air, speaking becomes distressing, and the irritability of the mind continues, but is not so acute as in the approach of the fit. There is great straitness of the chest, and a wheezing sound in respiration. An inclination to cough shews itself, but this is small and interrupted. The pulse is increased in quickness a few strokes, but without hardness. There is no preternatural thirst, unless, as often happens, the fit be excited by indigestible matter in the first passages. There is a propensity to make water, which is copious and pale, and frequently discharged.

After some hours of distress the patient perceives his anxiety to be less, the breathing is less quick and laborious, the inspirations are longer and more full, the expirations are still attended with wheezing; the pulse is not so quick, but more full; irritation is less acute. The cough probably brings up a portion of phlegm, and a very sensible relief follows that excretion. Then the tranquil state of the feelings introduces sleep, but not unaccompanied by wheezing, which continues almost always through the first night, and until, by the progress of the fit on the second or third day, a more considerable expectoration of mucus takes place.

The second day is ushered in by a remission of the symptoms which the patient perceives from the time of awaking in the morning. No change of posture is, however, yet made with impunity, and particular distress affects him, if he engage in the fatigue of dressing, whilst the stomach is empty. The pulse will be accelerated more than it was in the acmé of the paroxysm, and motion must frequently be suspended, or a vehement agony for breath will certainly come on. During the day, if no particular hurry occur, the breathing becomes gradually more free till the evening; an inexperienced Asthmatic even flatters himself that his disease is retiring,

but he finds at the approach of night that he must sustain a new attack. The paroxysm recommences with the usual symptoms, and the night is passed nearly as the former, but the sleep is more perfect, and productive of more relief.

The third day, the remission is more complete, there is some additional expectoration, and motion is performed with less distress, but still with great inconvenience. After the paroxysm has been renewed in this manner for three nights, expectoration generally becomes free, but there is no certain termination of the fit at a fixed period. However, except in particular cases, it goes off after a few days; and as the daily remissions become more perfect, the urine is higher coloured, and in smaller quantities; the expectorated mucus is more copious and digested, strength of pulse and vigour of action increase, and good humour and sunshine again enliven the mind.—The expectorated mucus has been said to be streaked with black, or to have a blackish tinge, and this appearance certainly prevails in many instances, but not invariably. The taste of the expectorated mucus is also equally uncertain; it is sometimes sweetish, but more frequently saline, and occasionally coloured minutely with blood.

There is a considerable variation in the times of accession of the paroxysm, and in its duration, the intervals of the fits, the quantity of mucus expectorated, and the freedom of that discharge. These circumstances of the disease will be influenced by the predisposing causes and occasional accidents. The disease appears to invade all temperaments; but, I believe more particularly the melancholic, or that which is between the melancholic and sanguine. The sanguine being in fact more liable to fall into phthisis.

This description seems to apply to the convulsive Asthma of Professor CULLEN. I wish it to be received as that of the *First Species* of this Inquiry, which the Author suffered in his own person for many years.

IN examining the symptoms of a paroxysm of this disease, we find some uniform and constant, and others generally occurring, but with uncertainty, in proportion to the various influence of remote causes.

The symptoms which are sufficiently constant to distinguish it are described by Dr. CULLEN in his Nosology.

E

“ A difficulty of breathing coming on at intervals.

“ A sense of straitness in the chest.

“ A wheezing in respiration.

“ Cough in the beginning of the fit, difficult or none ; towards the end free, and attended with expectoration which is often copious.”*

In endeavouring to find the cause of these symptoms, I shall pursue the steps which have before led me to the source of similar appearances, expecting to find a cause equal in its properties of acrimony or bulk, by which the respiratory muscles are irritated into excess of action.

In those disorders a material was discharged, or a compressing force was removed, before the extraordinary contraction of the muscles was suspended, or finally made to subside. In some cases a mechanical inconvenience, as in the instance of a gibbous spine, could not be removed, and then the irritation remaining, the disorder of respiration did not cease.

* Asthma. Spirandi difficultas per intervalla subiens; cum angustiae in pectore sensu, et respiratione cum sibilo strepente; tussis sub initio paroxysmi difficilis, vel nulla, versus finem libera, cum sputo mucii saepe copioso. *Nosolog. Method. G. LV.*

In such circumstances the indications were natural, and consistent with the laws which govern the animal œconomy. They would have afforded *prima facie* evidence that nature was desirous to discharge something injurious, even if it had not been exposed to the senses.

Having ascertained such outlines and signals of direction, we must follow the path in which nature is our guide; and we are encouraged by the acknowledged simplicity and uniformity of her laws, to hope that the same principle of *irritation* has excited her efforts in one case of Asthma, as in another, though it may be more retired from our view, and wear a different form.

It appears, then, that the same efforts of the muscles of respiration are exerted in this species of Asthma, as in the Continued Species of FLOYER, and that in general a long continuance of too much action of those muscles is the only distinction to be perceived in the latter species. There would have been less hypothesis, therefore, in the inference, that similar effects proceeded from similar causes.

The permanence of the symptoms in one species was accounted for, and their suspension

in the other might have been rationally explained if the functions of the animal system had been well considered; since these furnished a means of silently removing the particular irritation which certain data might have suggested to be the cause of the Periodic, as well as of the Continued Asthma.

We cannot trace the cause of appearances in the animal machine, without constant reference to the laws of the œconomy of life, any more than the general philosopher can take a latitude independent of immutable principles in reasoning on the natural objects of his inquiries.

Sir J. FLOYER, describing the *Periodic Asthma*, says, "the diaphragm is not without much difficulty moved downwards; but for enlarging the breast in inspiration, the intercostal muscles, which serve for the raising of the ribs, and lifting up the breast, strive and labour more vehemently; and the scapular and lumbar muscles which serve for strong inspiration, join all their force, and strain themselves to lift up the breast and shoulders, for enlarging the cavity of the breast, that the lungs may have a place sufficient for their expansion, and the air more plentifully inspire."*

* Floyer on the Asthma, p. 7.

Here is sufficient evidence of distress in labouring to accomplish some object, and it is surprising that FLOYER, who had had personal experience of the disease for thirty years, did not yet consider it as the energy of nature endeavouring to remove an offence.—This can only be accounted for by supposing that he was influenced by a prevailing theory, and that observing in some very few instances of the disorder no discharge of mucus or other extraneous matter, he was discouraged from following to their source, symptoms which uniformly attended the progress of general cases: in addition to this consideration we may reflect upon the small advance which had been made in the knowledge of the lymphatic system, whose power is exerted with such effect in the removal of serous effusion in every cavity of the body.

Physiologists have since attributed, with precision, such occasional increase of exertion to the urgency of some obstacle to the freedom of respiration. In those cases, says HALLER, the muscles inserted into the thorax, clavicles and scapulæ, unite their force. “*Scaleni musculi, mastoidei, trapezii, pectorales, tum levatores parvi, quos ex anatome oportet repetere.*”*

* Pr. Lin. Physiolog. CCLXIV.

That the absorbent vessels are equally excited when the lungs are threatened with suffocation, appears from the observation of Mr. CRUIKSHANK,* “I have repeatedly seen in animals “dying of hæmoptoe, and in the human subject “itself, the lymphatics of the lungs, which at “other times contain a transparent fluid, turgid “with blood, which they had absorbed from the “air cells.”

Motions performed with great energy are therefore strong indications of some injury to be averted, or some offence to be removed. And, as in the Periodic Asthma, the cause is not so clear as in the Continued Species, I shall take advantage of these indications, as the best direction which an obscure disease affords.

They point to an *irritation* in the lungs, or in some of the viscera, which, in common with the lungs, are aided by the respiratory muscles.

It appears from the preceding sections, that such irritation may be *material*, we should therefore consider, if any excretion of matter favour the supposition, or if any indication of offence

* On the absorbent vessels, p. 42.

constantly accompany the disease, and disappear with it, or, being only occasionally absent, if its absence can be accounted for by certain acknowledged laws of the animal œconomy.

SECT. V.

The presence of mucus in Asthma.—The origin of this serous fluid.—The observations of writers on this symptom of the disease.—The earliest medical authorities.—Galen—Alexander Trallianus.—The Arabian Physicians.—Remark of Willis, and criticism of Morgagni on the opinions of the antient authors.—Medical writers of the 16th and 17th centuries.—Jodocus Lommius—Sennertus—Riverius—all acknowledged the excess of serum in Asthma, and made it a cause of the disease.—The doctrine of Willis founded on this condition of the fluids.—Considerations on the authority of Willis.

THE spitting of mucus is so general a symptom of convulsive Asthma, that this matter must have been considered the principal cause of the disease by modern physicians, but from the obstacle of some few cases having occurred, in which there was no expectoration, and from that of others in which it was not considered equal to the effect produced; these instances of Asthma have, however, been uncommon, and might proceed from the same proximate cause embodied in a more subtle form, as in the *second species* of this Inquiry; or the lymph might have been carried off by the absorbents, if this irritating matter existed in the lungs, as in this species.

But the *general* presence of mucus is a conspicuous part of the disease, since it is partially expelled from the bronchia as the paroxysm declines, and copiously, in most cases, at the termination.

This matter is separated upon the membranes of all the cavities of the body.* Where those cavities have external openings it is not coagulable by heat, but where there are no external openings it is coagulable in the heat of boiling water.

Its quantity, in general, will be found to be regulated by the vigour of the animal, because the power of absorption bears a relative proportion to his strength or weakness.

An acute physiologist makes the following distinction: "In diseases where the contraction of
" the vessels is too great, there is scarcely as much
" moisture in the cavities or interstices of the parts
" as allow them to slide easily one upon another.
" In health the quantity of such liquors is moderate, and a pretty constant equality is kept

* *Ὀρρὸς* serum and lymph are not proved to be different from mucus, and distinctions can only be taken according to the consistence of the fluid. They are equally the watery part of the blood, separated in a condition more or less morbid.

“up between the action of the exhalents and
“absorbents: but when the body turns weak the
“exhalents pour out so much more than the
“absorbents can take in, that all the cavities are
“found to contain considerable quantities of
“liquors.”*

In attributing one species of Asthma, in which is included so large a proportion of cases, to the influence of this irritation, the authority of former writers may naturally be consulted; but here we must be careful to limit our confidence in the evidence to the description of appearances, excluding a partial bias to prevailing theories, or aversion from those which are exploded. The former may not consist with the testimony of facts, and the latter ought not to involve in their disgrace the record of those facts which experience has rather established than opposed.

It may be unnecessary to examine *all* the old writers for their opinions on Asthma, but let us consider the testimonies of some few who had weight in the periods when they flourished.

From these we may fairly infer what would be produced by a more extended investigation; in fact, the cotemporary writers, and those who

* Alex. Monro, sen. Works, p. 377.

followed them, entirely coincide with their brethren, and as far as I have been able to pursue the inquiry, no variety of description is to be discovered.

GALEN makes two causes only of Asthma, each distinguished by a material producing irritation, thick and pituitous humours, and a crude tubercle in the lungs.

ALEXANDER TRALLIANUS does not expressly mention Asthma by name, but doubtless alludes to that affection when he treats of the "signs of viscid humours contained in the lungs." Viscid serum, and extraneous substances, were the only recorded causes of Asthma at this period of medical observation: nor is any alteration to be expected during the interval of many centuries.

At length the Arabian adopted the pathology of the Greek physicians, with some addition, but little or no rejection of their facts: in Asthma their doctrine was accepted without dispute; and the remedies directed were to incise, dry up, expectorate, divert, and purge off serous humour in the lungs. AVICENNA gives the caution of not using the most powerful diuretics, lest the thinner fluid should be discharged, and the thick remain behind.

This practical direction resulted from the deference which the Arabian physician paid to the doctrines which he received from Greece. Pituita was supposed to take a consistence according to the situation in which it was included after it had descended from the head. At first it was watery and thin; then mucous as it was thickened by warmth; when the mucous distillation was shut up in a cold part of the body, it became vitreous; and in this state would create excessive pain if transferred to a hot situation: it was lastly gypseous, or stony, when included in the lungs, kidneys, or joints; because here the humour being resolved, and the thinner parts carried off, the thickest hardened into calculous substance.

When such were the only causes clearly assigned by the antient writers for the production of Asthma, WILLIS might justly remark, that they were not aware of a purely convulsive affection in considering the general character of that disease. MORGAGNI,* by his criticism, has not invalidated the assertion of WILLIS; for though the nerves may be sometimes particularly affected, in the opinion of those authors, the impression is from defluxion of serum, pituitous matter, or its supposed origin, the vapours from the lower viscera. It is

* Liber ii. epist. xv.

a very strong proof of the infrequency of Asthma, without manifest irritation from such causes, when the existence of more obscure causes is matter of debate.

The Arabian writers were themselves copied, with servile dependence, till the sixteenth, and even the seventeenth century, when the diffusion of anatomical knowledge, and a zeal for experiment, gave more clear discernment of causes and effects, and more just reasoning on their relation. We shall therefore offer some opinions on Asthma at those periods; and particularly the opinion of WILLIS, who has given so remarkable a tone to the teachers who followed him, that his authority on this disease may be traced through HOFFMAN, FLOYER, and CULLEN, who, however, appear to have had a very imperfect comprehension of his principles and meaning.

JODOCUS LOMMIUS* gives the signs of this disease under the term Anhelatio. He attributes it to concreted phlegm, and even to stones in the lungs; and he closely adheres to the antients in neglecting other causes.

* *Observat. Medicinal. Liber Secundus*, p. 110, necnon, p. 115 & seq.

SENNERTUS* delivers a pathology which entirely depends on the extraneous and evident irritation of substances described in the first part of this Inquiry; or, secondly, on the serous humour which observation had established as the predominant symptom of Asthma. He informs us, that the proximate cause of Asthma is the straitening of the bronchial tubes from compression or obstruction of humours often thick and viscid; sometimes thin and serous, but copious in quantity.

The hereditary disposition to Asthma is also stated to consist in a certain laxity and weakness of the lungs, by which the organ is frequently more liable to receive a flux of humours, and to permit their accumulation. In the prognostic, he says, other symptoms besides those of the pulse and respiration, must be attended to; for these may deceive the physician. Some patients die suddenly by suffocation, with a good pulse, whilst others, having a bad pulsation, are quickly restored by the dispersion of flatus, or *the discharge of serous humour*.

According to RIVERIUS,† though the generic term Asthma take in all difficulties of breathing,

* Tom. ii. lib. ii. Part III. cap. 2.

† Vide Praxeos Medicæ, lib. 8. cap. 1.

it more particularly points out that disorder of respiration which arises from the infarction of the bronchia, in its proper character, without fever, though sometimes fever may attend. The divisions of Asthma, are into Dyspnœa, Asthma, and Orthopnœa. The Dyspnœa is inferior in degree to Asthma and Orthopnœa, being the effect of a less quantity of matter obstructing the lungs; it is therefore without wheezing. Asthma is then described with this attendant symptom: for, says the writer, in Asthma, properly so called, the bronchia are filled with a pituitous humour, which, meeting the air in respiration, occasions the sound called wheezing. Orthopnœa is the extreme degree of this disorder of respiration.

By these examples we may see, that, in this period of medicine, an excess of serum was a permanent feature in the character of Asthma; and that, if a flux from the head were occasionally superseded, a flow of this matter from the pulmonary vessels took its place in the prevailing doctrines.

Cases of Asthma, so purely convulsive as to be independent of serous defluxion, must have been extremely rare; for they are not acknowledged as a species, nor ever clearly excepted from the general account.

However tedious it may therefore be to inquire into the histories of the antient writers, the examination must be useful, if it lead to this conclusive inference, that no such disease as Convulsive Asthma, *without a manifest cause*, was observed from the earliest records of medicine, till the time of CULLEN, who has, however, denied to the majority of cases, the existence of such cause.

WILLIS admits the Asthmatic affection to be free from an organic fault in the lungs in some instances, but he does not exempt these, though termed purely spasmodic, from the exciting influence of abundant serum. The procatarxis is, in his language, a redundance of such humours in the mass of blood, and in the whole body :*
“cujus materiæ portio quædam, arteriarum
“osculis in pulmones exudans, tussim ordinarium
“creat; postea cum serosa colluvies adhuc in
“sanguine exuberans, et particulis spasmodicis
“referta, etiam intra caput aggereretur, eadem
“nervos pneumonicos subiens, tussim simplicem,
“in convulsivum adauget.” This account seems to give as much importance to material irritation, as if he had entirely declined the consideration

* Willis Opera. Tomus Prior de Morbis Convulsivis, Caput xii. p. 137.

of any other cause, for the predisposition consists in a condition of the blood leading to effusion in the lungs, and the next source of convulsive motions is the serous colluvies, which is every where referred to.

We next see the Dropsy, the Asthma, and the Scurvy, united in his explanation of the convulsive disorder.*

Afterwards, the language is still less ambiguous, because he directly and plainly terms that form of Asthma, *purely convulsive*, which arises from the serous colluvies of the habit, "porro interdum observavi, *graves Asthmatis paroxysmos*, sine quavis notabili pulmonum labe accidisse; revera ut putaverim, hunc *morbum* aliquando esse *mere convulsivum*, ejusque insultos solummodo excitari quoniam *serosa colluvies*, particulis explosivis referta, *nervos*, pulmonum diastolen perficientes, subiens, spiritibus, ibidem scatentibus accrevit."†

WILLIS, it thus appears, had not in his contemplation a species of Asthma entirely divested of the character which has been lately

* Willis de Morb. Convulsivo. Caput xii. p. 138.

† Willis de Morb. Convulsiv. Caput xii. p. 138.

only given to the humoral Asthma. Whilst his authority has been followed by the nosologists and teachers of the modern schools of medicine, his meanings have been perverted, or his context not studied. It is only by reference to his doctrine of Convulsive Cough and Asthma in the twelfth chapter, *de Morbis Convulsivis*, and by considering his opinions, "*de Respirationis Læsæ Speciebus*," that his treatise "*de Asthmate*," which follows, can be properly understood. In the latter he alludes to his general theory of the cause of convulsions, and applying it in Asthma, we are to follow his data when we accept his conclusions.*

He first established the doctrine of convulsive motions in Asthma, and succeeding writers have generally contented themselves with adopting his theory. "It is astonishing," says MORGAGNI, "that WILLIS should have been the first who observed the nature of symptoms, which we have universally, since his time, acknowledged to exist in Asthma."†

It is, indeed, truly remarkable, that physiologists neglected to notice, that convulsion is nothing

* Vide Opera, tom. Posterior de Asthmate, p. 125.

† Morgagni, lib. ii. epist. 15, 5.

but a violent and irregular contraction of the muscle or fibre; and if such be the contraction of a muscle of respiration, it may be justly said to have become convulsive or spasmodic.

But if surprise be excited by the nature of the contractions in Asthma not having been understood before the time of WILLIS, still more may be expressed, that succeeding authors were so occupied in contemplating the new actions, as to forget the state of the habit in which they were said to take place, and which was so conspicuous to this writer as to be esteemed the very cause exciting the morbid motions which he described.

Nor is it a matter of indifference whether convulsions existed with or without the excitement of irritating matter in cases of Asthma, since if we give up the point that they existed without an irritating cause in this species, where serosity has been proved to be abundant, the inquirer may be still better satisfied with this easy solution in other cases (called the Dry Asthma) where the irritating material cannot be so readily discovered; and thus we are led into error, for that conclusion must deserve the name which is drawn from false premises, and contradicts the laws of the animal œconomy.

SECT. VI.

Anatomical evidence of serous effusion in the vesiculæ of the lungs of Asthmatics.—Effusion in complicated cases very frequent; in uncomplicated cases seldom inquired for, but occasionally discovered.—A series of Anatomical Observations applying to complicated and uncomplicated Convulsive Asthma.—The Suffocative Catarrh considered.—Evidence in Living Subjects of Effusion in the Vesiculæ of the Lungs, as palpable as from Dissection.—This Condition supported by the Description of Asthma by Cælius Aurelianus.—Physiological Considerations on the Entrance of Serum into the Air Cavities of the Lungs.—The Experiments of Dr. Goodwin and Dr. Hales.

UNCOMPLICATED Asthma is so seldom fatal, that few opportunities have occurred of searching for its cause by dissection. For this *Morbus Maxime Terribilis*, as it is called by WILLIS, may be carried on to old age, if supervening diseases do not destroy the patient, or disturb the operations of nature, by which a recovery from the paroxysm may be obtained.

Many instances have been found of effusion in the vesiculæ from complicated causes; and effusions in the sacs of the pleura, and in the

pericardium, are still more generally discovered, as these are frequent consequences of inflammation, of polypi in the large vessels, or of ossifications of their coats.

Cases of uncomplicated Spasmodic Asthma are not very likely to become objects of examination, since an acute disorder may have attacked the Asthmatic, and the contents of the thorax may be marked with the consequences of recent inflammation: the patient may have been dropsical, and effusion will be found in the cavity of the breast, or in the cellular substance, as well as in the vesicles of the lungs; or it may only be found in the sacs of the pleura, and the cells of the lungs may have been relieved, for, whilst the power of absorption remains, the lymphatics may be expected to use their energies in defence of the last reservoir of vital stimulus.

For these reasons, the presence of serum in the lungs, might not, in some cases occasion wonder, whilst in others the absence of this cause of Irritation would rather confirm the prevailing theory than create farther inquiry.

Though MORGAGNI frequently discovered such a condition of the air vesicles, when the patients had laboured under disordered respiration,

he generally contents himself with recording the fact; and dwells longer on the alterations of organic structure, which he had an opportunity of remarking. Effusions into the cavities of the chest and of the pericardium also are more carefully noticed than effusions in the vesiculæ and bronchia: the latter could not, in cases commonly occurring, occasion death; the former are frequent causes of death, though their preceding symptoms may be less distressing than the paroxysm of convulsive Asthma.

We are, therefore, not to expect so much demonstrative evidence of effusion in the air cavities in cases of simple Spasmodic Asthma, as in others where that might be the attendant disorder, but where life was terminated by one of more decisive violence.

But as there is some light to be obtained from these complicated cases, we shall present a few.

I shall likewise be determined by the history of symptoms, to claim, for the advantage of our Inquiry, cases which may be classed under other heads, but which I believe to belong to convulsive respiration.

OBS. I. MORGAGNI'S observation of morbid bodies induced him to give an opinion which embraces our assigned cause of Asthma. He says, that concretions in the bronchial tubes, and indurations of their glandules, very often arose from viscid humours, or pus remaining too long in these passages, or the air cells at their extremities:* this is informing us in other words, that after fluid matter has occasioned Periodic Asthma, it may become the cause of Continued Asthma; a species which has been treated of in the first part of the Inquiry, where may be found much authority in support of the reasonableness of his suggestion.

This author offers us also some detached facts which are to be classed as complicated cases of Asthma.

OBS. II. The lungs of an Asthmatic subject, decribed epist. xxii. art. 4. were found in the following state:—The right lobe was sound, but in the lower part very red; the left was universally pale, contracted, and hard, and contained sanious matter.

OBS. III. Article 34. epist. xviii. A history of the dissection of a patient, whose disease was denominated Convulsive Asthma.

* De Causis et Sedibus. lib. ii. epist. xv. art. 19.

The heart was diseased, and the lungs were filled with a frothy liquor; but there was no effusion in the cavity of the chest.

OBS. IV. Article 30. epist. xxi. A disease of the breast is reported, which was accompanied with laborious respiration. The air cavities of the lungs were found to be filled with frothy serum.

OBS. V. FABRITIUS HILDANUS opened a subject, who became asthmatic after a concussion of the brain. The disease ended fatally from a catarrh falling on his lungs. The lungs were found everywhere filled with a pituitous and viscid fluid. See Cent. I. Obs. XI.

OBS. VI. HOLLERIUS, Prax. lib. i. cap. 25. in scholiis, has informed us of an Asthmatic, in whose lungs, after death, the same pituitous fluid was found as in the preceding case.

OBS. VII. A woman of 40 years of age is stated to have died of Asthma; but she had also a stone in the kidney. A great quantity of frothy water was found in the cells and bronchia of the lungs.

This anatomical history is given us by FREDERIC RUYSCH. See his works, tom. i. obs. LVI.

OBS. VIII. For another instance of this morbid appearance in the lungs of a subject, who

had suffered the Asthma, see Riverius, observat. LX. Centur. i.

Obs. IX. An Asthmatic died, and his lungs were found filled on both sides with serum; but there were likewise adhesions to the diaphragm and pleura. The pylorus was diseased, and also the duodenum and pancreas: the pineal gland was full of white concretions.

This dissection is communicated by H. RIDLEY, in his *Observations de Asthmate et Hydrophobia*. They are given in German with FLOYER's treatise, by JOANNE CHRISTIAN FREDERIC SCHERF.

The extreme case of serum in the vesiculæ must be when concurring diseases have so weakened the patient that the habit cannot be excited to discharge it. When irritability has been so reduced, suffocation has really taken place, and many instances have been recorded where the danger of this event was imminent.

Obs. X. MORGAGNI* gives the history of a maiden subject, who died with a fluid running out of her mouth. She had taken cold at the time of menstruation; and difficulty of breathing was the reigning symptom. The abdominal viscera and uterus were in a very morbid state;

* Epist. xxi. xxix.

but the lungs were distended with a *frothy serum*. The dissection does not prove that she died from the state of the lungs only, but that an effusion had taken place in that organ; and it appeared that the natural effort of respiration was unequal to contend with that particular affection, for the fluid issued from her mouth agreeably to the feature which CÆLIUS AURELIANUS has given in his description of Asthma. An instance similar to this, as far as regards the affection of the lungs, will be seen in a patient who survived the discharge, and whose case is an acknowledged Asthma.

Instances of this kind are too numerous to be inserted, I shall, therefore, confine myself to a few cases, which are, in my opinion, evidently instances of Spasmodic Asthma; but without affording subject of theoretical debate, by a connection with chronic diseases of the viscera. Though agreeably to certain rules that govern the animal motions, diseases of the abdominal viscera may excite Asthma; but this will be shewn under the *Third Species*.—See Sect. xiii.

Obs. XI. In opening the chest, says Dr. BAILLIE,* “It is not unusual to find that the

* Morbid Anatomy, p. 50.

“lungs do not collapse, but that they fill up
“the cavity completely on each side of the
“heart. When examined, their cells appear
“full of air, so that there is seen upon the
“surface a prodigious number of small white
“vesicles; the branches of the trachea are at
“the same time much filled with a mucous fluid.
“This is not uncommonly the case in persons
“who have laboured for some considerable time
“with difficulty of breathing, but without any
“symptoms of inflammation; such persons would
“appear to die from want of a supply of atmos-
“pheric air sufficient to produce the proper
“change in the blood, which is necessary for its
“useful circulation through the body.”

Obs. XII. A mason was admitted an out patient of the Leicester Infirmary in the year 1786. He had been affected with Asthma several years, which he traced to a severe cold. The habit of this man was thin, and his temperament inclined to sanguine: the paroxysms had been most severe in the winter, but they had frequently attacked him in the milder seasons. He had generally pursued his labour without much consideration of his disease; allowing himself but one or two days of rest for the paroxysm to abate. At the time of his admission, the pulsations at his wrist were frequently

indistinct, and at other times intermitted; his feet were œdematous, his countenance was pale, his breath was always short; he had some cough; but he only expectorated after the paroxysms. He had severe attacks in the evening; and if he was free some weeks from violent symptoms, the invasion of the fit was truly regular in the manner of Spasmodic Asthma. I directed some emetics and absorbents, after the use of which the pulse was more regular. He then took expectorating and diuretic medicines with great relief; and at length was at least so well as to leave off attendance. His pulse was at its former standard, his appetite was mended, his flatulence was gone, expectoration was much more free, his urine was natural, his respiration was not much disturbed by exercise, and the paroxysms were lost. At the beginning of the following winter I was desired to call upon the same man, who having been greatly exposed to wet and cold, was laid up in his own dwelling. His difficulty of breathing was now so great, and the symptoms were so critical as to leave little expectation of his living through the night. The application of blisters to the breast and legs, puking, and then volatile stimulants, gave only temporary relief, and he sunk under his weakness, having had a regular paroxysm two nights before, which had not been succeeded by

expectoration. I was permitted to open the body, an object which had induced me to visit the patient with some assiduity after I had seen the improbability of his surviving the state of weakness in which I found him.

The abdominal viscera exhibited no mark of disease, the bowels were emptied of fæces, and the stomach was very flaccid, and expanded in the coats; the head contained no excess of serum, but the vessels were rather turgid; the lungs were very heavy, and being pressed, a frothy liquor was made to issue from his mouth. The substance was then cut open, and the cells and bronchia were found full of serum, of a light colour, unmixed with blood; there was only the usual moisture in the pericardium, and the sacs of the pleura; the heart and large vessels were natural. After the serum had been discharged by pressing the lungs, the mucus, which still adhered to the coats of the vesicles, appeared more frothy than the general mass, and was also of a darker colour, making the membrane in some places nearly black.

The disease described by Dr. MILLAR has been subject of doubt; CULLEN places it under Cynanche Trachealis, and considers it as the Croup. It is, however, not clear, that Spasmodic

Asthma would be a different disease from this, if it were to attack infancy only; at all events, it appears different as far only as it was accompanied with fever and inflammation. In the extreme irritability of an infant subject, inflammation may occur with other symptoms arising from causes obstructing the air vesicles, when in adults these causes may induce asthmatic paroxysms, without exciting fever, or so much sensation as to inflame the organ; for these reasons it may be proper not to omit the observations of Dr. MILLAR on the morbid appearance of two infant subjects.*

OBS. XIII. A child died in the first stage. The external parts were soft and œdematous; the lungs, and all the other bowels were sound; the stomach and intestines were much inflated with rarefied air, but contained no fæces.

In this instance there is no difficulty in concluding that the child was carried off by a convulsion before the lungs could be affected. The great distention of the stomach permits the inference of indigestion having been a previous complaint, and that the first passages were very

* Vide Dr. Millar on the Asthma and Hooping Cough.

feeble; this condition might suddenly induce difficulty of breathing, and, in the irritability of infancy, the consequences which happened are not uncommon. The absence of inflammatory appearances in this dissection takes away the probability of the Croup having destroyed the child. It seems to belong to the third species of Convulsive Asthma.—See Sect. xiii.

Obs. XIV. A child died in the second stage described by Dr. MILLAR. She had laboured under violent symptoms of the Asthma till the tenth day.

The vessels of the pleura, on the surface of the lungs, and of the trachea, were turgid, and seemed to have been obstructed; the parts had a livid appearance, resembling that which is observed when an inflammation terminates in a gangrene; the bronchial vessels were filled with a white, tough, gelatinous substance.

The *Suffocative Catarrh* is described by SCHNEIDER as follows:—"It is allied to the
"apoplexy and syncope, but is distinct from
"those affections: the diagnostic signs are, a
"weight and pain of the breast, a difficulty of
"respiration, an interrupted voice, danger of
"suffocation, anxiety, sometimes a cough, a slow

“ pulse; the membrane lining the nose and
“ mouth before, and behind, discharges a flux of
“ serum, with which the mouth is occasionally
“ filled.”*

If wheezing had been a symptom described by SCHNEIDER, and the inflammation of the mucous membrane of the nose and mouth had been omitted, the character given of Suffocative Catarrh would not have been improperly applied to Spasmodic Asthma: there is, doubtless, a distinction between the diseases; but there may be subjects affected with this Catarrh in whom the line of separation will be lost.

If the tone of the exhalents of the lungs be greatly reduced in a habit disposed to a ready association of muscles, and particularly of morbid contractions of the respiratory muscles, Asthma may be the disease occasioned by the defluxion, which, in other subjects, might be called Suffocative Catarrh.

OBS. XV. The history of the Catarrh which prevailed in Italy in the year 1730,† gives a

* Schneiderus de Catarrho. l. v. c. 4.

† The epidemic catarrh, or influenza, raged on the Continent, 1580, 1675. See Bergerus de Circul. Lymphæ. C. ii. § 7. Forestus, lib. vi. obs. 3.

specimen of Asthma terminating the more acute disease. The cardinal JOHANNES FRANCISCUS BARBADICUS died of a disorder, which MORGAGNI calls a Suffocative Catarrh, and which was probably a species of that epidemic which is now called influenza: whatever were the affection, its progress was marked by so considerable a disorder of respiration as to merit the name of Asthma, and when he could no longer expectorate, the patient died from suffocation. His lungs were found full of serous fluid; but there was no adhesion, or other mark of inflammation. His physician's words are as follow:—"Graves erant
" ipsi pulmones, sed a catarrhhali, quam con-
" tinebant, materia, multa passim e bronchiis,
" quacunque incideres, erumpente. Certe eorum
" omnis substantia flaccida, non modo non densa,
" aut compacta reperta est." The subject was gibbous, and seventy-two years of age, and as he had been frequently affected with defluxions on the lungs, the termination of the disorder could excite no surprise, any more than the morbid appearances on dissection. Had this plentiful effusion of mucus, or serum, fallen on the lungs of a younger man, whose irritability had been less exhausted, the energy of the respiratory muscles, and of the absorbing vessels, might have been equal to the task of relieving the organ from the oppressive

fluid; and the patient might probably have recovered.

MORGAGNI particularly asserts, that this patient was not affected before he died, with any symptom of peripneumonic fever, nor were any signs to be discovered in the lungs of such an affection, after death. We may safely say, that he expired under a paroxysm of Asthma, in which the convulsive motions were as strong as his irritability would admit.*

OBS. XVI. An ecclesiastic advanced in life, with a short neck, and fat, had been long out of health: he led a sedentary life, and was cachectic. (*Cocochymiam valde scorbuticam contraxerat.*) He was so affected with difficult respiration, and heaviness of the head, that he was incapable of any exercise, except that of going to chapel, and of returning every day. There he was seized with a fit of insensibility, and soon died.

The following day the body was opened; and there was no doubt of a disease, so suddenly fatal, having left vestiges in the brain where the cause probably lay. The encephalon was

* See Morgagni, epist. xiii.

accurately examined, but, to the surprise of all, was sound, "*Morbi, licet atrocissimi ne vel umbra quædam supererat.*" Proceeding to the thorax, the heart was found perfectly firm, and entirely free from any obstruction or polypous concretion. The cause of the laborious respiration, and ultimately of the death of this patient, was at last discovered in the substance of the lungs, this organ being discoloured, and its vesicular cavities entirely filled with a *frothy serum*.*

Thus dissection has furnished some instruction in this Inquiry, but still more is to be obtained from a consideration of the following important case, in which the genuine cause of one species of Convulsive Asthma is shewn more convincingly than by dissection of a dead body; at the same time it serves to confirm the conclusion which the cases we have just given lead to, and it also obviates the objection, that the appearances, after death, may have been effects of the disease, instead of the cause.

A female† was seized with a complaint that very much resembled the paroxysm of Spasmodic

* Boneti Sepulchret. Anatom. lib. i. sect. ii. obs. 57.

† A patient of Mr. Baynton, of Bristol. See Considerations on the Medicinal Power of Factitious Airs by Dr. Beddoes and Mr. Watt, P. IV. p. 53.

Asthma; it was, however, more violent than first attacks usually are, and its remission was attended with a very copious discharge of *frothy serum* from the bronchia, which was thrown up by a slight, though almost continual cough. After occasional relief, the disease returned in sixteen months with as much violence as at first. She was then attacked, after comfortable rest, at five in the morning, with Dyspnœa and Convulsive Cough; danger of suffocation was soon perceived; the senses forsook her, the face became livid, the extremities were cold, and the pulsation at the wrist was lost: this state continued for two hours, during which time a very large quantity of frothy serum, tinged a little with blood, was discharged, without any visible effort, by the mouth and nostrils. “ Then
“ some very faint and involuntary efforts to
“ cough came on, which gradually increased,
“ *and with every effort large quantities of the frothy*
“ *serum were thrown off; perhaps the whole quantity*
“ *might amount to three or four pints.* About three
“ hours after the time of attack, the difficulty
“ of breathing became very sensibly diminished,
“ and her senses were observed to return.” Dr. BEDDOES says, the fluid which was discharged was ascertained, by careful inquiry, to be *mucus*, and not saliva. The predisponent causes were such as lead to Spasmodic Asthma; and both

Dr. DARWIN and Dr. BEDDOES considered it to be an extraordinary instance of that disorder.

It is extraordinary from the very considerable excretion of serum; for a more moderate collection is to be supposed, where no excretion is observed; and we must be very inattentive in applying the function of absorption to the disorders of the lungs, if we give it no importance in such cases; but though I see in this instance very fortunate evidence of the cause of the disease, and such as cannot commonly be expected to appear in a living subject, from the activity of absorbing powers, yet the description is not solitary in modern medicine. A similar case is to be seen in the works of ALEX. MUNRO, sen.* in which a fluid was discharged from the lungs, but its accumulation had been more gradual, and the irritability of the habit was not so deficient as in the female patient.

We shall find also, by going farther back, that CÆLIUS AURELIANUS† makes this excess of mucous fluid a diagnostic in the worst cases of Asthma; and his reference to the most violent state of the disorder takes away all doubt of the

* Works of Alex. Munro, sen. p. 604.

† Morborum Chronicorum. Lib. iii. cap. 1.

appearance belonging to that form which is called convulsive. After mentioning the common symptoms in which are included wheezing, a cough dry, and then moist, spittings thin and frothy, and afterwards more thick and viscid, he proceeds to say, "At si gravior impetus
 "superpositionis* fuerit, ora ægrotantium li-
 "vescunt, et quidem excluso per nares humore
 "mucilento, relevantur, atque præfocationis
 "carent metu, quod non aliter cedit, etiamsi
 "per oculos lacrymarum fuerit fluor."

It is known with what energy the entrance of a single drop of fluid would be resisted by the passage of the larynx, yet the insidious entrance of serum into the vesiculæ is not productive of such acute distress. That it may be borne in these cavities without instant death, when it has taken possession, is proved by Dr. GOODWIN. He poured water through an opening into the trachea of a cat: the experiment induced great difficulty of breathing, and a feeble pulse; but the animal recovered, in repeated instances, from the sudden impression, to a state of seeming ease.†

Dr. GOODWIN finished his experiments on cats by destroying them after a few hours. It

* Superpositionis, i. e. *Paroxysmi*.

† Connection of Life with Respiration, p. 17.

would have been more satisfactory to have heard what symptoms appeared in a longer time; with this view I made the following experiment, which, with some modifications, was repeated on cats. These animals are more tenacious of life than most others; and I found that they would take a greater quantity of fluid into the lungs, without immediate suffocation, in proportion to their bulk, than the dog.

I confined a dog in an erect posture, and with the assistance of an ingenious friend, opened the trachea, and poured in four ounces of serum of cow's blood, warm; the passage was then properly closed. The dog was set at liberty within the bounds of a kennel, three feet by four, and open to the air in the front; he was affected with great difficulty of breathing, lay down panting, but suddenly arose with great emotion, and continued on his legs, with quick respiration, for some time. The distress gradually disappeared in four hours; but he refused food, and appeared to sleep. In sixteen hours he became unruly, and made violent efforts to release himself: broth with oatmeal was given him, which he at first took with eagerness, but he soon left off eating, and was as restless as ever; his respiration was very laborious, and his eyes were suffused with water; the floor of the

kennel was very wet, and I observed that he passed urine. After this state had continued till the twenty-sixth hour from the operation, with more or less Dyspnœa and anxiety, he became much more quiet: his breathing, in thirty-four hours appeared to be natural; but he then began to rub his neck, and scratch the wound. It was soon perceived that a great inflammation was come upon the integuments; and from the trouble which the animal gave, and the pain he was in, I directed him to be strangled. Upon opening the lungs, there were collected one ounce and a half of fluid, which was much more ropy than the serum poured into the trachea; two ounces and a half, with any ordinary mucus natural to the cavities, had therefore been absorbed, or exhaled, in the vapour of the dog's expirations.

It appears by the experiments of Dr. HALEs, that water poured into the wind-pipe may pass through the bronchia into the pulmonary artery; but in the reverse direction the passage of this fluid is so free, as to run from the artery into the air vessels four-fifths faster.

Serum of a hog's blood was afterwards tried, and it passed from the pulmonary artery most freely into the bronchia, but not into the veins.

But though serum passed with this facility from the arterial capillaries into the air pipes of the lungs, and doubtless with greater ease after death than in a living subject, it was found that globules of red blood would not pass through these exhalent mouths into the vesicles, though considerable force was made use of.*

Hence Dr. HALEs infers, that some Asthmas may arise from the effusion into the vesicular cavities.

“ When we see,” says this philosopher, “ how
“ freely the serum passed from the pulmonary
“ artery into the cavity of the vesicles and bron-
“ chia, it is no wonder that so great discharges
“ of humours are often made through the same
“ passages, when the blood is much diluted by
“ being, in colds, surcharged with too much
“ obstructed perspirable matter, or otherwise dis-
“ ordered: hence, also, some Asthmas have their
“ origin.” †

* Hale's Statical Essays, Exper. xi. &c.

† Statical Essays, Vol. II. p. 88.

SECT. VII.

Floyer, Hoffman, and Cullen, on Asthma.—Description of the disease by Aretæus.—The capillary exhalents of the lungs unlike convoluted glands.—The use and indication of Convulsive Respiration.—The effect of frequent recurrence of Spasm discovered by analogy of irritation situated in other organs.—Effect of irritation applied to different parts of the pulmonary system.—Diagnostic Symptoms.—The Difficulty of breathing.—Cough.—Straitness.—Wheezing.—Relief from discharge of mucus.—A person recovered from drowning presents an explanation of wheezing in Asthma.—Objections to the Theory of Spasmodic Constriction.

THE writers of authority, who succeeded WILLIS, have involved us in the uncertainty of their own conjectures. If we are to believe them, the nerves have been implanted in the animal system, to remind man of his misfortunes, and to betray the œconomy of life into perpetual derangement, and torments scarcely to be endured.

Sir J. FLOYER says, “the Periodic Asthma depends on the constriction of the bronchia and bladders of the lungs, by windy spirits:” as this state had never been proved, it might

very properly have been neglected, till a well digested examination of real appearances had been found insufficient to explain the cause, or to afford indications of cure. He did not, however, omit to remark the excess of contraction in the respiratory muscles of the breast and abdomen; and thus far he was consistent with his own injunctions to physicians, "of describing all sensible phænomena."

It is difficult to escape the charge of inconsistency, when this plain ground of *visible effects* is deserted, and the mind of the philosopher, impatient of slow progress and careful induction, launches into hypothesis.

The doctrines of FLOYER, HOFFMAN, and CULLEN, on the proximate cause of Asthma, are now accepted without much debate, as affording the easiest solution of the symptoms; and if the method of treating the disease had been successful, it would be at least useless, if not invidious, to condemn critically the principles on which it was pursued; we have, however, a confession of the greatest weight to raise the scepticism of practitioners. No agent has yet been discovered, which, in the opinion of Dr. CULLEN, can certainly remove Asthma; and we may, therefore, rationally object, that the cause

assigned by the Professor is no proper direction to a cure, and that its existence may be doubted. As this writer has taken FLOYER and HOFFMAN for his authority, and given the last finish to their theories, it might be sufficient to make some remarks on his opinions.

I shall, however, observe, on HOFFMAN, that whatever may be his theory, his descriptions of the Humid, Flatulent, Spasmodic, Hypochondriac, cases of Asthma, &c. point out causes of irritation in common to all the species, and producing the same effects in greater or less degree. He admires the description of Aretæus with great reason, and even accepts it as his text in explaining the disease. This accurate writer did not omit to mark the expectoration of *frothy aqueous matter*; finally, in a fatal event, *suffocation*; in a fortunate one, *free and moist expectoration, with copious urine and watery stools*.*

ARETÆUS informs us, that the disease terminates in suffocation generally, not often in recovery. From this it is probable, that he applied the phænomena of Asthma where they would uniformly appear, in diseases of great irritation and oppression of the pulmonary organ;

* Aretæus, lib. iii, cap. 11.

for the account before us must embrace many cases of stronger influence on the actions of life than those which the generic term of the present day is made to comprehend; though it comply strictly with the natural fact, as is proved by the cases in the last section.

CULLEN considers the disease to be without a *manifest cause*, but has marked for a diagnostic the afflux of serum to the lungs in the following words: "Cum sputo mucii sæpe copioso."

It is obvious, that mucus could not have been expectorated without a previous secretion of serum. But as this mucus is copiously discharged, the effusion of serum must have been considerable: it may be therefore proper to inquire in what state of the lungs such an effusion can take place. It is known that the glandules of the trachea and bronchia are subject to inflammation, and that in Catarrh an excretion of mucus is considerable from this condition of their vessels; but practitioners have generally testified, that pyrexia and symptoms of inflammation are not present in Spasmodic Asthma.

We must then look farther for the source of this copious secretion, and we shall find it in the vessels with exhalent orifices at the extremi-

ties of the air pipes: the construction of which is not complex like that of the mucous glandules; and they have not follicles in which they may deposit their lymph till it be excreted. There are many reasons for believing this to be the principal, if not the only source of the copious expectoration in Asthma.

In consequence of the condition of the habit in Asthma, the matter of heat is not given out in this as in other instances of glandular secretion. The capillary vessels are passive in this disease, and, not contracting so narrowly as to detain the gross part of the current, they permit lymph to pass instead of exhaling only a thin vapour.

There is as little difficulty in assenting to the position of a torpor* of these capillary extremities, as to that of their increased activity. In one case we must allow them the power of contracting, greater in proportion than what belongs to the trunks from which they proceed; and in the other less. The latter state is as

* *Torpor* and *Quiescence* appear to me properly expressive of the condition of a capillary vessel, which is not irritated to contract by its contents; but I am not certain that my application of these terms corresponds with the meaning of the learned physician, who introduced them.

consistent with physiology as the former, and each may exist in different habits.

The exquisite labour of respiration conforms to animal laws under the irritation of this fluid, though it may seem to counteract its own purpose; but, in the early period of the complaint a quickness of respiration precedes the paroxysm that the expirations may quietly carry off, in vapour, the serum from the cavities: the action of the absorbents is quickened, it is probable, in the same proportion, that by the united powers of these instruments, the balance may be restored between absorption and exhalation. If this object be not soon accomplished, the convulsive respiration may take place. It is the *Difficultas Spirandi* of Cullen,* which is repeated at intervals till the indication which it affords is answered, or the powers of the system are exhausted by the effort.

In the same manner Acrid Bile in the intestines occasions an increased peristaltic motion, and if it be not discharged by these natural means, an inverted motion may arise, equally counteracting the purpose of relief, as happens from the convulsive respiration in cases of

* See p. 5.

Asthma. Ileus is then produced, where less sensibility of injury, and less exertion to remove it, might have been followed by a regular discharge of feces.

In menstruation and in parturition, a similar excess of muscular contractions frequently opposes the discharge which nature intends, and this must be moderated before she can accomplish her purpose.

We see, then, that the actions called *Difficulty of Breathing* naturally follow the obstructed state of the lungs. We shall next consider how this state may occasion the other symptoms.

Irritation produces, in the pulmonary system, effects different in quantity and manner, according to the part of the organ on which it falls. If a drop of the most limpid water fall into the larynx, it excites a more violent cough than is occasioned by the serum effused in the vesicles at the extremities of the wind-pipe. This shews the difference between a catarrhal cough and an asthmatic one; the lymph accumulated in the vesicles is rather oppressive than acrimonious, and the sensibility of their membrane is less than that of any part of the bronchia and trachea. But, besides the vesicle being less sensible of

irritation, it cannot collapse in the attempt at expiration from its cavity being filled with lymph, which is the true cause of a paroxysm beginning with *little or no cough*, and that seemingly impeded; but after the fluid has been lessened by absorption, still more may be discharged in the vapour of expiration, and the elasticity of the bronchia being thus restored, the much-desired *spitting of mucus* may take place.

By the same state of the lungs we may account for the *Straitness* and *Anxiety*. The vesiculæ are occupied by lymph; the bronchia are straitened by the same matter in a more viscid state; the diaphragm cannot descend as it used to do, on account of the resistance of the stomach distended with flatus, and because the trachea is narrowed by the pressure of the œsophagus, affected like the stomach: the external respiratory muscles then endeavour to dilate the thorax, by lifting up the ribs and sternum, but they cannot accomplish the object of filling the air cavities thus obstructed, or of forcing down the diaphragm, which, by its own contractions, had been unable to conquer the resistance of the stomach: these real *obstacles to a free and full inspiration, equally prevent a free and full expiration,** which cannot take place till

* Cullen's Practice, MCCCLXXXIV.

the vesicles collapse; and we have therefore no necessity of appealing to a Spasmodic Constriction of the bronchia, till that state be made more certain.

FLOYER observes, with regard to the *Straitness*,* "that it does not depend on a great quantity of phlegm, because the lungs do not appear to be much oppressed with phlegm before the fit; and at the end of the fit the straitness goes off, before any considerable quantity is spit up:" but though we have accounted for the straitness by the existing state of the stomach, as well as of the lungs, I believe the last to be the principal cause, notwithstanding the remark of FLOYER; for there must be a point of time when the activity of the absorbents has lessened the quantity of serum collected in the air cells, and a degree of oppression being taken off at that time, some returns of action in the bronchial rings and vesicular membranes, will be obtained; relief may then be perceived in the breast before excretion of phlegm takes place, but not before it has been reduced to a quantity which may be controuled, when expectoration partially proceeds with critical relief to the patient.

* Pag. 7.

The *wheezing* is a symptom united by CULLEN, with the straitness and anxiety; but in addition to the obstruction of the tubes which admit and discharge air, we are not to forget the distention of the œsophagus, which is so considerable in hysterical patients, and which may prevail in all dyspeptic cases. If the trachea be compressed by any cause, wheezing will be the effect. In hysteria it may be produced by this distention, though lymph had been effused, and the spitting prevented by active absorption; and this consideration may answer the remark of FLOYER,* that "wheezing does not depend on phlegm, because the hysteric, who have no phlegm, wheeze very much."

Wheezing and straitness of the breast very frequently remain in a greater or less degree between the fits, when the convulsive actions of the muscles have subsided, which shews the inadequacy of a Spasmodic Constriction as the cause, since no one is ready to assert the constancy of spasm, without relaxation for a long period. The wheezing generally continues through the disease, gradually becoming less, till the secretion of lymph, is reduced to a regular quantity, and the œsophagus no longer compresses

* Pag. 43.

the trachea, indigestion being removed, when it ceases.

To confirm our explanation, we find this symptom in Phthisis attributed to the mucus or pus stuffing the trachea.* Wheezing is the same sound in Phthisis as in Asthma; but the observer was not biassed by authority to assign it to spasm.

We also see it accompany the condition of a person recovering from suspended animation after water had been received into the lungs. Dr. GOODWIN says, "a difficult and stertorous respiration is observed. This inconvenience arises from some water still remaining in the lungs, which will be gradually evaporated by the expired air."†

As to a Spasmodic Constriction of the bronchia, which, in the opinion of CULLEN, is the proximate cause of the disease, there are many objections to be opposed to this theory.

1. Dyspnœa has the same appearance to an observer as Asthma, only more constant;

* White on Phthisis Pulmonalis.

† Goodwin on Animal Life and Respiration, p. 118.

and CULLEN assigns to it the same causes as to Continued Asthma: if therefore this affection can exist without constriction of the bronchia as a proximate cause, so may Convulsive Asthma.

2. The straitness of the breast, some dyspnœa, and wheezing, remain between the fits in many instances, which should prove the presence of a Spasmodic Constriction though this state, by the laws of animal life, cannot be permanent.

3. This continuance of symptoms between the fits is acknowledged by all writers, and particularly of those symptoms which are most necessary to prove the spasm of the bronchia, as wheezing and straitness.

4. The spasm is said to be readily excited by "turgescence of the blood, or other cause of "any unusual fullness and distention of the vessels "of the lungs."*; in this case Dyspnœa would be more certainly attended by wheezing than Asthma is, which is not allowed, nor is Dyspnœa said by the Professor to be owing to spasm of the bronchia.

* Cullen's Practice, MCCCLXXXIV.

5. A fit of Convulsive Asthma of this species cannot be suspended by four grains of opium, which would probably be the case if it depended on spasm only.

6. In Catarrh and Phthisis a spasm of the bronchia is not affirmed, though the material continually discharged may be supposed to irritate, and in fact does bring on laborious breathing occasionally.

7. The Constriction has never been shewn by dissection; but in cases of vomicae, where the lungs had been much irritated, it has been discovered by dissection, that the "*branches of the trachea are never in any degree contracted.*"*

8. Where irritability is not worn out, the act of dying is attended by the same muscular efforts and uneasiness of the breast as are felt in the paroxysm of Asthma; but no constriction of the bronchia has been afterwards discovered, which might be expected, if it were a part of the last condition of the lungs. Since universal relaxation of the body is not a constant effect of dying, as may be proved by many instances.

* Dr. Stark's works, p. 28, 29.

Lastly. The supposed cause has never indicated a successful practice, for Anti-spasmodics have only been useful in the fourth species; and in many cases the actions of the external muscles have been taken for the evidence of constriction, under the confused term of Difficulty of Breathing.

It is not, however, intended to deny the possible existence of this spasm, but to state the imprudence of depending upon it in the practice. If it be necessary to the pathology of the disease, it surely may be better defended as a consequence of the effusion, than the effusion can be supported as the effect of the constriction.

SECT. VIII.

Asthma compared with other diseases, bearing analogy in their causes.—Observation on the Humoral Asthma.—Catarrh.—Phthisis.—Asthma, Lethargy, and Apoplexy.—The intercurrent of these affections.—One Species of Asthma is a temporary Dropsy, distinct from hydrothorax and anasarca of the lungs.—Asthma, Dropsy, and Insanity.

ASTHMA is so strongly marked, that there can be little difficulty in knowing the disease; yet it will elucidate the subject, to shew its distinction from some other diseases to which it may bear an analogy in its causes and effects.

Defluxions on the upper part of the lungs and Sneiderian membrane are usually inflammatory affections of the mucous glands which line the passage of the nose, fauces, and trachea, as far as its divisions, and possibly lower in the breast, but not extending to the extremities of the air pipes.

The Catarrhal disposition is very frequently followed by Asthma, because repeated inflammation of the capillary vessels and mucous excretories, lessens their power of contraction, and of resisting the impulse of the circulation though rendered

weaker than was usual in health. They then become subject to the influence of exciting causes of little force in comparison with what they formerly yielded to. For this reason elderly persons have their natural excretion of mucus much more copious, in proportion as they may have been more affected by catarrh, and they are accordingly more liable to Asthma. If inflammatory disposition be not wholly lost in these persons, by the progressive debility of the vessels of the lungs, Peripneumonia Notha will be the character of their pulmonary disease, attended often with great danger.

I am aware that this species will be designedly confounded, by many reasoners, with the Humoral Asthma; but it is time that the distinction of *Humoral* and *Convulsive* should be better understood. If mucus be discharged in greater quantity in one case than in another, the respiratory actions being the same in both, there is no good reason for calling one only convulsive. Is not every Humoral Asthma convulsive? If the unfortunate patient have so little irritability as not to be excited to cough and expectorate, the phlegm must suffocate him, unless the absorbing vessels carry it off: and this process is attended by Convulsive respiration. But though the Humoral must be Convulsive, the Convulsive Asthma is not always Humoral; for we shall see that irritation may exist in a more subtle form than that of lymph.

It is not consistent with the rules of the animal œconomy, that Catarrh should be indicated by those violent contractions of the muscles of respiration which take place in Convulsive Asthma. Fever attends both Catarrh and Phthisis; and we may observe, though we cannot assign a reason for the fact, that if fever supersedes, it generally terminates convulsive motions.

If Catarrh occasionally lead to Asthma, it still oftener brings on *Phthisis*, a disease which depends on a state of the lungs, opposite to that which permits serous effusion.

In Asthma, an excess of blood in the pulmonary vessels may very probably precede the exhalation of the finer part into the vesiculæ and bronchia: this plethora is local, arising from the relaxed texture of the coats of the vessels, and relieves itself by effusion.

In incipient *Phthisis* the arterial impulse is more considerable than in health, but the predisposition of the pulmonary vessels is not favourable to a relief by effusion, till the fever has acquired strength, when coagulable lymph instead of pellucid serum comes to be effused.

It is therefore to be allowed, that there is a predisposition, in consequence of which inflam-

mation may affect the arterial extremities, and produce Phthisis, as doubtless there is a predisposition leading to that atonic state of the vascular part of the pulmonary system producing asthma.

There may be also an intermediate state, in which a balance is preserved between the crisis of inflammation sealing up the orifices of the arterial exhalents, and of their distention so gradually acquired as to permit the escape of the finer fluid, and the consequent relief of arterial fulness; but it is probable that this balance cannot be long adjusted where the predisposing causes have had a considerable influence, and that if the exhalents do not dilate soon in consumptive habits, Phthisis must take place; and in persons of an opposite constitution, which I conceive is favourable to Asthma, the effusion of lymph into the vesiculæ and bronchia will determine, in no long time, the future character of the pulmonary disease.

Lethargic affections have been allied to pulmonary complaints in the consideration of many authors; so much so, as to create a question if the cause of lethargy did not exist in the lungs.

HIPPOCRATES says, "lethargic diseases are
"the same as peripneumonic, and not altogether
"different from the humid peripneumony." (Pe-

ripneumonia Notha.) Some of his commentators have even defended this opinion by the practical remark, that lethargy is critically relieved by the expectoration of purulent or serous fluid.

The lethargic symptoms in Asthma and Peripneumony are sufficiently accounted for by the interruption to the course of the blood from the right side of the heart to the left, obstructing the influx of venous blood from the head. The natural consequence in bad cases of Asthma is Apoplexy.

Asthma being thus occasioned by serum in the vesiculæ, may be considered as an *Hydropic Disease*; but it is obviously distinct from Hydrothorax, in which the water is collected in the sacs of the pleura, or cellular texture of the lungs. In each situation it will occasion dyspnœa, which, though subject to exacerbations, from accidental causes, will not generally put on the form of Periodic Asthma.

We have sufficient testimony of the connection of Asthma with Dropsy in the histories of practical authors, frequently pointing out the intercurrence of symptoms and the changes of one disease into the other, when Asthma has been of long standing: some proof of this is contained in Sect. VI. of this Inquiry.

HOFFMAN and WILLIS have particularly noticed the hydropic appearances of the feet, and the tendency to general dropsy in Asthma: and the observation of these authors is supported by that of other practitioners.

SYDENHAM opens his treatise of the Dropsy, by stating the first symptom of that disorder to be the swelling of the legs, and the pitting of the ankle by pressure of the finger: but this is not so certain a sign in women as in men; nor even in the latter is it to be considered as an absolute certainty of the disease having commenced. He then proceeds with the following observation:

“ Etenim cum senex quispiam, habitu corporis paulo pleniori præditus, *Asthmate* jam a multis annis laborans, ab eodem derepente, idque hyemis tempore, fuerit liberatus, mox ingens tumor musculos tibiæ occupabit, Hydropicorum tumores æmulans, qui hyeme etiam magis quam æstate, tempestate magis pluviâ quam serenâ, pariter invalescit, et tamen sine quovis incommodo insigniori, eundem ad libitinam usque comitabitur. Quo non obstante, si generaliter loquamur, suræ et tibiæ intumescences, etiam in viris, pro signo supervenientis hydropis habendæ sunt; maxime si ita affecti spiritum ægrius ducant.”*

* Sydenhami Opera Tractatus de Hydrope.

This sagacious observer might have attributed the swelling of the legs, with great truth, to hydropic effusion in the Asthmatic, as well as in other cases; and the cessation of the Asthma when these swellings commenced, seems to corroborate, beyond dispute, the theory, that both affections depended on one cause. The swelling was larger in winter than in summer, in moist weather than in dry. Alterations in the atmosphere rapidly affect the Asthmatic, and change his habit from a perspiring to an imbibing state, and whether the water stagnate in the vesicles of the lungs, or be taken up by the absorbents, and be again effused in the lower extremities, the identity of the cause is sufficiently plain.

Insanity sometimes suspends Consumption, and Consumption Insanity: Asthma, likewise, is succeeded occasionally by Insanity; probably from the turgid state of the vessels of the head in consequence of the difficulty with which the right side of the heart propels the blood through the lungs to the left. In the hydropic diathesis, so frequently accompanying advanced Asthma, the disease of the head is still more frequent.

The following two cases* deserve attention. In one, the patient had alternately Asthma and

* Withering on the Fox Glove, cases 24 and 34.

Insanity: in the other there appeared Anasarca and Insanity at the same time. The treatment was successful, though founded on the sole indication of curing the Dropsy.

We conclude, then, that Asthma, Insanity, and Dropsy, had the same cause; for, if Insanity and Asthma were one disease, and Insanity and Dropsy were one disease, *Asthma* and *Dropsy* must be one disease.

From a consideration of the causes of Insanity, by the learned Dr. ARNOLD,* there can be no difficulty in assenting to the connection between these diseases.

* Observations on the nature, kinds, causes, &c. of Insanity.

SECT. IX.

Additional symptoms considered, and referred to the same causes.

—Remissions of Convulsive Respiration. — Anxiety of the præcordia, and straitness of the breast. — Itching of the neck and breast. — Obscure heat without fever. — Dyspepsia. — Head-ache, sleepiness, and flatulence. — Nocturnal access of the paroxysm. — The power of volition in suspending Epilepsy and Asthma. — Asthmatic diabetes. — The union of oxygen with the blood, the absorption of heat, and the discharge of aqueous vapour. — Deficiency of oxygen from the condition of the vesicles, and consequent debility of the heart and arteries. — Polypi of the heart. — Syncope. — Irregular pulse. — Coldness of the lower limbs. — The intermitting pulse. — Correspondence of the stomach and heart. — Expectoration of black mucus. — The blood saturated with carbon. — General remarks.

WE have seen in the preceding sections, that the observations of modern physicians have strengthened the authority of the ancient writers; and that dissections have confirmed their facts, as to the cause of *one Species of Convulsive Asthma* being an excess of serum in the lungs. The diagnostics* of Professor CULLEN, were only to be explained by tracing them to this source from

* See Sect. vii. p. 80, 81, 82, 83.

which they naturally arose. But there are other symptoms, which, though not constantly meeting in the same paroxysm, very generally attend the disease, and give additional support to this proximate cause.

The contracting muscles by the laws of the animal œconomy, have alternations of exertion and rest. After a muscle has been for some time stimulated to contract, a relaxation will succeed, though the stimulating cause may continue in force.* Happy is the Asthmatic, who, in consequence of repeated paroxysms, is not influenced by the secondary law of habit; for contractions of the muscles will also continue at intervals, though the stimulus which first excited them be removed, as happens in tenesmus for some time after the exclusion of acrid excrement.†

The exacerbation will at least return every evening whilst the irritation continues, decreasing in violence as a portion of it is discharged, and the remainder becomes less oppressive: thus, though the whole object be not gained till the paroxysm ceases, something is obtained at every remission of these natural efforts.

* See Zoonomia, Vol. I. Sect. xii. i. 3.

† Ibid. Sect. xii. iv. 3.

Anxiety is owing to the difficulty attending the efforts of nature to remove an irritating offence.* If this exist in the chest, we shall be more satisfied with the pathology, because it is here that physicians have long referred the perception called *anxiety of the præcordia*; differing very little from the anxiety belonging to Asthma.

An *Itching of the Skin*, of the breast and neck, is frequently a symptom in the asthmatic paroxysm, sometimes preceding the violence of the fit, and generally declining as the agony of respiration increases; this may be the effect of sympathy with the lungs and first passages. Irritating matter in the stomach is as probable a cause of this symptom, as the obstructing lymph in the vesicles, since hysteric and hypochondriac patients, who suffer dyspepsia, are very much affected with it.

The difficulty with which the venous blood is returned to the heart, from the right ventricle and the pulmonary artery being obstructed, may be an additional cause of this affection of the skin.

There is frequently a remarkable *Perception of Heat*. This may have induced FLOYER to speak of fever in this disease, but an attention to the pulse gives no countenance to the observation;

* See Gaubii Instit. Patholog. Med. 686, 687.

as the quickness seldom amounts, in uncomplicated cases, to one hundred beats in a minute; and the general standard is from eighty to ninety. A great *desire of cool air* also attends, probably occasioned by a deficiency of oxygen, the means of obtaining which will be increased in proportion as the air is often changed, or more fresh air admitted.

Closeness is particularly disagreeable to the Asthmatic. "The patient," says Aretæus, "loves walking in the open air, with his mouth open, and is dissatisfied with the largest house, which seems too small to breathe in."*

The sense of heat through the body is not a constant symptom, for more frequently the lower extremities are very cold in the paroxysm; and when the patient himself has the perception of heat in his external parts, there is no increase of temperature if the thermometer be applied to the skin.

I have frequently considered this circumstance, and I can only satisfy myself by attributing it to slowness of venous circulation in the superficial vessels, arising from the impediment to a free entrance of the blood into the right side of the heart, occasioned by the compression of the pulmonary vessels.

* Aretæus, lib. iii. cap. 11.

Dyspepsia is a condition of the habit which will be found always to have preceded this species of the Periodic Asthma; comprising the *flatulencies* of the stomach and bowels, the *pain over the head and eyes*, and the *sleepiness*.

The *Attack of the Paroxysm in the night* is a peculiar feature, and gave rise to the following suggestion of the ingenious Mr. CHARLES DARWIN:
 “* Do the periodic returns of nocturnal Asthma
 “rise from a temporary dropsy of the lungs,
 “collected during their more torpid state in
 “sound sleep, and then re-absorbed by the vehement efforts of the disordered organs of respiration,
 “and carried off by the copious sweats about the
 “head and neck.”

The copious sweats about the head and neck are so uncommon as only to be seen in very gross subjects, and such as are affected with that form of Asthma, called Humoral, which the species now treated of embraces. †

* Vide Zoonomia, Sect. XXIX. Vol. I.

† In the second volume of Zoonomia, the author modifies the assertion in the former, and thinks the Humoral and Convulsive Asthma differ essentially from each other; the distinction, however, seems not to be very firmly established. In fact, the absence of mucus, in some fits of the Asthma, or the access of the disorder not occurring at the usual periods, or at the customary hours, can scarcely ever be traced to two regular deviations; and

The muscles subservient to respiration have been said by anatomists to be in some measure influenced by volition, and on this account they have long since distinguished them as having a mixed motion, that is, partly voluntary, partly involuntary: if this be the case, respiration will be performed in the most perfect manner when neither of these powers is deficient, and in proportion as one is feeble, the function will be served with less energy.

But the paroxysm comes on after the patient has been absorbed in sleep, when volition being suspended, irritation must perform the whole duty. Effusion of serum in the vesiculæ having previously taken place, if respiratory action be now diminished, that moment when the oppression of the serum can be no longer borne will be accelerated, because less vapour will be exhaled in expiration, and the absorbing vessels cannot remove the inconvenience by their power alone.

When this period arrives, those extraordinary efforts commence which constitute the paroxysm of Asthma, and which are the *nisus* of nature to relieve herself from injury. This accounts for it is acknowledged, that the Humoral and Convulsive are so intimately blended, as to make the task of finding a different cause for each much more embarrassing than that of assigning natural laws as the reason of the occasional absence of one or more of the common phænomena.

the circumstance which Sir JOHN FLOYER relates; he could protract his fit by denying himself rest: “* I have found, that by late sitting up I have
“ put by the fit for a night or two; and I have
“ found it commonly necessary to rise out of bed,
“ especially in the summer time, and to sleep in a
“ chair the first night of the fit. Two nights
“ before the fit Asthmatics want sleep frequently.”†
The fit threatens to take place two or three nights before the attack, and the power of volition prevents it, at the expence of sleepless nights, until the cause has proceeded to its *acmé*.

The same power is exhibited in Epilepsy as in Asthma. A young man has been affected with Epilepsy from the age of thirteen to nineteen: it most frequently makes its attack in his sleep, but before his senses are gone he perceives it. If his sleep be profound, and the head affected in the very first instance, he cannot stop its progress, though he has a confused sense of his situation; but sometimes he has a sufficient warning by a numbness in his right hand, a tingling, or a pain, and in this case he starts from his imperfect slumber, and using exertion of his muscles, with attention of mind, he can succeed in stopping the

* Treatise on Asthma, page 94.

† Ibid, page 94.

fit, even after the attack is begun. This instance of Epilepsy is marked with irritation in the stomach; a load of viscid phlegm is found to oppress that organ, and strong emetics have occasioned its evacuation in large quantities, with temporary relief.

But the paroxysm does not always come on in sleep, for after frequent attacks, a period of return is introduced into the habit, which becomes part of its œconomy, and is too powerful to be counteracted by volition. Here the same force of habit operates which influences disorders of the body in other instances, even after the cause which first excited them is removed.

The *Diabetes* in this species of Asthma may be properly attributed to the Hydropic Diathesis of the body, in which an effusion from the exhalents of the kidneys may be expected to accompany a similar effusion from those of the lungs.

It appears also, that the arterial exhalents of the kidneys may be relaxed by the sudden impression of passions of the mind, as may be the case in Hysteric Asthma.

The tendency to discharge copiously watery urine, accompanies more or less all the varieties

of Asthma which make their attack periodically. The kidneys receive nerves from the intercostals, and thus we are led to a supposition of strong association of actions in the kidneys, stomach, and lungs.

The discharge does not, however, appear to afford relief to the lungs in the paroxysm of Asthma. If it were useful, it would still confirm the pathology here delivered; but it precedes or accompanies the paroxysm instead of following it. It continues whilst the exacerbations last, and is reduced to a healthy standard when they finally cease, the balance between exhalation and absorption being then generally, as well as locally, restored.

In support of this reasoning, we find that the hydropic diathesis cannot be concealed in the advanced state of this species of Asthma; for, by the testimony of every medical authority, it terminates very frequently in anasarca.

But before that species of Dropsy comes to be suspected, the exhalents of the kidneys permit the passage of great quantities of water, which, for some time may suspend the effusion in the cellular membrane, or cavities of the body. Thus does Asthma connect itself with Dropsy by this inter-

mediate link, as well as by the effusion into the vesiculæ of the lungs.

Though this affection be in general temporary, yet its frequent recurrence with a degenerated condition of the fluids, have often made it permanent, and, by the testimony of M. SAUVAGE, induced a true Diabetes.

The *Straitness of the Breast*, or sense of uneasiness which has acquired this term, must be increased in proportion as the close application of oxygen to the pulmonary vessels is diminished. M. LAVOISIER proves, that of the oxygen which disappears in respiration, *four-fifths* are consumed by a combination with the carbon of the blood, forming carbonic acid gas; the remaining *fifth* is either absorbed by the blood, or, uniting with hydrogen, discharged from the blood, forms aqueous vapour.

It is also beyond a question, that a principal duty of respiration is to impart heat to the blood, and to furnish it with the quality which oxygen possesses, of stimulating the heart and arteries to more vigorous contractions.

Now Dr. GOODWIN shews, by his experiments, that a fluid in the air cells, introduced by the act of drowning, is an important obstacle to the union

of oxygen with the blood, and that it frequently prevented the reception of its stimulus, by the efficacy of which the contractions were to be restored, in suspended animation.

Can we then wonder that the Asthmatic should eagerly desire an open exposure and a change of air, since the condition of the vesiculæ, filled more or less with serum, opposes the ready combination of oxygen with the blood, by which a proportionate degree of vigour would be acquired.

We have, therefore, experiment in support of the cause here asserted, of some of the most remarkable symptoms which distinguish Asthma. Serum in the air cavities of the lungs may be productive, by its bulk, of uneasy sensation; but, considering its influence more widely, it may be the cause of deficient contractions of the heart; the blood will then be delayed more in the ventricles and pulmonary vessels, but particularly in the right ventricle; the current through those vessels being rendered difficult by the compression: hence *Polypi* have so often been discovered in the cavities of the heart and large vessels of asthmatic subjects.* The patient may, from this condition, be affected with *Syncope* and *Irregularity of Pulse*.

* See Part I. Sect. III. p. 40.

The irritability of the heart being unequally excited, at one time, its contractions may be languid, because the blood has less stimulating property; but occasionally they may be energetic and strong, from its feeling the excitement of uncommon distention.

The *Intermitting Pulse*, which FLOYER attributes to the constriction of the arteries, by circumvolving nerves, may naturally proceed from this condition of the heart.

There is also said to be a strong sympathy between the stomach and the heart, in which case the latter may be greatly influenced by Dyspepsia, so prevalent in Asthma.*

Spitting of *Black Mucus* is a symptom often occurring, but not invariably, in Asthma, as well as in the pituitous consumption.

Amongst the signs affording a prognostic of Consumption, MORTON mentions the expectoration of black and viscid phlegm in a morning. He tells us, that it proceeds from the glands near the windpipe being filled with a black humour, a symptom common to scrophulous and

* Vide Zoonomia, Vol. I. Sect. XXV. also 23, 4. and 35, I. 4.

scorbutic subjects, and indicating the probable consequence of an Asthmatic Consumption.*

But these glands have not been discovered to communicate with the cavities of the windpipe or bronchia, and the mucus is therefore not coloured by their contents.

Yet they have been found, upon dissection, filled with black matter. By the testimony of MORGAGNI, in three bodies out of four which he examined with this object in view, the black colour was diffused through the glands and paper being rubbed over the dissected portions, received a sooty tincture, not different from that of powdered charcoal diluted with a good deal of water.

He however denies, that the black mucus which is said to be expectorated in certain cases can have had a natural excretion into the trachea or bronchia, from these glands, but allows, that erosion in disease may possibly have opened a passage.†

There is, therefore, an expectoration of black mucus, which could have no other source than

* Phthisiolog. lib. ii. cap. ii. 10.

† Morgagni de Causis et Sedibus, epist. xxii. art. 21.

the exhalents of the vesicles, or the glandules which open into the trachea and bronchia; and there is also a similar black appearance in the bronchial glands which are not connected with the air cavities. It is also observable, that, by Morton's testimony, scorbutic habits are very liable to the symptom, and that it leads to Asthmatic Phthisis.

DR. WILLIS remarked, that some patients had frequently in the day, but particularly in the morning, "*Sputum instar attramenti nigricans*."*

FLOYER† describes this symptom as belonging to the Hysteric Asthma, as well as to the Periodic, and as giving the appearance of feathers; and DR. WITHERS had observed it in many cases.‡

I have frequently remarked an expectoration of black mucus in Asthmatics, when there could be no suspicion of the rupture of any small vessels. I believe the material which colours the mucus to be the carbon of the blood, which in the

* Willis Opera, Vol. II. de Phthisi Pulmonali, p. 49.

† Treatise on the Asthma, p. 11—19.

‡ Withers's Treatise, &c. p. 8.

healthy state of the system was exhaled in carbonic acid, the atmospheric air having been then properly decomposed.

The habit of an Asthmatic is generally distinguished by cold extremities; and Dyspepsia is accompanied with watery blood, and weak contractions of the muscles. A predisposition appears in these circumstances favourable to the opinion of DR. BEDDOES, that in Asthma the system is not sufficiently invigorated with oxygen, a conclusion which we are also led to by the state of the lungs, particularly noticed in this Inquiry.

But by whatever means the predisposition to Asthma may be acquired, hydrogen holding carbon in solution predominates in the system, and gives to the arterial too much of the colour and quality of venous blood.

An expectoration of this kind may be expected when a very considerable extent of the vesicular surfaces is covered from the contact of air by a coat of serum: but that pre-disposition of the blood, which leads to the pituitous Consumption as well as to Asthma, may at all times favour the appearance; and, according to the testimony of MORTON and WILLIS, the effect

occasionally takes place in both diseases. In the species of Consumption called *pituitous*, there are contra-indications, which, in its commencement, will not allow a certain prognostic of which disease it may finally bear the character—of Asthma or of Phthisis.

If the mucus be not black, it may be pellucid, or yellow, accordingly as it has remained in the follicles of the trachea or vesicles more or less time previously to the discharge. If it be tinged with blood, it is apparent that the capillary apertures are so dilated as to permit red globules to pass. If it have a saltish or sweetish taste, there must have been some blood in the mass, and more heat than generally prevails in the lungs of Asthmatics; and it is probable that spittings of this kind proceed chiefly from the follicles of the trachea, affected with some catarrhal inflammation.

Sleepiness comes on sitting, but not leaning backwards, according to FLOYER. This is in the *acmé* of the paroxysm, when the oppression of the fluid is most considerable. In this state a reclining posture would make the inspiration of air more difficult, because the stomach and lower viscera would press more against the diaphragm, than when in their depending situation.

The necessity of an erect attitude is also owing to the passage of the blood being obstructed through the pulmonary artery, occasioning plenitude and delay in the right ventricle, and in course an opposition to the free entrance of venous blood from all parts of the body into the heart: in this state of the ventricle and pulmonary vessels, a reclining posture, by impelling the circulation towards the heart, must increase the anxiety, the straitness, and the suffocative sensation at present subsisting; sleep will therefore be more opposed by the exertions of volition to preserve respiration and life, than it will be promoted by the fulness of the veins of the head, and the debility and languor of the habit; which causes might produce lethargy, if a more powerful instinct did not avert their effect.

The *Pulse* of an Asthmatic is generally feeble; as the fit approaches a temporary increase of fulness and strength may be sometimes perceived in young subjects; but the indication is not to be depended upon; for, in the progress of the paroxysm, weakness succeeds, with frequency, but the pulsations seldom exceed ninety in a minute.

When the pulse is most frequent the mouth is moist, and there is often a whitish mucus

upon the surface of the tongue. Thirst seldom attends either in the paroxysm or in the intermission.

The *Urine* is very pale and copious before the fit, and during its progress; it is also frequently copious and pale when the fit does not come on, in consequence of indigestion, to which the Asthmatic is always liable. When the fit goes off, there is no remarkable deposition in the urine, but it is generally in less quantity than is natural to health. If the urine be copious and pale, it is, I believe, never sweet. In consequence of the remark of SAUVAGE on Diabetic Urine, the water of an Asthmatic has been tasted more than once, but it was always found weak, saline, and of no saccharine taste whatever.

The *Belly* of an Asthmatic is seldom regular; when it has been so by custom, I have generally found that it was lax. If the patient is bound in his body, it probably induces a fit; but this state generally alternates with diarrhœa, and both may be attributed to the dyspepsia of the first passages.

There is, at the access of the fit, a remarkable action of the abdominal muscles, and of all the muscles which are in common use for the dis-

charge of fæces. The patient finds it impossible to resist the impulse, and before he has much experience he flatters himself that the evacuation will be followed by relief. This effort to expel the contents of the bowels may be excited by their acrimony, as in the third species; but the muscles which are subservient to the discharge being employed in the act of respiration, it may **not** be distinctly known where the cause resides, in the lungs, the stomach, or lower bowels: the result may, however, shew, that all these ^{or} cavities have been offended; that only the stomach and bowels have been irritated, and the fit may be short; or that the vesiculæ have been chiefly oppressed; and then the fit proceeds in a more regular manner, and terminates with expectoration of mucus to great certainty.

It has been observed, that a sense of heat prevails sometimes in the paroxysm, affecting mostly the trunk of the body; but the temperature is, notwithstanding, low; nor does this perception so often occur as that of coldness.

The *Habit* of an Asthmatic is generally cold, with the occasional exception of a short interval in the access, when there is an increase of effort in the arterial circulation, which does not continue long. Dyspnœa is not so likely to be marked with

this prevailing symptom, as the regular form of Convulsive Asthma.

If the bulb of a thermometer be put into the mouth of an Asthmatic, at the approach of a fit, the temperature will be found lower than in the intervals. In the height of the fit I have found the heat of the exhaled vapour confined to the cavity of the mouth, at eighty-two of Farenheit, when the same subject had, the day before, proved the temperature, by this test, to stand at ninety-seven.

Three hours before the death of an Asthmatic,* the temperature within his mouth was reduced to seventy-three. I have often applied the thermometer, but it is impossible to know with how low a temperature a patient may recover.

If the stomach be full or empty, the inconvenience in the paroxysm is almost equal; at least, nothing can exceed the distress which the patient feels from a perfect emptiness of that organ, occasionally, after the remission has commenced, and exercise is tried. If the stomach be loaded during the debility which it suffers in the paroxysm, the consequence is sufficiently manifest: the middle road should carefully be pursued.

* See Sect. VI. obs. xii.

The Asthmatic may suffer many or few fits in a certain time: FLOYER sustained thirty-six in the year; but some must have been of very short continuance, probably excited by indigestion, and terminated when the stomach was relieved; for it is allowed, that, after repeated attacks, the habit of convulsive contraction of the abdominal and intercostal muscles will be so confirmed, that convulsions may take place from trifling causes.

He observed, that the Periodic Asthma was regular once in ten days; but that the Continued Asthma was uncertain. When the paroxysm has come on so frequently as once in ten days, I have usually remarked, that considerable Dyspnœa has remained between the fits; and it always may be depended upon, that the longer and the more perfect an intermission is, when the genuine Convulsive Asthma is established in the habit, the more violent will be the paroxysm.

The *Mind* of an Asthmatic is impatient, and he suffers much from opposition to his own method of management. After several accessions he has ascertained modes of comfort and satisfaction, which the anxiety of his friends may impede, rather than promote, by their solicitude and attentions: he, therefore, is irritable, and with difficulty

restrains his disposition to petulance. But, excepting in the exhausted habit, vivacity and good humour never fail to return with the freedom of respiration.

The *Respirations* in the paroxysm are more numerous in a given time than in health, a fact which stands in direct opposition to the authority of FLOYER. I have reckoned from twenty to forty respirations in a minute, but they never exceed thirty without a very considerable increase of frequency of pulse, and a well-grounded indication, that the case is complicated with some pneumonic inflammation. In simple Spasmodic Asthma, however, the respirations are more frequent than in due proportion to the contractions of the heart: it is, therefore, extraordinary, that FLOYER should suggest a contrary state, which is not supported by any authority, except that of ZECCHIUS, which he quotes: in opposition to which WILLIS describes the respiration as "*crebra et anhelosa*;" and Dr. STARK observes, that patients in this disease commonly breathe "*thirty or forty times in a minute, and still oftener after eating, or the most moderate exercise.*"*

* Stark's Works, page 43.

I hope the cause which immediately occasions a paroxysm of the *First Species* of Asthma is sufficiently explained. We proceed next to the remote causes which support the doctrine here delivered, as they naturally lead to the condition described in the preceding sections.

SECT. X.

REMOTE CAUSES OF CONVULSIVE ASTHMA.

The *Predisposing Causes*.—The Periods of life.—The sex.—The temperament of Body.—Dyspepsia.—Its consequences. Effect of Dyspepsia on the circulation and secretions.—General Debility of the solids.—Condition of the fluids.—Sensibility or irritability of the habit.—Lymphatic absorption cursorily considered.—Its importance in the animal œconomy.

IN pursuing our inquiry into the remote causes of that serous effusion in the pulmonary vesicles, which has been described, we find a condition of the body which is liable to be excited by circumstances internal and external. This is a *Predisposition* to Asthma; and those circumstances which are sometimes internal, but generally occur from without, are *exciting causes* of the fit.

The *Predisposition* is, of all the remote causes, most important, and claims particular attention.

HIPPOCRATES* attributes to youth a state of habit ready to suffer hæmoptysis, inflammations,

* Hippocrat. Fœsii Aphor. 29, 30, 31. lib. iii. sect. 7.

and fever; beyond this period the constitution is liable to be attacked by peripneumony, lethargy, and Asthma. In advanced age difficulties of breathing, &c. come on, but this writer applies the word *ασθματα* to that constitutional affection which he assigns to manhood in the 30th aphorism, and *δυσπνοιαί* to that of old age in the 31st. And he also in the 26th aphorism includes *ασθματα* amongst the affections attacking the body in the period before puberty.

The affection signified by *ασθματα* in this place is again attributed to puerile habits in another* by the same word.

Infancy and manhood were therefore esteemed by him, the periods of human life predisposing to this disease; old age makes the habit less irritable, and therefore less likely to assume the strong convulsive contractions which may attend the other stages; but it does not follow that the contractions of the respiratory muscles are not convulsive in old age, if difficulties of breathing, or *δυσπνοιαί* affect the subject, in consequence of excessive moisture offending the lungs. We have no alternative in speaking of the nature of muscular contractions, which are convulsive when they exceed the common purposes of healthy

* Liber. de Aere, Locis et Aquis. Fœslii, tom. i. p. 281.

respiration: nor can difficulty of breathing be characterized precisely in any other manner, than by the proportion of contractions which these muscles undergo; though it may be allowed that a particular energy, which is not often to be expected in old age, is essential to the character of the Convulsive Asthma of Modern Nosology, which is so far supported by the authority of the Greek Physician.

Men are said by many writers to be more generally affected with this disease than women, which may probably be the case, because the female sex are not so much exposed to the application of exciting causes.

The *Temperament* which predisposes to Asthma is the *choleric*, as described by Professor GREGORY*, but it seems to derive its influence in this respect, from the disorders of the first passages to which it is liable.

Persons of this temperament are more subject to accumulations of blood in the pulmonary vessels, and to be affected by sudden impulses of anger and emotion of mind, which readily occasion an impetus in the circulation, over-

* *Conspectus Theoriæ Medicinæ*, 929.

powering the contractile tone of the exhalents. They have also too active a secretion of bile, which may occasion irritation and heat at the præcordia, as it certainly is frequently the effect of high passions and a luxurious life. If to this state be super-added Dyspepsia, the choleric temperament will be more subject to the exciting causes of Asthma than any other, and may be more generally observed to be subject to its attacks.

Wherever Dyspepsia prevails, there shall we find a fruitful opportunity of exciting the paroxysm of Asthma; but this debility of the stomach must probably concur with other causes before the disease appears in the form of the First Species.

After it has long had possession of the first passages, the proper nourishment of the body will be considerably impeded, and the solids being weak, the fluids will be watery and poor. The temperature of the habit is then low and unfriendly to the promotion of new chemical affinities, by which oxygen and heat are imparted to the system. A morbid state is then productive of new disorder, or it may be said, that predisposition is more confirmed, and more rapidly approaches the point to which it tends.

The stimulus of the blood will not excite the heart and arteries to vigorous action ; the exhalents will not contract with healthy irritability, and an over proportion of water in the blood will make the exit of serum through their orifices more easy and copious.

There is, besides, a mechanical effect from this relaxed state of the first passages, which may suddenly induce the proximate cause of Asthma. The stomach may be so distended as to fill a very considerable space, which should be allotted in inspiration to the descent of the diaphragm : at the moment when that muscle is excited to contract its fibres and become plane, that the lungs may be filled with new air, the bulk of the stomach may thus prevent the exercise of this function. The progress of the blood to the left side of the heart is then delayed in the pulmonary vein. The capillary orifices of the artery are so dilated to relieve the branches of that vessel that a critical escape of serous fluid ensues. This occurs in vessels which have coats not thin and tender, which predisposes to Phthisis, but relaxed and dilatable, which is part of the predisposition to *this species of Asthma*.

By this distention farther inconvenience follows, of the same kind ; other vessels are

probably compressed, and the Diabetes is produced. The duodenum, and more remotely the whole canal, suffer from the vices of the first digestion.

The motion of the blood is promoted both in the arteries and in the veins, by the action of contiguous muscles. The blood returning to the heart by the Vena Cava, and its branches is moved by the action of the heart and arteries, and also by the contraction of muscles which press the veins. Pressure, from these causes, and subject by the rules of muscular contraction to alternate relaxation, must determine the blood towards the heart, because these veins are supplied with valves which forbid its progress in a contrary direction.

The lymphatic vessels, more numerous provided with valves, have their action increased by the same causes. When, therefore, we consider the want of energy in the heart and arteries, and the irregularity of contraction of the visceral muscles, in Dyspeptic patients, we must allow a sufficient cause for a slow progress of blood in the veins, and the consequent turgescence of the arteries which secrete the urine, or which rather permit the thinner part of their contents to pass off in quantities proportioned to the necessity of relief.

The Vena Cava passing through the Diaphragm, the free motion of that muscle materially influences the return of the blood to the heart, and the circulation being impeded in the liver, from the languor of the vessels which are to carry off the blood, hydropic effusions may follow* in other cavities besides those of the lungs; accordingly, we observe Dropsy of the Belly and cellular membrane to follow Asthma from this mechanical cause, as well as from others that are well known.

This Dyspeptic state of the stomach is so prevalent in a great majority of cases, that it is difficult to separate it, as a predisposition or symptom of the disease in considering all. We may justly call it the cause of *one species*, but it will be found that none is clearly unconnected with flatulence, which, without any certain exception, makes part of the paroxysm, or precedes it.

Sir J. FLOYER considers this state of the stomach as secondary to the state of the lungs, and not as an occasional cause, but the contrary order is more probable, since Asthma seldom appears without having been preceded by Dyspepsia, though the latter frequently occurs unconnected

* Vide Hoffman, tom. iii. sect. ii. cap. 2. p. 98, neonon, tom. iv. Cons. et Resp. Med. Cent. 1. Casus XCIII.

with Asthma. The powers of digestion will certainly be additionally weakened whenever Asthma is formed, and in this view Dyspepsia may follow Asthma; but it has previously been a cause of the disease, which reciprocally increases, and is itself aggravated by this debility.

He remarks, notwithstanding this opinion, that
“a short fit is accompanied only with wind and
“spitting, and depending on disorders in diet,
“&c. and this was his Asthma before it settled
“into periods.”*

The œsophagus was found by Dr. HALEs, very dilatable with a small force of water or wind,† which leads to a conclusion that Dyspepsia may frequently distend the whole canal, and that it may produce wheezing where there is no obstructing mucus in the air passages sufficient to create that symptom. Flatulence may force the sides of the œsophagus against the trachea, compressing the cavity of that pipe into a smaller area.

HALES attributes the occasional vertigo of dyspeptic patients to the cause of Flatus in the

* Floyer, p. 12.

† Statical Essays, Vol. II. p. 183.

œsophagus, compressing the descending aorta, and by this means, impelling the blood for the instant towards the head.

The increase of bulk which an Asthmatic may occasionally sustain from this cause, will be in proportion to the quantity of aliment which has been taken, some substances containing a greater portion of fixed air than others; which air must be separated by heat and fermentation, the natural consequence of delay in a weak stomach. Pounded apples give out 48 times their own bulk.* A light atmosphere, discovered by the sudden falling of quicksilver in the barometer, may add to the influence of these causes by the compression on the ingesta being diminished.

Dyspepsia, as a symptom of Retrocedent Gout, Exanthemata, or Ammenorrhæa, may become an obstacle to freedom of respiration whilst it continues; but the relaxed solids and watery fluids, are not part of its consequences, when it proceeds from these causes. The idiopathic disease arising from a loss of tone in the muscular fibres of the stomach, may have depraved the digestion for any length of time, and general debility will be increased in proportion.

* Vide Dr. Hales's Vegetable Statics, p. 208.

The hydropic diathesis may be expected to follow Convulsive Asthma, and if this effect be not discovered so often in the lungs as in other cavities, the organ owes its greater security to the incessant activity of lymphatic vessels, and of respiratory motions which assist absorption, in removing by vapour the increasing fluid. We have a dependence on these combined powers in proportion to the importance of the function to be preserved by their efforts.

In the paroxysm the surface of the body is universally pale, and the muscles appear shrunk. The weakness of the heart and arteries, with a predisposition of their contents to the character of venous blood, because oxygen is deficient, sufficiently account for both symptoms.

In this state of the blood we need not foresee worse consequences than usually occur in the disease. Mr. KITE has proved, "that the left " sinus venosus, auricle and ventricle, do not " cease to contract in consequence of the phlogisticated state of the blood in their cavities."* Examples have been given in Sect. VI. of different degrees in the danger of the patient. In some

* Mr. Kite's Essays and Observations on the Submersion of Animals, &c.

subjects, whose habits had little irritability, the effusion was too oppressive to be discharged; in others, life was preserved with difficulty, after the balance had been long kept with great uncertainty between death and recovery. In these instances, effusion of serum had been sudden and extensive, excluding the further penetration of oxygen into the vessels, but life was still preserved, till the irritability of the system being exerted with energy, the bar was removed.

Though the blood have too great a proportion of carbon and hydrogen, yet we must not attribute the disease to this cause, without considering the state of the body which may occasion it. Oxygen exists in so large a proportion as a component of the atmosphere, that a deficiency of it in the blood must be occasioned by a peculiar derangement in the machine.

The habit of an Asthmatic is affected, by apparently small impressions on the nerve or fibre, whatever name this disposition may have obtained; Mobility, Irritability, or Sensibility. The robust are unaffected by impulses which the feeble or delicate may acutely feel.

This predisposition is likewise more perceptible at one period of life than at another. It decreases

with the progress of years, and is almost lost in extreme old age.

It is as well described by the term *Irritability* as any other, and may be most clearly seen in the facility with which Convulsive Motions, after having been once excited, run into excess, or, which having subsided with their cause, are liable to return, upon much inferior occasions, and even in some instances without a perceptible excitement.

Without this remote cause, the spasmodic contractions cannot in some cases be accounted for, and it seems to attend or precede Convulsive Asthma from mucous irritation. This irritation may be removed, but whilst the predisposition remains, the disorder cannot be said to be cured.

It may be suggested, that the serum collected in the vesicles, may be partly occasioned by a paralytic state of the absorbents. A temporary weakness of these vessels is not impossible, but the Pathologist must be unwilling to rely on the frequency of such condition, because Providence has, doubtless, designed them to relieve the disorders which may occur to every other branch of the animal system.

If, then, we were to consider their paralysis as a cause of the accumulation of fluid in the vesiculæ, and of the diabetes which attends it, we must suppose a condition not likely to admit of that relief which so periodically supervenes in Asthma. If we suppose the rupture of a lymphatic branch, we infer a fixed cause of continued Dropsy; and if a spasmodic constriction, the case is too uncertain and capricious to reason upon, and may so commonly occur, as to stand in opposition to the design of the lymphatics, whose office is that of the last guardian of the safety of the animal œconomy.

That the absorbing vessels are essential to the preservation of the air cavities of the lungs from obstruction of any kind, must be concluded from their great number dispersed in the pulmonary system. "Next to the liver," says Mr. CRUIKSHANK, "the greatest number of absorbents have been found in the lungs."* Dr. HALES says, the velocity of the blood in the lungs, is many times greater than in most other parts of the body. A remora in any of the vessels of this organ, will therefore be in proportion, more productive of uneasiness than in any other; and effusion from the exhalents, or rupture of the

* Anatomy of the Absorbents, p. 196.

vessels, according to the habit of their coats, will be a consequence of a free return of blood from the right side of the heart to the left being obstructed, sooner than in any other vessels where the velocity of the blood is less, though those vessels should be equally obstructed; therefore effusion in the vesicles must perpetually demand the absorption of the lymphatics of the lungs, and unless that function be preserved in healthy vigour more generally than a theory of paralysis or constriction will support, Asthma must occur oftener than we find it, and be much more fatal in its result.

SECT. XI.

The REMOTE CAUSES continued.—The EXCITING CAUSES.

—Alterations in the density of the air.—Effect of unusual rarity.—Oxygen united to the blood in greater proportion as the pressure of the atmosphere increases.—The rarity of the air on mountains and in elevated countries.—An animal destroyed by the exhaustion of air.—An animal exposed to accumulated density of air.—Lightness of air with moisture, and with heat and moisture.—The heat of summer and autumn.—Effect of evaporation from surfaces.—Cold.—Cold and moisture.—Easterly and North-easterly winds.—Rain, snow, storms.—Active exercise in warm air.—Dissipation of heat.—The asthmatic months of August and September.—Frosty weather.—The advantage of Frost.—Evacuations of blood.—Violent purging or vomiting.—Inanition.—Accelerated circulation.—Suppression of evacuations.—Repulsion of exanthemata and gout.—Dust in the air.—Metallic fumes.—Smoak of Tobacco.—Smells.—Fixed air.—Passions of the mind.—Changes of the moon.—Errors in diet.

THE influence of the air may not produce any evident effects upon the habits of a nation or body of men generally, but changes of the atmosphere, may, doubtless, induce alterations in the health of particular subjects, who may from this cause suffer paroxysms, or enjoy remissions of diseases to which they were predisposed. In all disorders of respiration, whether febrile or not, this truth is confirmed by experience. In *pertussis* it is

particularly remarkable, but not more so than in Convulsive Asthma. Sir J. FLOYER lived in Oxford twelve years, and had little distress from his complaint; but he never visited Staffordshire, his native air, without a severe paroxysm or two. An Asthmatic, whose case will be related, for several years after the establishment of his disorder could not stay a day in the place of his birth, and the residence of his childhood, and which he had occasionally visited with impunity till the age of thirty, without the same effect, though the disease began in a different situation, less favourable to its production.

The atmosphere may affect the Asthmatic by several changes. When the mercury in the barometer stands as high as thirty inches, the density of the air is sufficient, *cæteris paribus*, to preserve the intermission of his disorder; and alterations from this standard to a lower, will be unfriendly. Besides a change from this degree of density, the air may be cold or warm, cold and moist, or warm and moist; and rain, snow, or frost, storms, and fogs, may give additional inconvenience, but slight in comparison of the states which occasion their appearances.

The observations of FLOYER on the influence of density, or rarity of air on the Asthmatic, are

well founded. During a dense state of the atmosphere, acrid miasmata, effluvia, and vapours being suspended high, are not so likely to irritate the pulmonary membranes: at the same time these causes will not so much offend patients subject to Asthma of the present species, as they will affect those subject to the other species, whose sensibility may be equal, but whose pulmonary membranes are more naked of the natural defence of lymph.

Vapours are, however, accused in all sorts of Asthmas, without any reflection on the impunity with which many Asthmatics inhale the atmosphere of London and Holland, where the advantage derived from density and pressure, more than balances the inconvenience of fog, and various animated filth, which, from its quantity, and incessant supplies, is always floating and being inspired.

In higher situations, impurities of the air are a more sensible exciting cause of Asthma, or it may be more accurate to say, that when vapours hang low in these situations, we have a certain index of the diminished density of the air, which would otherwise carry them off; and that the cause of their low suspension is really a state of atmosphere, producing, at the same time, the disorder of respiration.

It may be said upon the same principle, that a dry and settled atmosphere is friendly to the Asthmatic, not only because it is free from impure vapours, but also as having more elasticity to press upon the vesiculæ of the lungs.

According to the state of the atmosphere the combination of oxygen with the blood is rendered difficult or easy. The soft and thin membrane through which it is absorbed, has frequently, in its natural state, been shewn to admit of the penetration of elastic fluids. The predisposition in Asthma appears unfriendly to their union, and changes in the atmosphere may more materially obstruct it.

The usual density of the air being lost, a certain volume will in proportion have less weight, and press less against the membrane, and the same volume will have less oxygen to enter into the new affinity. Where the heat of the body so much promoting the process was before diminished, this sudden rarity may be a powerful exciting cause of the Asthmatic paroxysm.

A certain quantity of oxygen is consumed in less time, in the respiration of air which has great pressure, than in air of little pressure. Under the *greatest* pressure, which was made by

an admirable chemist, the oxygen was consumed in less than half the time of the *smallest*, although the excess of the former above the latter, was much less than that which men experience in the common changes of weather.* If we reflect upon this circumstance, we must conclude, positively, that oxygen enters the blood vessels, contrary to the opinion of DR. CRAWFORD, and that pressure considerably encreases its penetrating force.

The objections which have been made to the accounts of hæmorrhages having been occasioned by great rarity of the air on high mountains, though ingeniously supported by experiments, cannot overturn the plain fact, of considerable disorder of respiration having been repeatedly experienced from this cause; though it is not to be supposed that concurrent causes existing in the habits of the persons affected, or in greater proportions of unrespirable fluid, may not occasionally operate in these regions. The pressure of external air upon the human body is estimated at 32,000 pounds weight in some states of its density, in other states it is supposed to be reduced to half that weight.

* See Minutes of the Society for promoting Philosophical Experiments and Conversation.

The subject has been more accurately handled than is here necessary to specify: the morbid alterations in the animal body, which are produced in consequence of the changes in the weight of the air, are more the object of this Inquiry.

An animal killed by exhaustion of air under the receiver of an air pump, has the right side of the heart and veins greatly distended with blood, and the left side almost empty.

An animal of equal vigour placed under a magazine of a condensing machine, will bear an increase of density of three or four atmospheres. The former animal expired in two minutes, the latter remained a quarter of an hour at a time, without any material inconvenience, and appeared to suffer most from returning to his customary medium of greater rarity.* In the first experiment the equilibrium was destroyed between the external air, and the air circulating with the fluids in a fixed state, which therefore expanded. This state the muscles of inspiration could not overcome, and the lungs being forced into a state of expiration, the blood could not be passed to the left side of the heart, from the collapse of the vessels.

* Mr. Kite on the Submersion of Animals, p. 50, &c.

In the second case, an excess of air merely effected a more perfect and durable expansion of the cavities, and thus facilitated considerably the passage of the blood to the left side of the heart,* doubtless affording at the same time increase of vigour and stimulus to the actions of that organ.

M. de SAUSSURE had proof of the inconvenience to respiration, from great rarity of air, on the top of Mont Blanc, the mercury in the barometer at the same time standing at little more than half the height which it stood at in the plain below. Sir W. HAMILTON observed a similar difficulty of respiration on Mount Ætna, which he attributed to the rarity of the air, distinct from sulphurous vapour. Oxygen has been found in less proportion, as a component of the atmosphere in these high regions, than in the lower, which is an additional cause of disordered respiration.

If to the lightness of the air, *moisture* be added, its influence may be more injurious, and has frequently been felt in various situations, when the predisposition to Asthma was not present. This constitution of the air excited the

* Mr. Kite, p. 52.

disorder of respiration, treated of by Dr. MILLER, under the name of Asthma.

Heat and moisture appear to influence the density of the air more than philosophers had conceived, before the observations of M. de SAUSSURE, jun. appeared.* The effect of these is felt by other valetudinary subjects of relaxed fibre, as well as by the Asthmatic, but by none more than the latter.

In *summer* and *autumn* the atmosphere is rare, and so far hostile to the Asthmatic; but to lessen this inconvenience, he enjoys the grateful sense of a warm skin, and general perspiration, by which the circulation is determined to the surface more than in the colder months. If it were not for this diversion in favour of the lungs, he would perceive much more of his complaint than he really does in the warm season, for many circumstances operate against him then which do not in winter. The exhalation from the pulmonary vessels, occasionally encreased by exercise or other causes, will oftener be profuse in the hot months, and be more suddenly followed by the coldness, which is known to come upon surfaces, in proportion to the evaporation made from them.

* Journal de Physique par M. L'Abbé Rosier, Tome xxxvi. Memoire sur la Densité, &c. p. 98.

Dr. RYAN* endeavours to establish the doctrine of cold, occasioning this disease. *Cold and moisture* check cutaneous perspiration, and diminish the heat of the lungs; there is, therefore, additional fluid circulating to the pulmonary exhalents, and there is less expiration of vapour in breathing. It is said that the skin may even be changed from a perspiring, to an imbibing state, occasioning an excess of water in the vessels. We have, therefore, in this state of the atmosphere, an exciting cause of Asthma, as frequently as in moisture with warmth. Cold alone will sometimes but not commonly excite the paroxysm, for there may be states of the atmosphere inducing great torpor on the pulmonary exhalents, without the presence of aqueous vapour, or moisture. The *East, and North-East Winds*, are so piercing, as to overcome the beneficial influence, which coldness, simply united with density of air, would have on the respiration. These penetrating winds are felt *intus et in cute*, by all persons of lax fibre, and sensibility of nerve; but a frost in itself is friendly to the Asthmatic.

The east and north-east winds, not only chill the lungs, making their capillaries incapable of contracting on their contents, but they check cutaneous perspiration inducing another cause

* Observat. on the History and Cure of the Asthma.

of Asthma by this matter being turned upon the lungs. Why the cutaneous capillaries are constricted preceding their torpor, or in consequence of it, whilst the pulmonary capillaries are affected with torpor and dilated apertures, can only be satisfactorily explained by recurring to the predisposition of an Asthmatic subject; at the same time allowing the fact, that even when this pre-disposition does not exist, perspiration suppressed on the skin, will always find an exit from the pulmonary capillaries, or from those of the intestinal canal, unless an acute fever supervene, from every passage being equally obstructed. This is proved by the moist expectoration of a mild catarrh, and by gentle diarrhœa from taking cold. In the Asthmatic subject fever does not readily come on, and the pulmonary vessels being weaker than those of the rest of the system, the flux is discharged from them.

Changes to rain or snow affect the Asthmatic, because of the decrease of weight in the air, which gives occasion to these alterations. Storms of any kind are usually attended with sudden rarity of the atmosphere, and according to the prevalence of excessive heat or cold accompanying the change, the Asthmatic will be more or less affected. Sir. J. FLOYER observes, with justness, these effects, but attributes too great

consequence to the influence of matters floating in the air, apparently looking at phænomena as causes of Asthmatic fits, which merely follow changes in the density of the air, as effects equally with these.

Active Motion in a warm air, with frequent respirations, produces a great increase of exhalation from the superficial capillaries, and from the lungs. The further augmentation of heat, is by this means prevented; but this is not the only consequence of profuse exhalation in the Asthmatic subject. The tone of his pulmonary exhalents being much reduced, a great and sudden abstraction of heat may leave them in too torpid a state to contract upon their contents. But the general vascular tone, though lowered, not being reduced so much as the tone of these exhalents and the *vis a tergo* being greater from occasional causes, the serous part of the blood passes through the enlarged apertures into the vesiculæ.

The *Dissipation of Heat*, by this means, is preductive of the most severe fits of Asthma. FLOYER had most returns in the hot months, and they were likewise the longest. The month of August was particularly his enemy, and I have seen in August and September more serious paroxysms than in any other months; for, in this

period of the warm season, the body is relaxed from the heat having continued for several months, and the predisposition to be influenced by this exciting cause, and by the great rarity of the air, is therefore much stronger than in the earlier months.

But heat may be carried away from the body by other means besides exhalation, and this effect takes place in frosty weather, but not with the same consequences to the Asthmatic. A *frosty air* is more dense, has more weight for its bulk, and contains a greater proportion of oxygen in the quantity inspired at every inspiration. A person also breathes quicker in this air, and therefore takes more frequently a change into his lungs, oftener decomposing it, inhaling oxygen, and discharging carbon. The influence of cold upon the capillaries, would be injurious in this case, if not speedily counteracted by this animating remedy, for the weak contractions of the vessels, and the chronic poverty of blood.*

Besides the loss of heat locally or generally inducing torpor of the vessels, a deficiency of

* See Dr. Crawford Exper. and Observ. &c. also Minutes of the Society for promoting Philosophical Experiments and Conversation, Exper. &c. concerning Respiration.

other stimuli may occasion it. *Distention* excites the actions of the whole arterial system, and therefore the paroxysm of Asthma may be excited by withdrawing part of this stimulus.

Profuse Bleeding, spontaneous or artificial, may leave the vessels with too little stimulus from their contained fluids, both on account of the want of distention, and of the want of a pungent quality, which red globules and gluten give to the blood. The capillary vessels will in this case not contract to their healthy strictness of diameter, and the fluid being thinner, as well as weaker, will more readily escape.

“Animals,” says Dr. HALE, “when they are near expiring, do usually breathe quick, the lungs then labouring to heave fast, that the languid blood may have a freer course through them, to supply the then almost bloodless pulsations of the heart, as was the case in the experiment of the mare when her blood was near exhausted.”*

When by the great evacuation of blood, the vessels lost their stimulus, the animal fell into cold clammy sweats, which could not happen from

* Hales's Statical Essays, Vol. II. p. 6.

the protrusive force of the blood, but must arise from the relaxation of the capillary exhalents.

There is reason to apprehend, that an injudicious use of the lancet in pulmonary complaints has brought on Asthma in some instances. I am certain of this effect in others where a Dyspeptic pain of the stomach was supposed to indicate pneumonic inflammation.

Violent Purging or Vomiting may excite the paroxysm, or indigested matter in the first passages, productive of those evacuations, may, at the same time, irritate the respiratory muscles of the abdomen and thorax, into such an excess of contractions as form the *Third Species* of this disease. But considering the exhaustion and debility occasioned by purging and vomiting, the alimentary canal is left in a condition powerfully adding to the predisposition to Asthma. This artificial depletion is not less productive of the fit, than fasting is.

The *Want of Food*, or a neglect of regular meals, will as certainly excite the paroxysm in some asthmatics, as a moderate and light supper of tender animal food has alleviated the distress in others, when, in some instances of long established complaint, the approach of

the fit was plainly indicated by the feelings of the patient.

A critical attention is therefore necessary to the calls of the stomach, and to the power of that organ to perform digestion. The first should never be neglected, and the latter never oppressed. If the stomach be loaded, the fit will be more violent than after the occasional cause of fasting.

Fasting, is not only an exciting cause of Asthma, but it will, according to its extent, increase the predisposition to the disease, by lowering the heat of the body. Animal heat may not solely be dependent on the decomposition of the air in the lungs; or, if it be, that operation is much influenced by causes variously affecting the habit through the medium of the alimentary passages and otherwise.*

A sudden *Increase* in the *Impulse* of the *Circulation* may excite the paroxysm of Asthma. It may be supposed that previously to the effusion of serum, a gradual distention of the vessels had taken place. Dyspnœa would attend the progress of this alteration in the tone of the vessels, and

* See Mr. J. Hunter on Animals producing Heat; also Dr. Percival's Essays, Vol. II. on Famine.

increase with the disease. When the vessels are no longer dilatable, they may be ruptured, or effuse by their capillary branches their serous fluid. Exciting causes will hasten this event, and rapid or violent bodily motion, by impelling the blood suddenly to the lungs, is one cause.

Upon the *Suppression* of the *Hæmorrhoidal* or *Menstrual Flux*, a subject disposed to pulmonary accumulation of blood, or whose vessels are weak and dilatable may suffer *Dyspnœa*, or a paroxysm of *Asthma*. A restoration of the suspended discharge removes the difficult respiration.

The same may be said of *Repelled Eruptions* or *Gout*; but causes of this kind excite the periodic paroxysm, only in persons who have before sustained it. If the breathing be affected from those exciting causes, when *Dyspepsia* and the *Asthmatic* habit are not established, the affection may be rather called *Dyspnœa*, or, if attended with fever, *pneumonia* or *peripneumony*.

The membrane of the air pipes of the lungs is defended more considerably from the acrid particles floating in the air, in the species of *Asthma* now under our consideration, than in the natural state where this disease is absent.

But the muscles of respiration of an Asthmatic are at all times very irritable, from the repetition of paroxysms, and slight offences may therefore induce a fit.

Dust of any kind is an exciting cause. Hair powder has been observed in many instances to bring on, first, sneezing, then, by association of muscles, more powers are put in action, to expel the irritating matter, which may, possibly, have only touched some points of the trachea uncovered by mucus.*

Metallic Fumes are very pungent, and will shew their effect on an Asthmatic, by exciting a paroxysm.

The *Smoak of Tobacco* is, in most cases, offensive to the Asthmatic, and even when the custom of inhaling it is pursued, and absurdly thought to be a remedy, the patient inspires the very qualities which are constantly being ejected in natural respiration, and thus strengthens the predisposition to the disease. It is affirmed that smokers are Asthmatic; and DIEMERBROECK found their lungs dark coloured, approaching to black and ulcerated.†

* See Floyer's Treatise, p. 74, &c.

† Diemerbroeck. Lib. II. p. 444.

Sir J. FLOYER mentions a patient who smoaked to cure a pain in the stomach, and by this means acquired the Asthma.

Fetid Smells are sometimes causes of the fit, but not often, unless particles not dissolved, but diffused in the air, are received into the trachea.

Strong Perfumes, generally called sweet, are as likely to excite a paroxysm as fetid smells. They all phlogisticate the air to a small degree, and though the eudiometrical experiments of M. ACHARD prove no considerable injury from the mixture of these fumes with common air, the sensible membrane of the trachea and bronchia of an Asthmatic, is a test which frequently supersedes all reasoning from philosophy.*

The *Aerial Carbonic Acid* is an exciting cause recorded by Sir J. FLOYER. I have known the inspiring of the vapour of fermenting substances in brewing, to be followed immediately by the paroxysm.

The *Passions* of the mind may excite a paroxysm, or strengthen the predisposition to it.

* See Journal de Physique, Tome 26. De L'Effet des Parfums sur L'Air.

Anger shews its effects on the circulation whenever it occurs. The fluids separated from the blood, are determined to their excretories in greater haste, and in larger quantity. Hence a redundancy of saliva, and of bile, and a straitness in breathing, are not uncommonly the result of an impetuous sally of anger. The Dyspeptic disposition is still more certainly increased by the emotions of anger.

Joy increases the vigour of the heart and arteries, and by impelling the circulation before circumstances have allowed the contractile power of the exhalents of the lungs to be restored, their orifices may let the serum escape.

Love, Grief, Terror, appear to distress the mind and to relax the habit; they may not, however, in this view, so frequently excite the paroxysm, as they may add to the predisposition to it.

The Asthmatic is ill calculated for *Venereal Pleasures*, however he may be prompted by sensation or taste to pursue this indulgence. Gratification not uncommonly excites the paroxysm.

Severe Study injures the digestive powers, and therefore promotes the predisposition. Ardent

thinking, attended by the occasional satisfaction of useful discovery, and the hope of reputation, may animate the body, and invigorate the mind; but these advantages are more than balanced by an increased disorder of the first passages, from the want of exercise so necessary to the peristaltic action of the intestines.

If the *Changes* of the *Moon* ever influence the motions in animal bodies, they may be supposed with great reason to excite the paroxysm of Asthma. It appears that the attractions of the sun and moon at some periods combine their powers, and influence the gravity of bodies with greater effect.

For the most ingenious reasoning on this subject, see *Zoonomia*, Vol. I. XXXII. 3.

Errors in Diet are a great source of inconvenience to the Asthmatic, as may be expected, from considering the Dyspeptic condition attending this disorder, and often the very cause of it. Under this head may be specified, as exciting causes, the drinking too much of strong liquors, also of liquors full of carbonic acid, with acescent materials in the composition, as sweet wines and new beer, a profuse indulgence in the use of tea, and of warm watery liquids of all kinds. Heavy suppers, eating between meals, and

generally, all food of difficult digestion, may produce the same effect; such are smoaked meats, pastry, fat pork or beef, water fowl, raw vegetables, sallads and unripe fruits; also boiled cabbage and carrots, rich soups, jellies, and sauces. These alimentary substances are not readily governed by the stomach of an Asthmatic, but remain till a fermenting process takes place, when, if purging or vomiting bring no relief, the paroxysm may be excited; even when these evacuations occur, such a consequence is not often prevented.

Every thing which in Dyspepsia ought to be avoided, should be abstained from by the Asthmatic, who must rigidly believe that his paroxysms may be more frequent, or the intermissions longer, in proportion as the seductions of the table are too powerful for his prudence, or are resisted by his care. Intoxication and surfeit are amongst the worst of his enemies, but they have so little allurements where the habit is infirm, that an Asthmatic is not likely to suffer from such exciting causes.

Disordered Respiration has been acknowledged by all pathologists to proceed from obstructions which we have enumerated, creating *Dyspnæa*, or *Continued Asthma*. *Convulsive Asthma* has been

inquired into, and been found to follow the immediate oppression of extravasated lymph in the lungs; this may be called the *First Species* of the *Periodic Disease*, as it embraces a very large majority of the cases met with in practice.

In examining the remaining species, the object of our inquiry is more obscure. But analogy is still distinct, and we have ascertained some fundamental laws of the animal œconomy, which bestow considerable light upon its relations.

SECT. XII.SECOND SPECIES OF CONVULSIVE ASTHMA FROM THE
IRRITATION OF AERIAL ACRIMONY IN THE LUNGS.

Diagnostics of this species.—The Remote Causes.—Condition of the mucous membrane.—The nature and effects of effluvia.—Odours.—Instance of a convalescent from the disease of Mucous Irritation.—Deduction supporting the proposition in Sect. 2.

THE *Second Species* of Convulsive Asthma is also occasioned by irritation seated in the lungs. Being accompanied with little or no expectoration of mucus, it has been commonly called the *Dry Asthma*. This species invades the patient suddenly, and will be generally found to succeed an alteration of the wind, or change of situation. We may, therefore, consider the cause to be the *Acrid or Offensive Quality* of some *subtle matter*, conveyed by the air, and attached in the act of inspiration to the sensible membrane lining the tracheal and bronchial pipes. This may be connected with the causes explained in the preceding sections, but it may be also unconnected with *sensible bulk*, and yet embody the proximate cause of Asthma.

All pathologists have been stopped in their course by this obscure disease, which, probably, confused their views of Asthma from manifest causes. Here they wanted the advantage of having set out with a precise knowledge of the external signs, and their object, the natural laws which govern them, and the principle of irritation which they indicated in cases where it was really conspicuous. This first step would have opened a path in which analogy, and the same laws would afterwards have led them on.

This *Species* makes its attack by day more frequently than by night, and is distinguished by there being little expectoration, and sometimes none, particularly when the complaint goes off abruptly and soon, for then the offence is probably removed by change of air and strong expirations.

If the fit continue long, the irritation may produce an increased action in the excretories of the mucous membrane of the bronchia. The most violent of the symptoms then generally subside, because the irritating matter becomes enveloped in mucus, unless the habit have arrived at that state of morbid sensibility, in consequence of which, convulsive motions remain, or return at intervals after the cause of them had been removed. Wheezing is not a symptom, unless

the long continuance of the fit should induce such a secretion of mucus as may straiten the air pipes. But this symptom is declared by many to be entirely absent, as it was considered solely dependent on the mucus which appears in the First Species, till the Spasmodic Constriction was invented. ETMULLER makes the diagnostics of the last species, and this, to consist in the presence or absence of wheezing. The truth is, that wheezing does sometimes come on from the cause mentioned, but it may be particularly noticed, that the excess of muscular actions has first subsided. The Diabetes is absent, but the action of the intercostal and of the abdominal muscles, is the same as in other varieties of disordered respiration. Whether a spasmodic constriction of the bronchia take place or not, I am entirely ignorant, for reasons before delivered.

In attributing Asthma to this kind of irritation, I infer, from analogy, that the muscular motions which take place, indicate an offence in some organs which these motions are to serve: and though the offending matter be not apparent to the senses, I prefer probable conclusions in reasoning on the few instances which this species offers, to deranging the induction established in a great majority of cases of Con-

vulsive Asthma, by assigning to similar effects causes dissimilar.

In this species the habit is more sensible of slight offence than it is in the first. The hydropic diathesis is not present, and frequently the tone of the vessels of the lungs is not reduced. Some turgescence of blood may appear in the face, and bleeding, if not positively useful, is not commonly injurious. Dyspepsia sometimes accompanies the attack, but not with violence. The peculiar marks of predisposition to be attended to, are the morbid sensibility or irritability of the body, and the dryness of the Schneiderian membrane.

Most writers have observed that a little spitting may take place in the dry Asthma, though there be no wheezing, but the line which they have drawn takes too many cases from the species before treated of, and enlarges the list of the present, more than experience will be able to defend.

The sensible membrane of the trachea is defended by its lymph from the attack of aerial acrimony, as far as the condition of the body, varying in sensibility to external impressions, will admit of this defence. Other things being

equal, this guard is sufficient, and effects the purpose for which it was designed.

But if the secretion of lymph upon this membrane be deficient, and the absorbing power be active, its surface may be irritated by a thousand imperceptible points which the air conveys in the act of inspiration.

It is said, that then a perpetual dry cough, inflammation, and hoarseness attend,* but these unequivocal symptoms of phthisis do not always follow such a condition of the lungs. A more ambiguous state may prevail, which inclines to Asthma, though the danger of phthisis will always be considerable, if situation expose the patient to the repeated or permanent application of the irritating causes.

The matter of this irritation is diffused in the air. *Effluvia* issue from bodies of the densest texture, and are discovered by the odour of all aromatic substances. Dr. LISTER found a number of stones which had been laid in drawers made of Barbadoes cedar, thickly covered with a liquid rosin, like Venice turpentine, though no manner of exudation appeared in any part of the cabinet.

* Observat. on Phthisis, by W. White, M. D. p. 63.

He concluded, that all the turpentine of the cedar wood had been carried into the air, and then condensed into its fixed state upon the stones. And that all odoriferous bodies spend their very substance in effluvia.*

The magnetic and electric influences depend upon still more subtle effluvia, whose activity is sufficiently known by its effects.

The astonishing divisibility of matter admits of proof to an extent which vindicates the inference of effluvia consisting of suspended particles.

Mr. BOYLE shews an instance of the divisibility of one grain of copper, and proves, that this portion of matter imparted a conspicuous colour to above 256,806 times its bulk of water; a manifest tincture to above 385,200, and a faint, but discernable colour to above 530,620 times its bulk of water.† What then may not be expected from the solvent qualities of the air, or from its capacity of serving as a medium of division for the particles diffused in it?

The influence of odours upon different people will be varied according to an idiosyncrasy which

* See Philosoph. Transact. No. 110. p. 224.

† The Hon. Mr. Boyle's Works by Dr. Shaw, Vol. I. p. 409.

determines them to be agreeable or not. Musk is offensive to many, whilst others delight in its effluvia. Mr. BOYLE gives many instances of the effect of odours on the sensations of man; and when it is proved that such odours are offensive, there can be but little hesitation in admitting the probability of their adducing Asthma, if the body have the predisposition before stated. It may also be readily allowed, that particles not qualified to affect the sensations, may affect the irritability of an Asthmatic, by offending the pulmonary function; or they may be received in a state so very diluted, that the membranes may not suffer from their attack, until, by accumulation and mutual attraction, they take a more condensed and substantial form; and by their pungency become suddenly offensive in the lungs.

Causes of this kind are most prevalent in populous or manufacturing places. There are persons so sensible of their impression as to be seized with a cough immediately upon entering a town; and others sustain a paroxysm of Convulsive Asthma, if they come out of the pure air of the country and sleep in a town. The greater or less pressure of the atmosphere modifying, more or less, such inconvenience.

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This appears sufficient to support the inference previously offered by analogy ; and to prove the existence of irritation as the cause of this species, though its form cannot be discerned.

The simplest case of reaction in the pulmonary system is that of expiration by cough, and of the resistance of the trachea by the shutting of the glottis against the entrance of further acrimony : this happens when an animal is exposed to breathe unrespirable air. His expirations exhaust the lungs of good air, but nature opposes the replenishing of them with bad.

Though the irritating matter be too subtle for observation, it yet may be excreted in the vapour of expiration, as it was received without any immediate perception of its inconvenience in inspiration.

Many of the exciting causes of the paroxysm in the last species of Asthma, may be here considered as proximate, because they induce no intervening irritation more near to the actual symptoms than themselves.

When effluvia fall upon the pulmonary membrane, the irritation of the particles will, in the first place, be felt according to its dryness ; and,

secondly, in proportion as the habit is disposed to the condition, commonly called nervous. If there have been frequent repetitions of irritating causes and convulsive efforts of the respiratory muscles, the Asthmatic paroxysm may much more probably supervene, upon the milder effort to eject an acrid particle by sneezing or cough.

When an Asthmatic is convalescent from the disease of mucous irritation, he is very liable to be the subject of this species. The absorbing system is put into additional activity by the plan of cure which, it will appear, is the only successful one in treating that species. The habit of the Asthmatic is generally strengthened, and the morbid laxity of the pulmonary exhalents is considerably less. There is, therefore, less danger of effusion, and more absorbing action as the cure proceeds; but the *sensibility* of the pulmonary system is not reduced to a healthy standard, and the *force of habit* is yet to be overcome. The irritation of effluvia may therefore excite the usual muscular contractions sooner, as far as regards their influence, than when the membrane was defended by the lymph.

I have had frequent experience of this fact, particularly in an Asthmatic restored from the state described in the preceding sections, whose

Schneiderian membrane became unusually dry in the progress of his recovery, and was even affected with inflammation. The fluctuating qualities of the air often irritating this membrane, occasionally produced a paroxysm without expectoration, until the *habit* of relapse was at last conquered by the means pursued.

In the preceding sections it was established, that the convulsive actions in Asthma were occasioned by the irritation of some *bulky obstruction* in the lungs, and it is now shewn that the same actions may be caused by the irritation of *subtle acrimony*, always present in the atmosphere in a greater or less degree, and ready to be inspired.

The *first* and *second species* being thus occasioned by causes of *irritation* seated in the lungs, we have so far supported the proposition, that, “*the excessive contraction of the muscles of respiration*” “*indicate an injury or offence existing in some organ*” “*which those muscles serve.*”*

* See Sect. II. p. 17.

SECT. XIII.

THIRD SPECIES OF CONVULSIVE ASTHMA FROM IRRITATION IN THE ABDOMINAL VISCERA.

Inquiry, if the immediate cause may be extraneous to the thoracic cavity.—Association and sympathy of muscles.—The final cause and indication of sympathies.—The muscles of respiration are subservient to the functions of several organs in the abdomen.—Their convulsive contractions indicate offence to those organs.—Convulsive Asthma is occasioned by Irritation in the Abdominal Viscera.—Instances of this cause.—General Deduction.

WE shall now inquire, whether this convulsive disorder of the respiratory muscles may proceed from irritation in any other part of the body. Circumstances defend the conclusion of these actions having been excited in some instances by irritation, external to the thoracic cavity; but it cannot be made to appear with certainty, that the irritation of extravasated serum, or of aerial acrimony, was not present in the lungs at the same time. The former might be removed by the unobserved power of

absorption; and the latter might be carried off imperceptibly in the vapour of expiration.

This consideration will make a practitioner doubt the seat of the disease in many cases, and ultimately, as has hitherto been the custom, refer it to the lungs. I, however, believe, that it frequently exists in some of the viscera below the diaphragm; and I attribute the general inattention to this seat of the cause, to the circumstance of Physicians having taken a partial view of Asthma, and that through the medium of prejudice. If the observer had simply noticed the external actions, and considered them only, he must have been led to the inference, that they indicate an injurious offence in the abdominal, as well as in the thoracic viscera.

We must acknowledge a law of the animal œconomy which has been before appealed to.* A Sympathetic Association of muscular contractions is known to take place, when the fibre of one muscle is irritated. In this manner tenesmus brings on strong peristaltic action of the whole intestinal canal. This affection of the rectum is also excited when the upper part of the canal has been irritated; it proceeds also, as well as strangury, from inflammation

* See Sect. I.

of the uterus. A strangury and tenesmus mutually occasion each other. These are sympathetic affections of parts nearly contiguous, but the association of actions is still more extensive.

An irritation of the neck of the bladder, or the extremity of the rectum, was observed by Dr. WHYTT, to be the cause of a constant contraction of the diaphragm and abdominal muscles.* When the uterus is irritated by inflammation or pregnancy, the first passages are much disordered, and vomiting is frequently excited. In labour the most violent contractions of the abdominal muscles and diaphragm take place; in other words, the muscles subservient to respiration are excited to act with increased energy, and powerfully assist in delivering the organ from its burden.

But though the actions of different muscles may be associated for a good end, we have not yet in Asthma facts which shew a sympathy or association more extensive than may belong to the functions of the thorax and abdomen.

In reasoning upon sympathies, Dr. WHYTT opposes the opinion, that they are occasioned

* See Whytt on the Vital and Involuntary Motions. Also his Observations on Nervous Diseases, p. 26, &c.

by anastomosis of nervous branches, and gives examples of more consistent affections, which, on this theory, might be expected to take place, but which do not usually appear. It may be asked, if the difficulty be removed by referring all such instances to the common sensory, without tracing the design of the several motions? Doubtless, whatever be the origin of these extraordinary sympathies, the *final cause* is the good of the animal œconomy.

Dr. WHYTT discovers, in the sympathies which he enumerates, some that are marked with a *Wise Intention*. He instances the contractions of the abdominal muscles and the diaphragm in tenesmus, strangury and labour; in sneezing, coughing, and the hiccup; and the "increased motion of the organs of respiration "in the fit of an Asthma, they are," says he, "the efforts of nature, to free the body of "*something hurtful*."*

The "*Wise Intention*" of all the sympathies may some time be elucidated. Those muscles which serve the function of respiration, are never excited to extraordinary contractions, without affording to the considerate observer the indication

* Sympathy of the Nerves. p. 72.

of something that is now offending, or that has offended, an organ in the thorax or abdomen, which it was the natural business of an individual muscle, or of the set with which it associates, to remove.

From the best experiments, it appears, that *Sensation* and *Irritation* are distinct properties of the living animal. It has been proved, very satisfactorily, that certain instinctive actions, calculated to avert injury or pain, may be independent of nervous influence, and they are therefore exerted without the intervention of the sensorium commune.*

But though this distinction, pointed out by GLISSON, enforced by BARON HALLER, and acceded to since by the best authorities in physiology be just, it does not follow that the influence of sensation may not be communicated from the nerves, in which it is inherent, to the muscular fibres, though the latter may contract without such a medium of stimulus.

If instinctive actions be therefore performed by the muscles, without nervous excitement, they are also performed in consequence of it, and their

* Vide Croonian Lecture on Muscular Motion, by Dr. Blane, p. 36, &c.

contractions take place without the possibility, of distinguishing where the stimulus was first applied, on the muscular fibre or on the nervous filament; but in addition to this general presumption, it is proved, that the contraction of a muscle may be excited by irritating the nerve leading to it, whilst the nerve itself is unaffected.

We have thus obtained a certainty of the influence of the nerves on the muscular fibre, and it is of little importance to know if this influence be mutual; every purpose of practice is answered by the assent to this position, that the *sentient extremities* of the nerves, and the *moving or muscular fibres* have a correspondence, so strict as to induce some physiologists to think that they are extensions of the same nervous medulla.* The sentient nerve may excite contractions, and correspond by sympathy, with distant parts. The muscular fibre is susceptible of the excitement of the *vis nervosa*, and it is also irritable by stimulus in consequence of the *vis insita*.

The experiments of Professor MONRO,† and his objections to the independence of the *vis*

* Vide Dr. Cullen, Institutions of Medicine, also Boerhaave, Instit. p. 395.

† Observat. on the Nervous System, Chap. XXVII. also Dr. Smith's Tentamen Inaugurale, p. 45.

insita appear to leave the question exactly on that footing, and no otherwise invalidate the conclusions of HALLER, deduced from the irritability of the heart, after a perfect separation from the body.

Salutary actions are, commonly excited without consciousness but of the general effect to be produced; such are sneezing, coughing, and laborious respiration, belonging to the pulmonary organ. Vomiting and discharging feces which are actions of the alimentary canal and bladder; in all these motions, though unconsciously excited, the muscles of the chest and abdomen are active instruments.

Mr. HUNTER * noticing the analogy between coughing and vomiting observed, that in the former the lungs are passive, in the latter the stomach is not necessarily active, as the diaphragm and abdominal muscles are able to empty the stomach as well as the rectum. † Though this be not precisely the fact, yet the muscles of respiration are the most active instruments in emptying the lungs, and assist also in evacuating the lower

* Vide Observations on Digestion, p. 200.

† This was also the opinion of the French Physicians, but it has been confuted by the Experiments of Mr. Haighton. See Mem. Med. Soc. Vol. II.

viscera. This natural alliance of powers is frequently exerted, when it would not be necessary to produce the effect desired. In violent coughing to discharge extraneous matter from the lungs, the stomach is compressed, and the diaphragm coming into action, vomiting is brought on. On the contrary, acrimony in the stomach and duodenum excites the associated efforts of all the respiratory muscles, which act by sympathy, as if the cause of offence peculiarly disturbed the lungs.*

The author of *Zoonomia* looks beyond these natural associations of muscular motions, and is desirous of finding more remote connections of cause and effect, than I apprehend can be supported by experience in this disease.

The object of discriminating the parts in which the cause of Asthma may be seated, is next in importance to that of discovering the cause itself. It is therefore necessary to consider an opinion on this subject, which is interesting in proportion to the authority of the writer; in doing this, I shall appeal only to the facts which he adduces. After many difficulties in arranging the theory of Asthma, he concludes, that the

* Vide Willis de morbis Convulsivis, Vol. I. Chap. xii.

Convulsive Asthma is like other convulsions, or epilepsies, "and may be occasioned by pain in "almost any remote part of the system."

He is more confirmed in his opinion from knowing an instance of one lady, whose Asthma ceased, on her being afflicted with pain, and gouty swellings of her large joints. A young man was also seized with Asthma from the retrocession of eruptions on his face.

The laborious respiration of infants in teething is also stated to be the Asthma Convulsivum exerted to relieve pain.

In adults, the author gives no example of the supposed pain being seated farther from the lungs than the liver, or biliary ducts. And relief, in consequence of pain being transferred from the trunk of the body to the limbs, with a cessation of Asthma, must be considered as evidence of the disease having been occasioned by a cause seated in the trunk, if the fact be appealed to.

The teething of infants may produce quick respiration, but has the observing physician remarked, that it was then unaccompanied by fever, or disorder of the first passages? Pyrexia distinguishes it from the Convulsive Asthma of adults;

and an affection of the stomach and bowels, almost constantly attending dentition, permits the inference, that spasmodic respiration may be intended to remove that uneasiness. *

Has any practitioner observed Convulsive Asthma to be excited, as *Tetanus* is, by a prick of the toe? It is natural to believe that where no disorder of the lungs has appeared, and where little or no mucus has been excreted in the progress of the complaint, an inconvenience may have existed in some of the other viscera whose functions are served by the muscles thrown into such violent action.

The intercostals, the diaphragm, and the abdominal muscles are the common property of all the viscera of the chest and belly, and discover their uses when fæces of the blood are discharged from the lungs in mucus, or in carbonic acid and vapour; when any acrimony is vomited by the stomach, when excrement is expelled from the bowels and bladder, and a stone from the kidnies, ureters or bladder, or any extraneous matter from the uterus. In these cases the muscles we have mentioned may naturally associate their motions, and the indications are not obscure; until there be good evidence of a more remote seat of

* See Zoonomia, Vol. II. III. I. I. 10.

the immediate cause of Asthma, it is unphilosophical and useless to desert these limits. *

In Sect. II. and III. of this Inquiry, there are instances of disordered respiration from causes existing in the abdominal viscera; and though the form of disease which they assume be generally that of Continued Asthma or Dyspnœa, periodical exacerbations may be observed, which are the unavailing efforts of the *motus medicati* increased to remove the offence.

When these permanent causes do not exist, the paroxysm may take its regular form from immediate irritation in parts below the diaphragm, especially the hollow muscles.

The relief which is sometimes obtained by vomiting or purging, shews, that acrimony in the *stomach or bowels* may be a cause of the Convulsive Asthma; but the example is not to be confided in, unless the paroxysm totally subside in consequence of such evacuations. If the convulsive respiration clearly goes off, we have proof, that

* A very curious case of Convulsive Cough is recorded by Dr. Whytt, arising, seemingly, from consent with the sensations of the lower extremities, but the respiration in Asthma is performed by a complicated association of muscles, of which a cause similar to that of the Convulsive Cough is not yet known.

in these instances, no other acrimony or offence excited the actions than what was seated in these passages. If, on the contrary, the paroxysm do not entirely subside, we must remain in doubt; or, by a prudent comparison of symptoms, decide, whether the remaining motions are the effect of *habit*, or arise from irritation in some other organ. The necessity of such deliberation too often occurs in practice, and unexpected relief may be given by antispasmodics, or patience must be still exercised in waiting for expectoration, or some other discharge.

The Diabetes of Asthmatics deserves to be considered with a particular reference to the diseased state of the stomach. Dr. FERRIAR* remarked, that in the cases of Chronic Diabetes which he had seen, Dyspepsia always preceded, and SYDENHAM† had regarded it, as dependent on the last disorder. When the stomach is distended with gluttony, or even in common instances with flatulence from its weakness, it compresses the vessels, bringing back blood from the lower viscera to the heart; the emulgent then find a difficulty in forwarding their contents by the corresponding veins, and relieve themselves by passing their serum into the kidneys. The oftener

* Med. Hist. and Reflect. vol. ii. p. 53.

† Epistola Respon. l. p. 271.

this necessity occurs, the readier will be the exit, and the more resorted to by the animal œconomy as a mode of relief.

Irritations of different organs frequently occur at the same time, but the *stomach and duodenum* are their principal seats. FLOYER gives histories confirming this fact, but he does not make use of the principles which are here taken from nature; and no writer has before directly applied the muscular motions of Asthma to the purpose which is now pointed out. We have suggestions and hints which do not perfectly reach the object, though it appears in great simplicity. Instances of disorder in the first passages, or biliary ducts of Asthmatics, have been remarked by many physicians; and I have no doubt, if more attention were paid to the subject, that much additional evidence would be produced. Dr. FERRIAR* gives the case of a lady whose paroxysm terminated with sickness and vomiting, and MILLAR points out these evacuations, or the discharge of wind, as the means of critical relief.

WILLIS speaks of Asthma from sympathy arising from a stone in the gall bladder.

HOFFMAN has cases of the same kind.†

* Med. Hist. &c. Vol. II. p. 53.

† De Asthmate Convulsivo, Obs. 2. 4. p. 193.

I have met with several in which disorder of the stomach was only indicated. A lady was affected with orthopnœa and great distress every night; she had a strong acidity and great inflation of the stomach. The respiratory actions were truly asthmatic, but they disappeared upon a return of healthy digestion, which took place when a secret cause of uneasiness was removed: she had, however, frequently discharged from her stomach, acid or bilious matters with relief.

The *Hysteric Asthma* is, probably, occasioned by the same state of the first passages in many instances; and, if attended with wheezing, this symptom is explained by the pressure of the trachea, from the distention of the œsophagus.

An Asthmatic at sixteen years of age parted with a considerable quantity of ascarides and some round worms, and had no fit for two years afterwards.

A stone found in the *kidney* of an Asthmatic, recorded by RUYSEN, probably added to the irritation exciting the disease.

The *uterus* may be the seat of irritation, which, I have no doubt, frequently occasions Asthma. Females, of constitutions peculiarly irritable, and

still more if they have sustained dyspnœa, may readily fall into the paroxysm at the period of menstruation, when the uterus is turgid with blood, creating a perception of something to be discharged. In such an instance, can any effort be more natural than that of the very muscles which are so often employed in discharging substances from the uterus?

The hysteric lady in FLOYER began to suffer Asthma at the age of fourteen. Distress of mind is described as a remote cause. Dyspepsia followed, which, united with a particular condition of the uterus, might immediately produce a paroxysm.

Dr. WAINWRIGHT knew a lady who had a fit every time her menses flowed, and was worse for all medicines for seven years, but afterwards had relief.*

If the irritation in the uterus be permanent, and continually inciting muscular reaction without relief, convulsions more violent than in Asthma, and more extensive, may supervene. A young person, ill of the Asthma, was unexpectedly attacked with epilepsy. The fits of this disease returned frequently in the day, and almost every

* Mechanical Account of the Non-naturals, &c. p. 14.

day for several months, and no cause could be discovered sufficient to produce these effects. " At last, excruciating pain in making water over-
" came the particular false delicacy, and obliged
" her to disclose their source, which was an acrid
" discharge, excoriating the vagina, proceeding
" from a diseased uterus."*

The communications of nerves may be mentioned, as very probably connecting many of the motions excited by irritation in these viscera ; but I am satisfied with the close analogies of facts, without launching farther into conjecture than experience and observation may justify.

It has appeared in the preceding sections, that Convulsive Asthma is caused by the irritation of some material in the lungs.

We may conclude from the analogies, the reasoning, and the facts before us, that it may also be caused by *irritation in some of the abdominal viscera, but particularly in the stomach.*

Some cases, with additional remarks on this species, to prove the importance of the Inquiry, will be offered in the Appendix.

* Considerations, &c. by Dr. Beddoes and Mr. Watt. Part IV. and V. p. 89.

SECT. XIV.

FOURTH SPECIES OF CONVULSIVE ASTHMA.

The Consequences of Convulsive Motions.—Convulsive Asthma remaining after the Irritation is removed.—The influence of habit.—Repetition of morbid motions, arising from sensation and perceptions of the mind.—Fever counteracts the principle of habit.—Instances of mental impression operating upon the body, and inducing morbid motions.—Ideas of relation.—The Hysteric Asthma.—Inference from the whole.

WHATEVER may be the origin of a convulsive disorder, a certain consequence of its repeated attacks will be an increased mobility or sensibility of the muscles. Asthma is particularly attended by this inconvenience, as appears by the paroxysm returning after the material which occasioned it, had been removed.

It may therefore be said to exist without any apparent, or even probable cause. This surprising circumstance is the effect of principles by which the animal œconomy is always regulated, and which may be referred to the *perceptions* of the mind exciting, by the medium of *sensation*,

motions of the body when under the influence of *habit*.

The original motions were caused by *irritation* only, or that instinctive feeling of injury which is immediately followed by the reaction of the muscles. *Sensation* has been stated to be a distinct property of the living fibre ; but it is capable of attending, or being introduced by previous irritation. *Habit* consists in the facility with which a muscle repeats its former motions, and with which it acts in association with other muscles. It may be called the predisposition to this species of Asthma, of which *sensation* may be considered as the proximate cause.

Every sensation of the body raises a perception or idea of the mind, which being recalled by the memory or imagination, brings back the sensation combined with it : if a complex idea be recalled, complicated sensations may be revived.

Thus the irritating cause of Asthma makes a sensation of the body, creating a perception or idea of the mind, which may be associated with other ideas. If any one of these be recalled by memory, others may be restored, and with some of them the corresponding sensations of the body, or of the irritated organ ; and thus, the very emo-

tions of mind, or the muscular contractions of the body, which had been either the cause or the effect of such sensations, may return.

In this view the repetition of muscular convulsions is not always obscure in its principles as it has proximate and remote causes, though not material, and may readily take place, if pyrexia do not prevent it. In cases of those poisons which produce fever, an insensibility of their future stimulus is commonly conferred with the disease;* but in cases of irritation not producing fever by its specific quality, as in Asthma, the system will be more liable to convulsive actions, the oftener they have been performed; and this may be the effect of sensation, as well as of very inferior, and seemingly inadequate causes of irritation.

When *Phthisis* has supervened upon Asthma, the hectic fever destroying the force of habit, the periodic paroxysm is not preserved, but subsides into moderate dyspnœa.

In conformity to these principles, pneumonic inflammation may have left such a debility of the capillaries of the lungs, as to cause an effusion of

* As in Small Pox and Measles.

serum into the vesicles: this state may have continued but a short time, and the convulsions of Asthma may have taken place for a few hours only, yet ideas may have been excited by the sensations of this paroxysm, and even by the circumstances accidentally connected with it, which, recurring at intervals, may restore such sensations, and by these the convulsive motions at first united with them. Paroxysms, from such causes, have occurred in many convalescent subjects, when the primary cause, after a considerate balance of all the circumstances, was not suspected to exist.

Operations of the animal œconomy from ordinary causes of greater simplicity, will explain the subject more clearly.

In the discharge of urine and alvine fæces, certain ideas become linked by sensation to the animal motions excited by the distention of the hollow muscles of the bladder and intestines. A propensity to these evacuations may afterwards return at periods, when the ideas of time or place introduce the connected sensations of those discharges; and the abdominal muscles, and diaphragm and bladder, are excited to contract at such periods, though the stimulus of distention be, in fact, not present; but by habit, the peristaltic motions are brought to obey the new rule

of the œconomy, and urine is even secreted against their arrival.

The effect of frequent emetics is well known : the stomach is rendered more irritable by the repetition ; and ideas connected with the nausea created by the medicine, very frequently induce the nausea without its assistance. The sight of a phial, or of a liquid, with which the operation had been promoted, by raising associated ideas, led to the very impression of the first link, and excited the contractions of muscles which empty the stomach, and still further, the associated contractions of other muscles, which, by the usages of the animal œconomy, had before acted with them.

The powerful influence of ideas which circumstances may have connected with a particular impression, is too well ascertained to be doubted. The sensation of terror has induced syncope, epilepsy, and hysteria. The object which excited that sensation, may not only renew these bodily disorders by its own re-appearance, but circumstances may raise associated ideas, connected with a train of sensations, the individual parts of which successively introduce each other. When this association is established, the same animal motions may return from apparently dissimilar

causes, but these may be considered as remote causes of the sensation immediately causing the disease.

A lady had been thrown into terror by a foot-pad, and for the first time sustained a series of hysteric fits. Her constitution became feeble and acutely sensible. The disease returned on smaller alarms for many years afterwards, and particularly in consequence of slight circumstances which referred to the attack, though entirely distinct from it. After three years, during which interval she had diversified her impressions in a distant neighbourhood, she passed in a carriage along the road, and near to the spot where the assault was made; when affected by the chain of ideas, and her attention to them, she relapsed into strong convulsions.

A female had been long subject to dyspeptic complaints and to irregular secretions of bile. She married at twenty-five years of age, and then found it necessary to employ herself in business, and to attend with great care to an increasing family. These objects gave her the most trouble on Sundays, on which day she gradually became more indisposed with Hemicrania; but, on the other six days, she had her usual health. In ten years the complaint was much aggravated, and it

affected her earlier by a few hours, but did not cease sooner than before. In this form the intermittent disease continued for several years, evidently excited by the great anxiety and fatigue of one day in the week.

Her situation was again altered: Sunday became a day of rest, and an improvement of circumstances diminished her general anxiety. It might be supposed, that the Hemicrania would be lost with the impressions which brought it on, but it still returns at its former periods, being linked with ideas of relation that arise from external circumstances. It is probable, that a complete change of residence, by which the impressions might be obliterated, would destroy the force of habit, and overcome the disease.

The case of Hysterical Asthma in FLOYER,* was probably first caused by a disorder of the stomach. It appears that affliction, at the critical age of fourteen, had thrown the lady into hysteria. Dyspepsia accompanied her agitation of mind, and the acrimony of the first passages, which naturally follows the disturbance of digestion, might irritate the system of muscles into a paroxysm of Asthma.

* Floyer, p. 17.

The same contractions of the muscles would be subject to return, when the habit of their associations had been once established. Slight causes of irritation might excite their convulsive efforts, which, though fruitless, would be consistent with the laws of animal life. Certain ideas, which in the first attack of hysteria, at the age of fourteen, concurred with a particular condition of the uterus to bring on the affection of the stomach, œsophagus, and respiratory muscles, being occasionally recalled, would revive motions more readily from habit and repetition.

Thus are many causes apparently lost, whilst their effects are continued in the diseases which they produced; habit rendering the body liable to a recurrence of morbid actions, in proportion as the ideas annexed to them, by circumstances, may lead to the sensations which are now their real cause. The revolutions of seasons, the changes of day and night, the hours of rest and activity, the hours of meals, the objects of pleasure or pain, the connections of friendship, or business, become united with the motions of the mind and body; and thus associated, morbid actions are revived, according to their situation in the general chain.

All this is well known ; but, like many other parts of knowledge, the result of common observation, the impression has been superficial, and too much neglected in practice.

But all physicians have acknowledged the strength of indications afforded by habit in the disease of chin-cough. Here every part of the usual plan of life and diet, is directed to be changed. A new air is particularly requisite, whatever be the standard of its purity ; and by thus counteracting the former perceptions, the disease will frequently vanish without the continuance of medicine.

In epilepsy, a disease observing periods, like Asthma, Hippocrates directs a total change in the manner of life, that former habits may lose their influence.

In Asthma, if in any disorder, a similar alteration ought to be enforced ; and, as will appear in the practice, the judgment of the Physician will be defended by the event.

We have now taken a view of Asthma under all the forms in which it has been said to appear. We shall obtain a more distinct direction to a cure of the disorder, if a new arrangement of species be set out on the basis of inferences from this INQUIRY.

DISORDERED RESPIRATION, unattended by Fever, may be divided into *ASTHMA*, *Continued* and *Periodic*.

Continued Asthma can not be properly said to be free from Convulsive Contractions of the respiratory muscles, but these are carried on without regular paroxysms. They are more permanent, but less violent, and depend upon fixed irritation, Abdominal or Thoracic.

Periodic Asthma, discovered in regular paroxysms of convulsive contractions, and therefore usually called *Convulsive Asthma*, which term we adopt as describing its character, and still complying with general custom.

CONVULSIVE ASTHMA.

1st Species, from Irritation of Effused Serum in the Lungs.

2d Species, from Irritation of Aerial Acrimony in the Lungs.

3rd Species, from Irritation in the Stomach, or some of the Abdominal Viscera.

4th Species, dependent upon *Habit*, and caused by *Sensation*, after Irritation has been removed from the Thoracic, or Abdominal Viscera.

These are the Species to which I shall refer, in the Second Part of this PRACTICAL INQUIRY.

THE
PRACTICE IN ASTHMA.

PART II.

SECT. XV.

The Cure of Convulsive Asthma attempted.—Indications arising from the distinctions of species.—The Paroxysm, including exacerbations.—In what the Cure of Asthma consists.—Remedies tried.—Cathartics.—Emetics.—Diaphoretics.—Bleedings.—Diuretics.—Issues.—Antispasmodics.—Expectorants.—Blisters.—Inhaling of Vapours.—Oxygen.—Hydrogen.—Stomachics.—Absorbents.—Stimulants.—Bathing.—Tonics.

AFTER a full consideration of the facts in the preceding sections, and the inductions from them, it will not be expected, that, in attempting the cure of Asthma, I shall confine myself to the lines which have been marked out by former writers, who did not sufficiently attend to nature, and whose grounds of reasoning and practice were hypothetical.

A Professor, who directed the opinions which still influence the practice of medicine, and whose authority concentrates the theories, real or supposed, of former teachers, gives no encouragement to the pupil, nor confidence to the practitioner in following the indications of cure assigned in his cause of Convulsive Asthma.

“As it is seldom,” says Dr. CULLEN, “that an Asthma has been entirely cured, I therefore cannot propose any method of cure which experience has approved as generally successful.” He, however, states the disease “to admit of alleviation in several respects from the use of remedies, and he makes it his business to offer some remarks upon the choice and use of the remedies which have been commonly employed in cases of Asthma.”*

I am obliged here to dissent from this practical observation, as experience convinces me that there is less opportunity of even only alleviating an existing paroxysm of this disease, than there is of preventing its return, in which the cure may be said to consist. CULLEN particularly followed the authority of FLOYER in his doctrine on Asthma; but did the success of this physician, in

* Cullen's Practice, MCCCLXXXVII.

treating his own complaint, induce the Professor to adopt his theories? FLOYER laboured under Asthma for thirty years, and we cannot therefore much confide in the judgment of his practice.

It is time that other indications should be followed than those of relieving spasmodic constrictions of the bronchia and turgescences of the blood vessels, or let us rather become empirics, and take the chance of benefit from experiment, and the happy success of blunder, than rely on directions which confessedly do not point to the object of our wishes, and may possibly lead us to error.

The author of this Inquiry had the strongest motives for his attention to Asthma. Having been subject to its attacks, he had a prospect of suffering its tyranny as long as Sir J. FLOYER did, if he had not at length determined to consider the disease as if it had never before been treated, and resorted to a practice which was not prescribed by former rules. His attempts afforded present instruction, and the means of further improvement, as the *Juvantia* and *Lædentia* more clearly elucidated the indications. He was, however, in this course of trials, too often the victim of established, though ill-founded theories, to give them credit. Despair at length gave place to hope, and he can

finally affirm, that the doctrines of the preceding sections were the result of experience in the effect of remedies, as well as of observation of symptoms, and a careful comparison of analogies.

He had observed the serous effusion in the vesiculæ of an Asthmatic in the year 1786, but he had not been led to a conclusion of the disease being generally occasioned by irritation of that kind, till personal inconvenience induced him to examine its forms under all circumstances and every influence. Impressed by the salutary caution of CELSUS, not to mistake effects for causes, he had not yet sufficiently reflected on the degrees in which effusion might take place, but considered the appearance in this case as evidence only of the termination of a violent disorder, or the immediate occasion of death.

At length a further consideration of this dissection prompted him to act more decisively against the predisposition. He next extended his inference from the appearance, and consulting analogy and the laws of animal life, he took the convulsive contractions for indications of this irritating offence, which he found might exist in greater or less quantities, according to the extent and prevalence of remote causes.

His satisfaction was still more perfect, when he lastly found that the same *principle* of irritation might occasion the disorder in the other species of Asthma where mucus did not appear, his practice at the same time continuing to answer with great success to the indications which he had consulted.

The doctrines of the preceding sections may therefore claim the confidence which is generally given to experience; and there is the less occasion for being diffuse in the remaining part.

I must, then, request the reader to consider the inferences and species proposed in the former sections, as marks to guide his medical walk, which have not been set up without mature attention to the force of remedies which they point out in Asthma.

A *Paroxysm* of Convulsive Asthma, is that state of the disease which has an *Exacerbation* at night as long as it lasts. When the intermission takes place, Asthma is not cured; and though the paroxysm be generally attended by at least *Three Exacerbations*, it sometimes is extended through many more, nor is there any certain limit to their number. If it has not embraced so many as three, benefit may be said to have been derived

from some operation of art or nature, when the patient has a confirmed predisposition to the disorder, but it cannot be said with propriety that an advantage has been gained, if the exacerbations have been renewed as often as was customary in former fits, or oftener than three times, if the disease was new. Much less can a cure be asserted till an entire change in the habit of the patient, comprehending vigorous digestion, and easy respiration, be well established after the paroxysm has been long overcome.

The cure of the Convulsive Asthma can therefore be only attempted with a prospect of success during the intervals of the fits. But the paroxysm may be frequently alleviated; and whoever has experienced its agony, will allow the value of the smallest improvement in treating it.

I shall notice different classes of remedies proposed or tried in Asthma, pointing out the treatment which may most generally be adopted to relieve or shorten the paroxysm; and afterwards recommend, from experience, a plan of *Cure*, illustrated by a few examples, assigned to the several species of the disease.

CATHARTICS, considered generally, are injurious in cases of Convulsive Asthma, from irritation

in the lungs. If this class of medicines be ever useful, it must be in that species in which the irritation is seated in the first passages, but even here, the practitioner must not forget the predisposition to every form of this disease, in which laxity of fibre, or morbid sensibility, is predominant. There may be complicated cases in which the propriety of purging may be less doubtful; but there are instances of its bringing on a paroxysm, and we can therefore, not recommend any evacuation but the mildest, with the intent of discharging the corrupted remains of indigested matters from the first passages.

Purging has been suggested as a means of promoting absorption: if ever it can be employed in this intention, without inducing greater inconvenience than it will remove, it must be in Dyspnœa, when the vessels are turgid, but have not yet relieved themselves by serous effusion: this state comes nearest to the second species of Convulsive Asthma, but in this I have not seen purging of any advantage.

A bolus composed of Calomel, Antimon. Tartarisat. and Pulv. Jalapii was taken when the symptoms of a paroxysm had made their attack. A similar medicine was taken in another paroxysm in the height of an exacerbation, by the author, who was affected with Convulsive Asthma of the

first Species. The paroxysm was not suspended or alleviated in either instance, but it was certainly prolonged in the last.

EMETICS.—Some relief has been immediately obtained by vomiting, and this happens generally in cases of Asthma, wherever the irritation may exist. But it is particularly useful when the first passages are loaded with indigested matter, so frequently exciting the paroxysm in the first species, or acting as the proximate cause of it in the third.

Nauseating doses are most useful in the three first species, as they determine the fluids to the surface of the body, and thus relieve the lungs or abdominal viscera ; they also promote the absorption of extravasated serum, and exhalation from the lungs, and they are powerful expectorants.

ETMULLER and BAGLIVI recommend vomits, and FLOYER approves of their operation once a month ; but a repetition at regular periods is to be condemned, as it may probably tend to introduce in the habit a new rule of secretion.

Other writers consider emetics as dangerous in the paroxysm, but violent vomiting is not generally recommended ; and the gentler motions of nausea, with slight puking, are more likely to determine from the lungs than to increase the flow of humours

to that organ, as is very justly enforced by Dr. FOART SIMMONS, in treating of Phthisis.

In this intention, if the subject be uncommonly vigorous for an Asthmatic, and occasionally in the second species of the complaint, tartarised antimony, or antimonial wine, may be given. In other cases, small doses of ipecacohan are to be preferred. I have, in several instances, excited strong vomiting at the approach of the fit, but not with that good effect which follows a gentle operation. R. B. took five grains of Tartarised Antimony when the paroxysm had just commenced. After violent evacuations upwards and downwards, with great present distress, the paroxysm was lengthened by several exacerbations more than he had before sustained. Greater weakness in the intermission, and night sweats, were, besides, the consequence of this treatment for several days.

DIAPHORETICS.—Neutral saline medicines are given with advantage during the fit of the first species, and also of the second. In the third species they are often useful. In the last they are manifestly hurtful. Whenever they are used, the intention should be to promote a gentle diaphoresis, but not sweating, which is always injurious, and particularly so if forced by heating sudorifics.

BLEEDING.—Many doubts occur on the propriety of bleeding in Asthma, in any species of the disease. Before the pulmonary vessels have relieved themselves by their exhaling orifices, blood may possibly be drawn with some advantage, but when effusion has taken place, a certain debility is indicated, and a loss of contractile power in the vessels, which prudence will rather submit to during the fit, and attempt to remedy in the intermission.

In this state of the disease, nature pursues the path best adapted to her circumstances; the escape of serous fluid gradually relieves the vessels, and respiration and absorption must be relied on, with a salutary cough, to clear the air cells of the lymph. If considerable evacuations of blood be directed, the sudden depletion of the vessels may leave their coats without the stimulus necessary to produce a contraction, equal to the space which the blood had occupied; the heart will participate in the injury, and will also be deficient in vigour of contraction. If, therefore, blood be taken, it should be drawn from the vessels at intervals, and in small portions, which would allow of a contractile power being exerted, in proportion as the vessel loses its contents, and so much fluid would not finally be taken away as to leave it without the stimulus of distension, so essential to its return of health.

But bleeding is an imprudent operation in every species of Asthma, unless it be the second. In the first species I have repeatedly directed it, but have never had reason to think that the paroxysm was shortened an hour by the loss of blood; and I have often been convinced that expectoration was delayed, and that more dyspnœa remained in the intermission than was common after former paroxysms. In old people who have been used to the disorder, it is certainly injurious.

In the second species there are occasionally topical inflammations, which this operation may relieve; but if it be carried far, there is the strongest reason to apprehend, that the patient may be plunged into Asthma of the first species.

DIURETICS.—Whether the great flow of watery urine from the kidneys be a critical discharge to relieve the lungs in the first species of Asthma, or not, I have never seen the paroxysm shortened by increasing it. The diabetes is also a symptom in the third species, and can be explained only from the state of the first passages, which has been described.*

Notwithstanding these doubts, diuretics have been recommended in Asthma by physicians,

* Sect. x. xiii.

antient and modern. CELSUS* says, “*prosunt etiam quæcunque urinam movent.*”

HOFFMAN’S opinion is thus explained, “*In statu cachectico, cui jungitur Asthma magnam opem ferre deprehenduntur diuretica.*”† RHODIUS‡ asserts, that after the speedy discharge of thirty-seven pints of urine, the disease was cured. BAGLIVI says, “*pluries adnotavimus, in pectorismorbis, semper ducendum esse ad vias urinæ, natura id monstrante.*”§

“As diuretics and quicksilver”, says a writer of ingenuity, “have been famed for their service in the Asthma, have we not reason to suspect that an anasarca, so obsequious to these remedies, is often the foundation of the Asthma?¶

FLOYER says swelled legs and copious urine are beneficial changes in the Asthma.

Whatever species of Asthma may be alluded to in these accounts of benefit from diuretics, I cannot think that any critical discharge is so useful as that by expectoration in the first species. And

* Celsus, lib. iv. Cap. 4. † Tom. iii. Sect. ii. Cap. 2.

‡ Lib. iii. Obs. 27. § Baglivi, Obs. p. 103.

¶ Edin. Med. Essays, Vol. ii. p. 326.

we are to avoid impeding that event when diuretics are given; squill and vinegar coincide in both intentions.

In experiments with digitalis, I have proceeded to a dose which induced symptoms, well known by practitioners, to mark the propriety of discontinuing its use; but I have not seen benefit from the exhibition. It has, however, been lately said, on the respectable authority of Dr. PERCIVAL, to have been employed with advantage in Asthma; and the reasoning and experience of Dr. FERRIAR corroborate this testimony of its good effects, when joined to small doses of opium. I cannot say, precisely, in what species of the disease these physicians have used it, as the divisions of Convulsive Asthma proposed in this Inquiry are not referred to.

If urine be small in quantity, and high coloured, saline diuretics should be given, and mercurials are also then usefully combined, as the case is probably complicated with visceral obstructions.

ISSUES.—The antients had always in view the serous defluxions in this disorder, and endeavoured to intercept them descending from the head. This was the indication followed in the cruel practice

of ÆTIUS, who had so little ceremony in using the cautery, as to direct fourteen ulcers to be made and kept open at once, between the head and the diaphragm.

In very old Asthmatics, issues are sometimes necessary. When the disease is not inveterate, they may occasionally be useful, by diverting aqueous humour from the lungs, and giving a better opportunity for the operation of tonic remedies.

In several instances of young subjects, I have directed issues to be healed without the smallest inconvenience, and with a removal of the disorder in some, in which if the discharge had been necessary or useful, this consequence could not have happened.

When the disease is complicated with general dropsy, I have seen great advantage to the breathing, from their application in the thighs.

ANTISPASMODICS.—Antispasmodic medicines have no certain efficacy in shortening the paroxysm of the first species of this disease. Exceptions may be made to this general remark, but they cannot be founded upon precise distinctions of the different species.

In the fourth species which often appears in Asthmatics, who may be also subjected to exciting causes, occasioning a relapse into one or other of the three former, antispasmodics will be useful. Amongst these Opium stands first, but its value is frequently enhanced by the addition of *Æther*. If these valuable medicines had been applied from a just discrimination of the different species of Asthma, they would not so frequently have deceived the expectation of relief from their use; but such a distinction could not take place till the indication of the convulsive actions being well understood, irritation, under different forms, were considered as the cause to be removed.

Calcined Zinc, which has been strongly recommended, has been found in many trials perfectly inert and useless in the paroxysm. And yet the antispasmodic powers of this mineral have been proved in epilepsy, and the opinion of GAUBIUS on its virtues has been justified by the experience of many other physicians. If it be used in Asthma, it can be only as a means of counteracting the habit of convulsion discovered in the fourth species.

In the intention of removing spasmodic constriction, a numerous list of antispasmodics has been tried in the first species of Asthma, but

in general with little advantage. Valerian, cardamine, camphor, musk, castor, beladonna, tobacco infusion, extract of henbane, fetid gums, cuprum ammoniacle have been given in various doses, more or less joined to other antispasmodic, or tonic medicines, and combined with opium in large and small portions, but in the first species, the paroxysm was not often suspended, though frequently prolonged.

In the Dry Asthma (second species) I have not made so many trials; but I can affirm, that no antispasmodic is so useful in the beginning as nauseating doses of ipecac. with diaphoretics, in the cases which I have had an opportunity of treating.

In the access of a paroxysm of the first species, R. B. took four grains of solid opium, which produced nearly an apoplectic stupor for two days. After a few hours the most debilitating sickness came on, with incessant efforts to puke. The labour of the respiratory muscles abated, but the wheezing evidently increased; a countenance more turgid than usual, and intense head-ache attended. The pulse was more strong and quick for a few hours, but then sunk into great weakness.

The paroxysm shewed itself four hours earlier than usual the next day, and two grains more

were taken when it was perceived to commence ; respiratory labour seemed again to abate, but the anxiety increased to an alarming degree, as the stupor became something less. The pulse was now weaker, and frequently irregular. Loose motions succeeded, and a general sweat. The energy of the paroxysm then returned with exquisite distress. A medical friend, who attended with great care to the progress of these trials, was alarmed, and endeavoured to promote puking, without effect. Blisters were applied, and draughts of vinegar and pepper were given, interposed with strong coffee and mustard. The patient was at last brought back to a state more usual in former paroxysms ; but with every care there were nine exacerbations before the spitting becoming gradually more copious, concluded the fit. Notwithstanding the unfortunate result of this experiment, the influence of doctrine, and the weighty authority there is for the existence of a Spasmodic Constriction of the bronchia, induced him to repeat it. He took two grains of opium in another paroxysm after an active vomit, and bad consequences still ensued, though not so considerable. In the latter experiment, the extraordinary symptom of a most painful strangury came on, which continued several hours.

Extract of henbane was substituted for opium in succeeding trials, but with no greater success in the beginning, or height of the paroxysm. In the second species this narcotic produced rest, when opium would not; but though the exacerbation was disturbed, the paroxysm was not shortened.*

Musk was given twice to a patient in the first species, in doses of half a dram each. A perspiration came out, but the anxiety and laborious respiration were not lessened.—Camphor being added in equal quantity, heat was much increased, with violent head-ache, pain in the stomach, and spastic twichings in the intercostal muscles, but with no relief to the breath. Plentiful dilution being used, the extraordinary symptoms subsided. Camphor was also joined with fœtid gums in many instances, without advantage, and where dyspepsia was very predominant, these complicated forms always increased it.

It is in the fourth species that antispasmodics are given with the greatest success; and, I have little doubt of their general advantage, when this state of Asthma can be well ascertained to exist. Vinegar, cordials and volatiles, may be combined

* See the Appendix for the result of later and fuller experience of the advantage of using this medicine.

frequently with narcotics, but the fetid gums disorder digestion, and also promote purging, which should be avoided.

Opium and Æther are the most valuable of the class in this species, and their dose must be proportioned to the necessity of the case. The judicious practitioner will frequently exhibit them in small doses, with as good an effect as can be obtained by large ones.

Opiates are occasionally useful after emetics and aperients, in cases where these instruments are employed.

EXPECTORANTS.—These are a class of medicines useful in the first species of Convulsive Asthma, in proportion as they are indicated. All practitioners are convinced of the necessity of employing them. Myrrh is certainly not an expectorant; and, however valuable as a stomachic, it has been of no use during the paroxysm.

Ammoniac is a very valuable expectorant, but, when given alone, it is sometimes too heating, and may therefore be properly united with a saline menstruum. A composition of this kind, is, however, likely to purge, if not prevented by opium. Assafœtita, which has been much recom-

mended by Dr. MILLER, is still more heating than ammoniac. He found it most beneficial when it puked the patient, but the disease that he describes is not determined to have been the Convulsive Asthma of adults, and the good effects which are mentioned, have never resulted from its use under my observation. As puking was the effect of the medicine, we may perhaps see, in this operation, the means of relief more than compensating some bad qualities. It is also materially inconvenient to persons who cannot be contented with a constant fœtor in the mouth, alvine discharges, and the air of the chamber.

The oily and demulcent expectorants, are not calculated for any species of Asthma; the stomach of an Asthmatic is already sufficiently disordered, and would be more so with the addition of these medicines.

Squills are very useful in the two first species of the disease. When united with vinegar, we obtain the medicine on which FLOYER bestows the greatest applause. In many trials I have seen great advantages from vinegar of squills, in the first species of Convulsive Asthma. It is most useful at the commencement of the paroxysm, and then in proportion as it is attended with some little nausea without diarrhœa. However

much it may promote urine, this effect seems not to shorten the paroxysm of Asthma, whilst its other powers have increased expectoration, and probably excited absorption.

Tincture of squills combined with extract of henbane and the nitric acid, has been proved by recent experience to be expectorant and sedative in the paroxysm of the first species, but given by itself it has not been successful.

Vinegar of squills is also a good medicine in the second species, but I have remarked, that its power over the paroxysm is then only in proportion to its emetic, or nauseating effect. In the third species, unless it vomits, I can see no use in the exhibition.

Oxymel is only efficacious, as it contains vinegar or squill. Honey and sugar are too fermentable for any species of Asthma, and frequently impede the operation of better medicines.

Decoction of seneka is eminently useful in the first species, particularly to old people, but in the paroxysm of young persons, I have found it too heating. This distinction applies to Convulsive Asthma, purely uncomplicated, and free from fever; but the disease is frequently observed in

middle-aged, and elderly persons, to take the character of peripneumonia notha in the winter and spring, and seneka is then the most certainly useful medicine that I have tried, promoting expectoration, perspiration, and urine, in a powerful manner.

Expectorants of heating qualities are generally improper in Asthma; and in giving them it should be recollected, that the state of the stomach requires amendment. Nauseating doses partly coincide in both intentions; as their effect may be a gradual removal of the offensive matters, which will be passed forward from the duodenum, and absorbents, with bitters, may then be pursued with greater advantage.

Blisters between the shoulders are not of decisive use. They have been generally accompanied by medicines which might promote expectoration without them, and the usual length of the paroxysm is not diminished by their application.

INHALING VAPOURS.—Hippocrates introduced the inhalation of vapours from various herbs, and resinous gums. He used herbs and nitre boiled with vinegar and oil, and directed the vapour of such boiling compositions to be

drawn into the lungs through a proper pipe. This practice was extended in many directions, and upon various indications of disease, as appears from many parts of his works.

Upon the indication of excess of serum, fumes were directed to be inhaled by practitioners, many ages after his time, for the purpose of drying the moisture which was the cause of Asthma, and also to carry off the remains of the obstructing matter. Frankincense, myrrh, and many other gums, were in common use, with which arsenic was occasionally mixed very injudiciously. But this application of the mineral, arose from the mistake of taking the gum juniper or vernix of the Arabians, which, by their medical authors, was prescribed in fumigation, under the name of sandarac, for the *σανδαράχη* of the Greeks, which, doubtless, was an arsenical mineral.*

Inhaling of fumes has also been suggested by modern physicians, both in Phthisis and Asthma. The vapour of æther, raised in the steam of warm water, has been often inhaled from the instrument recommended by Mr. MUDGE, but without advantage in Asthma. In the first species the symptoms were aggravated by its use, as we may

* Vide Galen, Lib. IX.

presume, from the greater rarefaction of the air contained in the lungs, and the more considerable expansion of the fluids in the pulmonary vessels.

The vapour arising from hemlock leaves infused in boiling water, was once found serviceable in the second species of Asthma, but always injurious in the first. In the last kind, its narcotic quality may be supposed to recommend its use, but antispasmodics directly taken into the stomach, will act with more decision, and render other means unnecessary. If there be virtues in some herbs, calculated to promote expectoration, the vehicle of aqueous vapour is not favourable to their operation; heat and moisture conveyed into the lungs, being more likely to increase the disease than to give relief.*

Smoaking Tobacco is practised by some Asthmatics, who mistake the great excretion of saliva for a necessary evacuation. I am satisfied that a much more copious determination of lymph is made to the bronchia and salivary glands, by smoaking, and it will be entirely conformable to the actions of the animal œconomy, if the habit of such secretion be established, though this ex-

* The inhaling the vapour of radical vinegar from a glass vessel has been well recommended. The process and vessel are described in Vol. III. of Dr. Duncan's Annals of Medicine.

citing cause be absent. I have persuaded some Asthmatics to abandon the practice, with great advantage in the first species. The system cannot obtain the necessary supply of oxygen, sufficiently fast in the paroxysm, even if the impurity of tobacco fumes be absent.

Oxygen, Hydrogen, Hydro-Carbonate. — Those who are best acquainted with pneumatic medicine, speak in sanguine terms of the effects of oxygen in Asthma, “No sooner does it touch the lungs,” says Dr. BEDDOES, “than the livid colour of the countenance disappears, the laborious respiration ceases, and the functions of all the thoracic organs go on easily and pleasantly again.”

Many authorities confirm the fact of benefit being derived from the inspiration of this gas in Asthma, but as there has been hitherto little distinction of the causes of this disease, pneumatic medicine has been often tried from random indications; and hydro-carbonate and hydrogen are said to be useful in Asthma, as well as oxygen, though their properties are so different. Dr. FERRIAR gives us an account of undoubted benefit from the use of hydrogen in Spasmodic Asthma, but the disease is said to have taken place after inflammations in the thorax and adhesions of the

pleura : should it not, therefore, be included in the continued species, from fixed causes? In a case of this kind, oxygen would probably revive pain and inflammation by its stimulating properties, opposite to those of hydrogen, which last could not be a permanent remedy.

I offer this suggestion with great deference to the judicious Physician whose authority I quote. He referred, without doubt, to the old distinctions of Asthma, whilst I reason from the principles of this Inquiry.

In the first species of Convulsive Asthma, I have no doubt of the advantage of using oxygen in the paroxysm ; but I cannot expect a perfect cure from the continuance of this remedy only in the intermission, though, here too, it may aid the general means.

I am well acquainted with the return of the disorder in two instances, after the most favourable expectations having been entertained, from the relief afforded by inhaling oxygen in previous paroxysms.

In the second species of Asthma, I am informed by a Physician of great accuracy and discernment, that oxygen appeared hurtful, increas-

ing heat, anxiety, and producing temporary fever, when the pulse was previously under 90. Hydrogen and hydro-carbonate were tried without benefit, and the fit vanished by the patient moving out of town.

In a case where the first passages were affected with dyspepsia, and the greatest debility, oxygen was usefully inhaled, though I cannot say what length of time was required to produce the good effect. I am informed only that the Convulsive Respiration appeared to belong to the third species; and that the patient enjoyed a better appetite, and suffered less in the paroxysm from the inspiring of oxygen, than he was used to do before he applied to it.

It is not always possible to ascertain if irritation of serum existed in the lungs or not, in the third species, when great acrimony offended the first passages, and had a decided influence in bringing on the fit.

But if oxygen be really a remedy for dyspepsia, it may be useful in this species, by invigorating the arterial and absorbent systems, and thus, eventually promoting peristaltic action, and a better assimilation of alimentary matter. It has

been rendered probable by M. HALLÉ, that oxygen is principally instrumental in performing those combinations in the intestinal canal by which assimilation is produced.*

That it is useful in the paroxysm of Asthma, from irritation of mucus, may be inferred from a consideration of every circumstance of predisposition to the disease, and still more from its proximate cause.

If oxygen be inspired, it may act directly upon the capillary orifices, and excite them by its properties to contract their apertures, and thus prevent the further exit of their serous contents. If its stimulating qualities were to be applied to the arterial trunks only, they might propel the blood with unusual force, and the capillary extremities not being equally excited, the disease might be increased; but in speaking of this diffusible and subtle fluid, we cannot apply the same reasoning as to other powers operating upon the œconomy of life; we are to consider that it is a necessary constituent of the blood in its healthy state, and we have some facts to depend upon, which prove its efficacy in appeasing the distress of a paroxysm of Convulsive Asthma.

* See *La Médecine Eclairée*, &c. par M. Fourcroy.

We are also to consider that it may be made to penetrate more extensively, and deeply, into the air cavities, by being inspired in greater proportions than can be afforded by a common atmosphere, so that the points of vascular texture, uncovered by mucus, may be exposed to a greater influence, though they be fewer in number, than in the healthy state of the lungs.

Its application gives to the pulmonary vessels, and to the heart itself, that vigour which sends the blood to the left ventricle, and the anxiety and straitness, are in proportion diminished: but it is carefully to be remarked, that expectoration still terminates the fit in a greater or less degree in the first species, which comprehends so large a majority of the cases of Convulsive Asthma. See Sect. IX. for additional reflections upon its use.*

STOMACHICS.—These remedies are absolutely necessary in Asthma to correct dyspepsia in whatever species it may appear. Bitter tinctures are not to be used in the paroxysm, but testaceous powders are generally beneficial. Acetous acid is particularly grateful to the stomach, and appears

* See the Rev. Mr. Townshend's Guide to Health, Vol. I. for additional evidence of the use of oxygen in Asthma.

to stop the tendency to fermentation, at the same time that it excites absorbing action and invigorates the organ. It is obvious, that cretaceous powders should not be exhibited at the same time, but it is fully confirmed by experience, that both eminently counteract the flatulence and distention.

Additions of stimulant, or heating properties, are out of place till the third day, when the patient usually begins to mend in the first species. Generally speaking, after the third day of the paroxysm, any particular bitter, or cordial stomachic, will be useful in all species of simple Asthma.

The mixture proposed by Dr. GRIFFITHS, of myrrhh, kali, and vitriolated iron, is a stomachic, of great use between the fits, when the predisposition is to be cured.

Vinegar is a most useful medicine in the paroxysm of the first species. In the access of the fit it may be united with squill, or ipecacohana. Afterwards, according to the progress of the complaint, æther may be added in the first and the third species, but in the second it is too heating. When opium is given, it should be united with this acid.

Vinegar would have been found much more useful than it has appeared to be in this disorder, if it had been less combined with saccharine and acescent substances. I have seen the paroxysm, in the first species, relieved by vinegar, simply united with water, when oxymel was useless or injurious.

The effect of this acid upon the lips, which it renders pale and shrivelled, seems to indicate a quality stimulating the absorbing vessels to increased action; and it is thus that its operation in Asthma is probably to be explained: there may be other reasons given for its good effects, but not so clearly established.

M. ACHARD* found, by experiment, that vinegar, of all solid or fluid perfumes, phlogisticated the air at least.

The use of chalk in Asthma seems to arise from the great disorder in the secretions of the first passages. I conclude, that the capillary orifices of the stomach pour out a fluid in too great quantity, shewing that its coats are morbidly relaxed, in which state the secreted juices may

* See Journal de Physique, par M. L'Abbe Rosier, Tom. 26.

require correcting, and the secreting vessels may demand some appropriate astringent to excite their contractions. Whether chalk answers this last purpose or not, we may attribute to it the property of an absorbent, and it is as advantageous in Asthma of the first and third species, and occasionally in that of the second, as it is in diarrhœa.

It has not, however, been generally the custom to use absorbents, because practitioners have hitherto merely considered difficulty of breathing, without referring the symptoms which constitute that state to their true causes.

In Asthma of the third species chalk has admirable effects; it should be first given in a neutralized draught, after a gentle puke. Rhubarb should be interposed, and after two days, opium being added, will sometimes prevent another exacerbation. I have even seen this effect produced on the second day, but not without a previous evacuation from the first passages, and a very free use of chalk.

STIMULANTS.—The stimulants which have been so profusely used in practice within these few years, have been applied in all species, and all stages of Asthma. In the paroxysm of every

species in which the irritation was not discharged, their exhibition has frequently done mischief, and not uncommonly induced a necessity of bleeding, which has been erroneously attributed to the natural indications of the disorder.

I have never yet seen æther give ease in the acmé of the paroxysm of Convulsive Asthma of the first species. In many trials the anxiety and the energy of respiratory labour were certainly increased by it. If the irritation arise from repelled gout, the case may be more susceptible of benefit from its use, but this case should be distinguished from those of disorders in the alimentary passages which cause the paroxysm in the third species.

The acrimony of indigested aliment, offending the stomach and duodenum, have certainly produced, in many subjects, the reaction of the system in a paroxysm of Asthma, which should be classed in the third species; but in this case saline absorbents are infinitely to be preferred to the hot and stimulant draughts of volatile salts, æther, and fetid gums, the bad effect of which is too often only diminished by the rhubarb or aloes which are fortunately admitted in the composition.

In the paroxysm of Convulsive Asthma, a writer of great authority recommends a tea-spoonful of æther three or four times, to which he adds ten drops of laudanum. We have likewise a direction to apply a blister, to give an emetic, and to bleed. It is difficult to say what natural symptoms of the *same disease* can indicate such contrary remedies; and we can only be satisfied by reflecting, that Convulsive Asthma has never yet been referred to its distinct and characteristic causes, and that the indications may in one species call for a medical agent that cannot be applied in another, in which, even one of an opposite quality may be required.

In saying this, I endeavour to account for the success which may occasionally attend on each plan; as, from long knowledge of the admirable abilities of Dr. DARWIN, I fully confide in the judgment of his directions.

But though stimulants be misplaced in the paroxysms of three species of Convulsive Asthma, they may be used with advantage in the fourth, if joined with opium, and possibly other narcotics.

They are also occasionally beneficial in the intermissions of the first and third species, as a means of exciting digestion, and the general powers

of the habit, particularly of the absorbing system. The intention in which they are to be given will determine the Physician in his choice.

BATHING.—Warm bathing is hurtful in every species of Asthma. Not contented with probability, R. B. went into the hot bath both in the intermission and the paroxysm. The distress in breathing was much aggravated by the trial in the last state, and the paroxysm was excited in a few hours, and at an unusual period, by the trial being made in the intermission.

The cold bath has been judiciously recommended by Dr. RYAN, in Asthma. I believe there is no single remedy of more value in all species of the complaint during the *absence of the paroxysm*. I can assert this upon numerous trials of its efficacy.

In the paroxysm, R. B. went into a bath of forty-six degrees of Fahrenheit. It required some firmness to make the attempt, and great patience to bear the want of success attending it. The sudden abstraction of heat was evidently injurious; and it was some hours before the impression was so far overcome as to take away fears of the consequence.

TONICS.—Tonic medicines, if we separate a class of stomachics from this general head, cannot be reasonably expected to be useful in the paroxysm of Asthma. They have been applied partially, and abandoned capriciously by many practitioners, in cases of Asthma, during the intervals.

But a desideratum has always been a proper distinction of specific causes. If tonics be given in cases of disordered respiration arising from secret vomicæ, adhesions of the pleura, and many other causes of Continued Asthma, what consequence can be expected, but an increase of the disease? The recollection of every practitioner will enable him to allow, that instances of this complicated kind have been confounded more or less with Convulsive Asthma of nosologists; and when iron, or Peruvian bark have been exhibited, these valuable medicines have met with unmerited disgrace.

But, besides this cause for the rejection of tonics, the want of firmness in continuing the use of them, when properly indicated, is a great source of their discredit.

If a febrile affection come on during a course of steel or mineral water, the medicine is probably discarded never to be resumed.

Peruvian bark may load the stomach, and bring on dyspnœa in one preparation; it is then abandoned without trying another of lighter digestion, and more divided parts.

I can affirm, that in the intervals of the paroxysms of the first, third, and fourth species of Asthma, tonics are generally beneficial: and I am of opinion, that a temporary inconvenience from the use of one form, should incite the Physician to find another, and apply it, never abandoning the general intention.

In the second species their advantage is more doubtful, and their exhibition must be decided upon after a careful attention to remote causes.

In pursuing, consistently, a course of tonic medicines in this disease, the Physician should prepare his patient for the necessity of long perseverance. A predisposition is to be cured which consists radically in laxity of fibre, and which is consequently attended with feeble vascular contractions. This state has been growing very probably for years, and the expectation of removing it in as many weeks, or even months, is puerile, and not to be defended.

It is almost as rational to promise, that a remedy shall confer upon the soft fibre of an infant muscle, the premature density and tone of adult growth.

In the first and third species of Convulsive Asthma, the practitioner may be safely referred to all medicines which belong to the class of tonics, which may be taken up and suspended, or variously combined, according to his judgment. A long use of one form diminishes its influence, whilst another will continue the impression with greater effect.

In the choice of tonics, the preparations of iron are to be preferred as essential means of cure. These should be occasionally assisted by bitters and Peruvian bark, and the state of dyspepsia is never to be overlooked, but obviated by frequent interposition of absorbents and rhubarb. Opium is also required to tranquillize occasional uneasiness from the new excitement of preparations of iron. Oxygen is too well recommended upon principles closely connected with the predisposition and remote causes of Asthma, to omit its use, by modes of exhibition now generally known.

I have tried calcined zinc in seventeen paroxysms, and more intermissions, without being

able to discover the smallest advantage from its operation. In general it loaded the stomach, when given in a full dose. The accounts we have of its efficacy must be assigned partly to enthusiasm, and more generally to the want of discrimination of the species of Asthma, and the erroneous interpretation of the causes which terminate the fit. These are more or less dependent on the density of the atmosphere, and changes in its degrees of purity, and frequently on the condition of the first passages, hitherto greatly neglected in treating the disease.

SECT. XVI.

A plan of treatment proposed for the PAROXYSM of each species.—General rules of diet for the Paroxysm and intermission.

IN a paroxysm of Convulsive Asthma, we are first to consider what species of the disease it belongs to, and next the indications which are to direct us in the treatment.

Paroxysm of the First Species.—The indications are to lessen the distention of the pulmonary vessels, by determining the blood to the surface of the body: to accelerate the passage of the blood from the right to the left side of the heart: to remove the extravasated serum already present, by absorption, exhalation, and mucous expectoration: to correct dyspepsia, and encrease the tone of the first passages.

In answering the indications of every species of Asthma, we are to employ the instruments

proposed in the last section, with the practical cautions there recommended.

By gentle puking we may obtain some knowledge of the state of the first passages, and the paroxysm will go on with milder exacerbations, if irritating matter be removed from the stomach and duodenum. Afterwards a draught with one ounce of distilled vinegar, and three grains of pulv. ipecac. in pure water, may be taken every four hours, as a means of determining to the surface of the body, and promoting absorption and exhalation. If costiveness prevail, it will be necessary to remove it, carefully avoiding purging.

Instead of acetous draughts with ipecac. the Physician may have reason to prefer chalk or magnesia usta in a draught of mint water, with the same nauseating ingredient. The indication of disorder in the first passages, will determine him in his choice.

To accelerate the passage of the blood to the left ventricle of the heart, besides these means, oxygen may be inspired, diluted according to the rules of Dr. BEDDOES.

In the morning no time should be lost in supplying the patient with clear coffee, as soon as he

awakes, which should be repeated at intervals with dry toast.

The patient may also take during the remission, a bolus of pulv. columbo, with a few drops of tinct. opii. every three hours, and infusion of coffee or camomile; the nauseating draught being suspended between the exacerbations.

At the beginning of the second exacerbation the nauseating draught should be repeated, at first with a sufficient dose of ipecacohan to excite puking, and afterwards without that effect. In the second remission, the plan pursued in the former should be resumed.

The third exacerbation will be probably mild, after which the acetous draught may be frequently united with æther in place of the ipecacohan. With this plan there will appear on the third day, a considerable tendency to expectorate, which should be promoted by ammoniac, with vinegar of squill and tinct. opii, or with volatile salts. Ammoniac is called an expectorant, but the patient, before this period, too frequently takes this nauseous medicine without use.

From this time, bitter infusions of myrrh, columbo, or quassia wood, may be given with

great advantage, more or less united with absorbent earths, magnesia, or vinegar. If the exacerbation still return in the evenings, it may be proper to continue the nauseating medicine at the hour of its attack, except in Asthmatics, who, from having frequently sustained the paroxysm, may probably be chiefly influenced by habit. When this is ascertained, a considerable dose of opium, with æther and volatiles, is the specific remedy.

Paroxysm of the Second Species.—The indications are to discharge the subtle and acrid particles which have been received in inspiration, or to promote such a secretion of lymph as may envelope them, and thus defend the membrane from their further irritation; and lastly, to remove the patient from the sphere of their influence.

The first intention is not readily accomplished by art, and whatever claims may be made to the honor of curing paroxysms of this species, nature is often the patient's only friend. The irritating offence will naturally increase the action of the bronchial vessels, their lubricating lymph will be secreted to sheathe the passages from further injury; and this event frequently takes place without any thanks being due to medicine; it may, however, be promoted by saline and

antimonial diaphoretics, and nauseating doses of ipecac. adding tinct. opii, when the paroxysm declines.

A change of the wind may likewise save the patient every trouble in executing the last intention, but if this relief do not come, it will be necessary to direct a different residence.

Paroxysm of the Third Species.—The indications are to discharge irritating matter, or to remove obstructions, from some of the hollow viscera below the diaphragm.

The diagnostics, it must be confessed, are here often difficult to ascertain. But if the disorder do not belong to this species of Asthma, we must assign it to the first, and the same preliminary treatment may be safely pursued. After one gentle emetic, an opinion may be formed with more precision, whether pulmonary irritation be present as well as abdominal, which may be discovered by the cough that attends in both; and also from the measure of relief which is obtained by emptying the first passages. In the first species the cough is so small and painful as to be suppressed by voluntary efforts. In the third it is more open, but equally without expectoration, as in the beginning of the other.

The considerations, analogies, and facts of Sect. XIII. may direct the inquirer further in the diagnostics of this species.*

As we consider this species to depend much on disorders of the lower viscera, the turgid state of the liver may be a frequent cause, both creating dyspepsia, and following it. It may be therefore necessary, in some cases well understood from former circumstances, to give crude quicksilver triturated into a bolus with conserve, or calomel with rhubarb. But generally we are to pursue the most quiet means of discharging acrimony, or altering its qualities, in which last intention, chalk probably acts with so much benefit, as well as the volatile and fixed alcalis.

After a moderate evacuation, if the habit of convulsive contractions be of long standing, an opiate may be given with great propriety; but in young Asthmatics, if the offence existed only in the alimentary canal, the paroxysm may be suspended, or the exacerbation be so mild as not to distress the patient. Whether this state be obtained by the operation of an opiate or not, absorbent earths are eminently useful, and should afterwards be continued through exacerbations and

* On the same subject see the Appendix.

remissions, in a vehicle saline and bitter, and opium, with or without æther, may be added, as judgment may direct.

Paroxysm of the Fourth Species.—The indications direct us to make sensation less acute, or by varying impressions, to break the chain of perceptions, connecting themselves in the mind with the primary cause.

To be correct in discriminating this species, is not always possible; but that there is reason for the establishment of it, is proved by the analogy of all convulsive contractions; by paroxysms returning upon such minute causes of offence, as to be traced with difficulty, and at last only through the links of mental association of ideas.

Here we see the use of opium and other antispasmodics; their influence on animal sensation prevents the effect of slight irritations, which, though not likely to endanger a function, might excite muscular convulsions, but for their exhibition in habits already distinguished.

It has been shewn that this may supervene upon each of the former species. Nature or art may have removed the irritating offence, but convulsive motions may still continue, at greater

or less intervals. In the first species, and in the third, it may be pretty well concluded, that the recurrence is owing to habit, if the patient be considerably improved in health, if dyspepsia be entirely removed, and if expectoration and wheezing do not terminate the fits.

But no diagnostic is so strong as the effect of medicine. According to circumstances, opium and æther may be employed in large doses, and in the alteration of symptoms which has been described, these antispasmodics are instantly useful.

DIET—The Asthmatic should avoid the Errors in Diet pointed out as exciting causes in Sect. IX. His food should not be generally fluid or weak. In the second species there is the necessity of a perspiring state of the body, but the stomach requires solids, even in that. Vinous drinks and malt liquor should be avoided, particularly in the paroxysm of the first species, and watery gruels and broths are equally bad, if taken largely. Whatever is stomachic is proper, if it do not stimulate. Acidulated water, milk and water, with toasted bread, or biscuit, rice boiled in broth, till it be soft, without fat, are suited to the paroxysm.

Infusion of coffee may be considered as medicinal in every species of Asthma except the second, in which it is too heating for common use. It is best in the first and third species, in both which dyspepsia is so predominant, as to make the treatment of one not inapplicable to the other. Sir J. PRINGLE speaks of it in the paroxysm as a most powerful medicine, and directed it in the proportion of one ounce to a dish, without mixture, and to be repeated every half hour. Dr. PERCIVAL gives his authority for the use of coffee in Asthma, as a successful means of relief. Sir J. FLOYER used it with great benefit in the latter part of his life, as appears from the account of Dr. MUSGRAVE.

If coffee be boiled, it loses part of its flavour; it should, therefore, be infused like tea, by pouring boiling water upon it in a close pot.

From the end of one exacerbation to the beginning of the next, a more cordial aliment may be used, but not so exciting as in the intermissions of the paroxysm. Coffee and ginger tea are the most cordial articles which should be allowed. Hot liquors are always improper; cold water is taken with great benefit, and if acidu-

lated with vinegar, its good effects are often more considerable.

Pure cool water is most clearly beneficial after an imprudent meal. If the Asthmatic perceive his stomach to be loaded, he may next expect the symptoms of a paroxysm. In these circumstances I have experienced, very frequently, the advantage of repeated draughts of cold water, so that one or two quarts have been taken in the whole, from the commencement of the uneasiness; and this has given perfect relief when coffee had failed.

It is particularly necessary not to oppress the stomach by more than it can govern: but it is not less important in an advanced state of the disease, to supply it with tender animal food and light wine. Examples of this are numerous, and a specimen of the cordial diet is given, with clear evidence of advantage from it, by Dr. WHYTT.*

The practice of taking rich soups and broths, is very injudicious in all stages of Asthma.

* Observations, &c. on the Cure of Nervous Disorders, p. 502.

The vessels are both filled and relaxed by such a diet, and the stomach is not improved by their use. To be more particular would be a repetition of the cautions as to Errors of *Diet*, in Sect. IX.

SECT. XVII.

The Predisposition removed, and the diseased cured.—Examples of the Practice.—Recapitulation.—Conclusion.

WHEN the paroxysm has subsided, we are to proceed with a further application of remedies indicated by the remote causes. This part of the practice has been little attended to,* though it is only by removing the predisposition, that the disease can be cured.

It is therefore our duty to urge the necessity of counteracting the exciting causes, and to shew in what condition of the body they may produce their effects. Unless this honest solicitude of the Physician be answered by the confidence and submission of the patient, the latter cannot be insured against the future attacks of Asthma, though a paroxysm may have terminated in the most perfect intermission; nor can any blame be

* See Tonics in Sect. XV.

reasonably attached to his adviser, if the disorder return.

The reader may anticipate the plan of cure, if he have attended to the observations on the predisposition and exciting causes of the first species, which takes in so large a majority of cases. . He is referred to Sect. X, XI, XII, XIII, where the *nocentia* are pointed out, and consequently the means of avoiding their effects. The remedies mentioned in the 15th section may further assist his views, if he particularly notice oxygen, stomachics, and tonics.

In the *First Species* it is obvious, that the proper indications can be only answered effectually by the use of medicines, which give a contractile tone to the pulmonary capillaries, increase the power of the stomach and bowels, and promote absorption and strength through the whole habit.

For these purposes iron, cold bathing, exercise, change of air, oxygen, bitters, Peruvian bark, absorbents, and acids, are to be first recommended, and these diversified according to their effects, will prevent the recurrence of paroxysms, by altering the condition of body in which they are excited.

We must continue the use of absorbents from the close of the paroxysm, employing magnesia when the body is costive, but preferring chalk in common instances. This medicine, given in bitter infusions, will oppose dyspepsia as a temporary relief, but must not be relied upon for a more extensive advantage. The preparations of iron are to be given at first in small doses, and afterwards in larger. If heat or pain occasionally attend, we must, during these symptoms, suspend their use, and substitute saline draughts with opium.

When the paroxysm threatens to appear, the exhibition of these tonics must be again suspended, and the plan should be pursued which has been pointed out in the last section.

Every preparation of iron may be used in the intervals of the paroxysms, but the rubigo ferri is much to be preferred. The directions which are given by LEWIS and CULLEN, and other writers on the materia medica, are well known, and should be generally observed in prescribing this mineral.

I have many proofs of the greatest advantage from a patient continuance of this plan, but a short case is sufficient to exemplify the treatment.

A clergyman, forty-eight years old, had been subject, since his thirtieth year, to this species of Asthma. I had seen him in two paroxysms; and, after the last, I succeeded in engaging his attention to a course of medicine to prevent a return.

A powder of crab's claws, rhubarb, and pulv. aromat. was directed to be taken every day after dinner, and to be repeated occasionally, if the disordered state of the stomach required it. I also prescribed pills of vitriolated iron and bitter extract, of which he took three twice a day, with an infusion of columbo root and ginger for several weeks, when the paroxysm returned, during the continuance of which they were suspended. At the close of the fit he resumed them; but after a few days they were changed for ten grains of rubigo ferri, twice a day, and five grains of rhubarb were taken every night: the cold bath was also used every other day; his diet was more cordial, and he was indulged with porter. After a perseverance in this plan for some time, his medicines were occasionally suspended, and frequently changed into other forms of the same class. He afterwards bathed in the sea for several weeks. He was used to sustain twelve paroxysms in the year, but he is now free from them, and carries every mark of health, with a perfect freedom of digestion and breathing.

In the *Second Species*, exhalation should be kept up from the vessels of the lungs by the use of diaphoretics. Small doses of opium are usefully conjoined, and the patient should be removed from the influence of irritating causes, such as are known to exist in towns and manufactories.

The Dry Asthma seldom occurs under the distinctions before marked out. It is not a disease which follows such dangerous debility as that of the first species, but it is more subtle and capricious in its attack, and less usefully influenced by the action of tonics, which may frequently be injurious by increasing the absorption from the pulmonary membrane, and consequently its dryness, and by this means laying it more open to offence. It may be sometimes seen in the progress of convalescence from the first species, and it is then an indication of tonics having performed their part, and of the propriety of suspending them.

A gentleman had been many years subject to this species of Asthma, in which the fits usually terminated in some little expectoration, beginning to subside, when the tracheal passages became moist; at length he left a populous town on account of its frequent returns, and went into country lodgings only one mile distant. He was there

free from his complaint, except the wind blew from the town, which brought on a paroxysm in two hours from the change, in six instances. When the wind blew again from the country, although easterly, the paroxysm soon went off.

At length he removed two miles further, and in this situation entirely lost his complaint, taking small doses of opium and absorbents, which prevented irritation from very slight offence, and corrected his digestion which was faulty: but the grand means of cure appeared to be a situation more remote from the origin of effluvia, which could not then arrive at his lungs, but in so diluted a state as to lose their influence.

In all cases of this kind there should be very particular enquiries made into the nature of the situation in which the patient lives. There may be many unsuspected causes for his sufferings; but, by retreating from some local inconvenience, these may altogether cease, and the occasion of their former existence be very manifest.

The *Third Species* is to be cured by the means generally proposed in the first,* but with a more

* Excepting cases of obstructed viscera. See Appendix.

free use of absorbents, and a more rigid attention to diet. Chalk and opium will astonish the Asthmatic by their excellent effects, when the irritation proceeds from disorder of the first passages only. Of irritation in the uterus, an example was given in Sect. XIII.

I have no doubt of the fact, that acrimony sometimes gradually, accumulates in the stomach and duodenum, until a paroxysm is excited without other irritation; but more extensive observation, with reference to the principles here laid down, is necessary to settle clearly the distinction between the first and third species.

R. S. aged forty, of rather a full habit, but pale skin, applied to me. I found that he had suffered many paroxysms of Asthma, clearly considered convulsive by his friends and medical advisers. These were preceded by puking, flatulence, and acidity of the stomach, with other symptoms of dyspepsia. I directed the following draught to be taken three times a day, viz.

R. Pulv. Cretæ ℥ss.

Tinct. Opii gutt. xv.

Ætheris Vitriol. gutt. 40.

Infusi Flor. Chamæm. ℥iss.

Tinct. Columbo ℥ii. m.

A few grains of rhubarb were also taken every night at bed-time. He had been affected with a diarrhœa, which sometimes preceded, and at other times followed his paroxysm, without regularity. The disorder of the first passages was soon checked, and the returns of the paroxysm were delayed by the medicine. Afterwards a course of iron, with other tonics, was pursued with great success in confirming the habit, and finally curing the disease; as I have recently been informed that no paroxysm has occurred for several years. I infer, therefore, that its cause must have existed in the first passages; and I think this, and many similar cases can only be explained by referring to those principles of the animal œconomy regulating muscular contractions which were considered in Sect. xiii.*

The cure of the *Fourth Species* must be attempted upon principles suggested in Sect. xiv; the application of which will not be difficult when the diagnostic is well established by the effect of antispasmodics, and the progress of certain convalescence. The influence of external impressions must be maturely considered. Tonics have frequently removed the weakness of an Asthmatic, and a change of ideas, aided by the use of opium,

* See the Appendix for some cases of the Third Species, with remarks.

to abate sensibility of slight irritations, would have secured him from relapse, if the exertion had been recommended, or its necessity foreseen. A neglect of these means may be considered in many instances as causing the return of Convulsions of the muscles of respiration. This truth might be supported by the evidence of several cases within my knowledge, but I shall give the following as an example particularly under my observation.

R. B. enjoyed general health in various situations till the year 1783, when dyspepsia first attacked him at twenty-five years of age. The symptoms increased gradually for four years. He was hypochondriac, sleepy after meals, and had constant pains in the intercostal muscles.

1788.—His eyes were constantly inflamed, and a stupor came on every night, which made reading very painful. He had lived upon a weak and fluid diet, and had taken saline medicines injudiciously.

In the summer of this year, after awaking in the morning, he perceived some wheezing in his expirations, but no dyspnœa.

In the autumn, after a catarrh, and fatigue in riding, he was seized in the usual manner, with

a paroxysm of the Convulsive Asthma of the first species.

In the succeeding winter he had several paroxysms, and tried the means of alleviating them, which are pointed out in the preceding sections. His experiments frequently prolonged their duration, and the intermissions were neglected.

For four years this disease preserved its character, and was remarkably excited by the following remote cause :—In the vicinity of Birmingham is the highest land of the kingdom, from which rivulets descend to the eastern and western oceans. The soil is gravelly, but always moist with springs; the air is light, and continual evaporations make it cold. He was frequently called to this neighbourhood by the ties of family, or motives of business, from a residence forty miles distant, and two hundred feet nearer to the level of the sea. In his first visit, after he had suffered the Asthma, he was seized with a very severe paroxysm on the evening of his arrival. He was laid up during his stay, and the symptoms had not subsided when he pursued his road back. As he descended from the high country, the dyspnœa gradually went off, notwithstanding the great fatigue he underwent. In the course of the four following years he repeated this journey, in warm and cold weather,

and under various circumstances, seven times, but with the same result in every attempt.

1792.—He had tried numerous remedies in the paroxysm, and had attained some advantage over it.* Dyspepsia was less, and his general health improved, but he had not yet succeeded in lengthening the intervals.

He now pursued more vigorously, the plan which he had adopted. He took iron in large doses, and in all preparations, but preferred the rust, which seemed to correct dyspepsia more effectually than any other. He went into the cold bath every other morning, and took absorbents occasionally with bitter infusions, and rhubarb.

In the summer dyspepsia had greatly abated, and the intermissions became longer. In October he went to Bath, and drank the water a few weeks with great benefit. Upon his return he resumed his tonics, and trusted chiefly to the rust of iron, taking chalk very seldom. The cold bath was suspended in the winter.

1793.—Some boils had appeared in the last year, and they now shewed themselves more fre-

* See the two preceding Sections.

quently upon his face and body. The paroxysm did not come on so often, but was excited by fatigue or cold, and by professional business, which he now determined to abandon, rather than his hopes of a perfect cure.

1794.—In the winter he was very free from disordered respiration, which he attributed to excursions and change of ideas, in new pursuits. In the spring he had two severe returns, excited once by the dust of oats, and a second time by hair powder, but he expectorated little, although dyspnœa subsided with the paroxysm. His disease now approached the character of the second species, and the change was considered favourable. He also applied the principles of Sect. XIV. to these attacks, and secretly determined to oppose them in future by sedatives, which he had long discarded as useless in this intention.

An opportunity occurred twenty days after, when he completely stopped the paroxysm at its commencement, by two grains of opium dissolved in vinegar with æther. He enjoyed a good night, and arose in the morning without dyspnœa or expectoration.

He was now prompted to see the event of a journey into Warwickshire, but here the paroxysm

came as usual on the evening of his arrival, when his mind was occupied in reflecting on the distress which he had before experienced in the same place, and which he had great anxiety to avoid. When he perceived the symptoms, he withdrew from company, and took a draught of cold water and vinegar, with forty drops of tinct opii. He soon obtained relief, but it was not extended to a perfect removal of the affection, which he attributed to the strength of habit.

The dose of opium was repeated, and he had a good night, but no sleep: in the morning some dyspnœa remained, but without wheezing. Further reflection strengthened his opinion that he was now under the dominion of a secondary disease established by habit, and he determined to answer the *new indications* by any effort which circumstances might demand. He recollected the aphorism of Hipocrates on the convulsive disease of epilepsy, and the doctrines of some modern writers on the powerful influence of custom or habit in the animal œconomy.

Military business appeared to be most opposite to his former pursuits, and therefore most likely to break the association of his ideas, to dissever the links by which they revived old sensations, or to conquer their influence. Exercise near the sea,

where the density of the air might co-operate with the other means of cure, and the opportunity of bending his mind to the principles of a new science, were his motives for taking a company in a regiment of militia, commanded by officers, who were his particular friends.

At the end of June 1794, he joined this regiment, then encamped upon a dry common, elevated above the plain, and sloping towards the sea, which was at a few miles distance. The Colonel permitted him to occupy lodgings, with his family, in the vicinity of the camp. He at first avoided, with great care, errors in diet, which are exciting causes frequently met with at military tables. But after a few weeks he found that such precise caution was unnecessary, an accidental deviation from rules not being followed by any inconvenience. He soon gave his whole attention to the scene before him, and attempted to fill his mind with the images which it presented. A new system of tactics being ordered to be practised by the regiments in camp, he employed himself in the study of its principles, and of their application to active service.

In these pursuits during the summer, and till late in the autumn, he had uninterrupted health. He again felt the vigorous spring of youth, and

enjoyed that satisfaction of mind which, from the capricious tyranny of his disorder he had not experienced for the preceding ten years. He generally arose at four in the morning, and often marched six miles in the dust of two brigades of infantry, to be reviewed in the heat of the day. It was noon before he returned to the camp, but neither cough nor dyspnœa was excited. Dyspepsia was entirely overcome: liberties were taken with every species of diet, and no exertion seemed too considerable, as fatigue was never felt. Towards the close of the campaign the season being very inclement, the tents were wet with rain for several weeks, but he suffered no alteration for the worse, though now constantly sleeping in the camp.

1795.—The regiment was cantoned in the towns of Cambridgeshire during the winter, and he had no return of Asthma.

In March he had orders to march with three companies, and to follow other divisions of the regiment to Hull. He was now so confirmed in health, as to determine upon finishing his military experiment, when this duty was discharged.

But at Huntingdon, having taken cold, and drunk bad wine, he had symptoms of his dis-

ease; their progress was, however, suspended by opium, and finally carried off in a bilious diarrhœa.

At the end of March, fully satisfied with the success of an uncommon experiment, in which he had employed ten months, he resumed his regular profession, and to the present period, in June, 1803, has felt no symptom of his former complaint.

He therefore believes himself to be cured of Asthma, as the interval of so many years has elapsed since he had a paroxysm; but this conclusion is strengthened by other considerations. He is no longer troubled with indigestion, nor affected by the numerous exciting causes which prevail in Birmingham, where the air is much rarified, the population very great, and dust continually floating in the atmosphere. To secure himself more effectually against a return, he however, pursued the means of prevention during the two first years of his residence, since which period he has taken no particular care, except by cold bathing in the summer.

MUCH more may be said upon Disordered Respiration, but affections of the lungs, attended with fever, are not to be considered upon the principles of this Inquiry. These cannot be esteemed cases of Convulsive Asthma; and Continued Asthma has been sufficiently noticed.

It may be convenient to recapitulate the principal facts and inferences on which I have endeavoured to establish the distinctions, and the practice laid down in the preceding sections.

In Sect. I. The nature of *Convulsive Motions* is stated. These are shewn to be *re-actions* of muscles for the purpose of removing injury or irritation.

The popular term, *Difficulty of Breathing*, is then proved to consist chiefly in such *re-actions* of the respiratory muscles, and not merely in causes of opposition to the free inspiration of air.

The re-actions of the abdominal and the thoracic muscles are commonly associated. A perception of irritation in the rectum or bladder is followed by moderate re-action, as a natural effect. A similar perception in the lungs, though not from common causes, is followed by stronger re-

action, for the purpose of relieving them. And in all cases of irritation in the viscera of the thorax or of the abdomen, the same muscles are the instruments of relief.

Sect. II. Having established the fact, that convulsion is a re-action of muscles, caused by injury or irritation, we are led to consider the *irritations* which produce the Convulsions of Asthma. Some of these had been noticed as *manifest* causes of *Continued Asthma*, in which the same external effects appear as distinguish *Periodic Asthma*.

The step from *manifest effects* to *manifest causes* being easy, and their connection not likely to be disputed, the evidence of these causes of Continued Asthma appeared to be a true and proper basis for the following proposition, viz.

“ *The excessive contractions of the muscles of respiration indicate an injury, or irritation in some organ which those muscles serve.*”

In Sect. IV. We arrive at *Convulsive Asthma*; so called by general consent. Here the external re-action is a *manifest effect*, as in the Continued Asthma; but the *cause* is frequently not manifest without investigation of facts and analogies. Yet as the Periodic and Continued Asthma only differ

as the re-actions more or less remit: and as similar effects proceed from similar causes, we are disposed to attribute such re-actions to irritations, however obscure. These are investigated by tracing them from their effects, and from the appearances which they occasion in the disordered system.

Sect. V. In the *First Species*, the appearance of mucus is a leading feature. All, except modern writers, considered this material, or one equally manifest, as the cause. It is shewn, that no such disease as Convulsive Asthma, without a manifest cause, was noticed from the earliest records of medicine, till the time of CULLEN, who, however, denied to the majority of cases, the existence of such a cause. To determine an important question, whether a material or manifest cause exist or not in this disease, the evidence of dissection is next examined.

Sect. VI. In many cases an excessive collection of lymph was found in the air vessels after death. But the most convincing proof of such a cause is taken from living subjects. A violent affection was discriminated by Drs. DARWIN and BEDDOES, as a case of Convulsive Asthma, in which "large quantities of the frothy serum were "thrown off," and the patient recovered from

her insensibility. The description of Asthma by CÆLIUS AURELIANUS, corresponding with the state of this patient, corroborated their opinion of the nature of the disease.

An objection may be made to the possibility of an animal being preserved with such an effusion of fluid in the lungs; but this is obviated by the experiments of Dr. GOODWIN and the Author, who found, that, by avoiding the passage through the larynx, the oppression could be borne without instant death; and, finally, be overcome by absorption.

Sect. VII. It is next inquired, what state of the lungs permitted the passage of so much lymph. The explanation depends on the preceding facts and inferences. The capillary vessels, greatly weakened by remote causes, let the serum pass; the effect of which is difficulty of breathing, or a re-action of muscles, to remove the inconvenience.

The remaining diagnostics are then considered, and referred to the same cause as *Difficulty of Breathing*. The vesicles not being able to collapse, there is, at first, *little or no Cough*; but, in proportion as the fluid is lessened by absorption, the cough increases, attended with *Spitting*; and the

“obstacles to a free and full inspiration, preventing also a free and full expiration,” are accounted for by visible signs. *Wheezing* and *Straitness* are occasioned by the obstruction of lymph, and by the state of the stomach and œsophagus, which was a remote cause preceding the difficulty of breathing in the fit.

Sect. IX. Other symptoms are detailed, which frequently, but not constantly, attend this species of Asthma. None of these is inconsistent with the cause assigned; and the most remarkable of them can only be accounted for by its existence.

Sect. X. The *predisposing Causes* are naturally connected with this proximate cause of effused lymph. *Dyspepsia* and *Irritability* are the most important of all. The muscular re-actions take place sooner or later, as the predisposing Irritability is greater or less in the asthmatic subject.

Sect. XI. The *exciting Causes* are detailed; each of which may suddenly bring on the paroxysm: they are therefore all objects of practical attention.

Sect. XII. The *Second Species*, usually called the Dry Asthma, is traced to *Aerial Acrimony*

in the lungs. As the fits were very capricious, and the cause obscure, a conclusion was drawn, and readily assented to, that a spasm of the bronchia occasioned this disease: but in reasoning upon it, a previous induction, from conspicuous facts, was much wanted. If a distinct conception of the external re-actions had been attained, and the laws of animal life which govern them had been justly applied, irritating causes would have been clearly seen in many cases. And after this essential step, analogy, and the same laws, would have been safe guides in inquiring after the causes of others.

It is shewn that *subtle matter* may be conveyed insensibly to the branches of the trachea, and that it may suddenly occasion muscular re-action in the same manner, as a cause of sensible bulk.

Irritations seated in the lungs having been thus shewn to occasion two species of the disease, the proposition in Sect. II. p. 17, is so far supported by both.

Sect. XIII. In the *Third Species* there is a new object of inquiry. Diseases of the Abdominal Viscera had been observed in cases of Asthma; but they had not been considered as proximate

causes; nor could they be so considered till the muscular re-actions were better understood. In these consists the paroxysm, which may take place for the purpose of removing injury from the abdominal, as well as from the thoracic viscera: all the acting muscles being common instruments of relief to these viscera.

Acrimony in the stomach or bowels, very probably, causes re-action in many cases, and merits great attention. Thus Asthma may be said to begin in some very irritable habits, at a period, which, in others less irritable, is that of predisposition only.

A conclusion is drawn from these premises, that a third species of Asthma is caused by "*Irritation in some of the Abdominal Viscera, but particularly in the Stomach,*" still further confirming the proposition.

Sect. XIV. The *Fourth Species* is that disease which, having been originally caused by the irritations above-mentioned, retains its form of muscular re-action from habit. *Ideas* of the mind may revive *sensations* of the body, that act upon the predisposing *habit*. In this view, sensations are the proximate, and ideas the exciting causes: and instances are given of their power, both in

the ordinary actions, and in the diseases of the animal œconomy.

Convulsive Asthma is therefore divided into Four Species, each of which is distinguished by the property and situation of its irritating cause; and all are governed by the fixed laws of animal life.

Part II. Medical treatment should be applied to the predisposition, for, unless this be effectually removed, the disorder will return. The successful agents are tonics, employed with long and patient perseverance in the majority of cases. To these must be added such others as lessen morbid irritability in all: and in the Fourth Species, the means of changing ideas of the mind, and conquering their influence on the sensations of the body.

Thus the Inquiry has shewn some specific causes of Convulsive Asthma, not before properly attended to. If these afford the indications which are pointed out, it may be expected that the practice will correspond with them. According to my experience, the directions here given, will furnish the practitioner with the best means of alleviating the paroxysm and curing the disease.

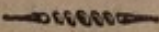
There are, however, contra-indications, and conversions of symptoms in all diseases, which demand, occasionally, clinical attention; and in this disease, as well as others, no written rules will then supply the want of medical observation and experience. The general lines which are laid down may guide the student in his further inquiry, and probably assist the judgment of those who have not determined to limit their views to the distinction of Humoral and Convulsive Asthma.

APPENDIX.

ALPHABET

ALPHABET

APPENDIX.



SINCE the former Editions of this INQUIRY were published, I have had further experience of the advantage of following the directions contained in it; at the same time, the reasoning and conclusions are more confirmed by additional observation.

ON THE DISTINCTION OF THE SPECIES.

I DEEM it of no great importance, that a distinction between the *First** and the *Third*† *Species*, cannot be convincingly proved in all cases.

Where dyspepsia occasions the re-action of the respiratory muscles, it may be said, that the Third Species of Asthma is formed before the patient

* See Sect. IV. VII. IX.

† See Sect. XIII.

had been reduced to the state causing the First; and this conformably to the laws which regulate all the respiratory motions.

The First Species may therefore include two causes, each equal to the visible effect; but as the proportions of irritability vary in different subjects, muscular re-action is sooner excited in one than in another.

We may be guided frequently to a distinction by considering, that, in the Third Species, the subject is likely to be younger, and to have more bodily vigour. He is probably attacked after dinner, or a meal of indigestible food, or after drinking flatulent liquor; but the subject of the First Species is generally seized in the night, after having slept.

Mucus is discharged in both by coughing. In the Third, it may be owing to an obstruction in some of the Abdominal Viscera, or to the distention of the first passages, from dyspepsia, as, if either of these states exist, there may be a difficult transmission of blood through the lungs; and lymph may be forced out of the vessels, occasioning expectoration, as well as diabetic urine.*

* See p. 138, 141, 192.

But here the quantity of mucus will be much less; and it must be considered as an effect of the condition that causes the re-action, and not the cause itself, as in the First Species.

Besides the stomach, the other viscera of the abdomen may be found to be diseased. We must not hastily conclude, that the affection of the liver, of a kidney, of the uterus, or of the bladder, is a remote cause merely, or an effect of Asthma; or that it is incurable. We are certain that the re-action of the respiratory muscles may be caused by an irritation in any of those organs, and we must apply examination and reasoning to discover which. The principles of this Inquiry may guide us to a conclusion on this point, and we must proceed in attempting to remove it. But a disease of one of them will not create so much difficulty in the distinction as that of the stomach, though it may be longer before it be noticed, and the treatment be necessarily different, as employing deobstruents and diuretics, mercurial doses, with gentle aperients, and cautiously avoiding iron and tonics, till the obstructed organ has been perfectly relieved.

On the contrary, when dyspepsia appears divested of these causes in the lower viscera, there can be no practical inconvenience, since both the

stomach and lungs must be cured of their weakness before the Asthma can be cured. The object of suspending or shortening the paroxysm being of little importance, in comparison with that of security against its return, which can only be attained by the same general means in either species.

Of the *Second Species*,* it has been remarked, that an irritation in the trachea, naturally brings on an increased secretion of lymph to defend the membrane: but an observing practitioner can be at no loss to distinguish such an effect from the more copious spitting of the First Species, in which also, the habit of expectoration frequently appears between the paroxysms.

The Second Species may be distinguished from the Third, by the capricious manner of the attack; from dyspepsia not having preceded, though it may occasionally attend the paroxysm; and from the fit going off without an apparently critical discharge. The uneasiness at the præcordia, called Anxiety, is in no greater degree than dyspepsia; and wheezing does not occur till the violence of muscular re-action is past. The result of a strict inquiry may also shew, that a

* See Sect. XII.

particular place, or a certain point of the wind, produces a fit in this Species ; when, if a change of residence brings relief, the nature of the disease will be sufficiently manifest.

The Second may be distinguished from the Fourth Species by its first form being preserved ; whereas, the Fourth is rather a sequel, divested, in great measure, of those original signs of material irritation, Spitting, Wheezing, and Dyspepsia.

The *Fourth Species** may be considered as established, when general strength of body is acquired, with improved digestion ; when expectoration is much diminished, and particularly when dyspnœa and wheezing are gone, the disease retaining only its original symptom of convulsive respiration : it generally succeeds the First and Third Species after a diligent employment of the means of cure, but in appearance, it is more allied to the Second than to any other, though attention to the previous state of the patient will point out the distinction between them.

To be more assured of the disease in these circumstances, he may be tried with antispas-

* See Sect. XIV.

modics; and if the paroxysm be suspended by a dose of opium or æther, I confidently believe that he may obtain a cure by continuing steady in his obedience to direction.

ON THE
SUCCESSIVE APPEARANCES OF THE
SYMPTOMS.

OF the symptoms which are said to constitute Spasmodic Asthma, the essential one is the *Difficulty of Breathing*; by which, in definite terms, we are to understand, the convulsive re-action of the respiratory muscles. This belongs to all the Species; and it is more in compliance with established method than the natural fact, that the other symptoms have been considered as diagnostic.

In consequence of this view of the subject, the definition in this Inquiry was framed in terms which may possibly be objected to:* but in confirmation of it, I have observed the symptoms to appear individually in succession, at greater or

* See Sect. I. p. 2.

less intervals; and the violent re-action of the muscles to crown the whole in the following order:—First, the *Wheezing* was perceived: after an interval of many months, *Anxiety* and *Straitness* of the præcordia succeeded: then the short and interrupted *Cough* came by fits in the morning, or after meals. *Dyspnœa* then appeared, and gave, in some cases, a more certain prognostic of Periodic Asthma; but often the *Convulsions* made a sudden attack without this intervening state.

The other symptoms may therefore appear, collectedly or individually, without the convulsive re-action; but unless this be added to them, a paroxysm of Asthma cannot exist. They denote a pre-disposing state of the Thoracic or Abdominal Viscera, which the re-action is intended to remove.

This progress may be seen most distinctly in subjects, who, from being less irritable than others, are not so soon seized with a paroxysm. But there must be better opportunities than are usually allowed to the Physician, who is seldom called for till the attack has taken place. Still, by examining into previous complaints, with some actual observation of the present, he may obtain his object of inquiry.

The following cases exemplify this gradation of symptoms.

CASE.

Mr. T——N is about fifty years of age.—Two years ago, when he was in bed, he first perceived a Wheezing in his respiration, which has returned almost every night since without any difficulty of breathing. It was like blowing through a reed, and gradually became worse. Last winter he had a Cough and Spitting for the first time, and some straitness under his sternum, but no fit of the Asthma. In the day he is free from wheezing, and has no dyspnœa. When I first saw him in the last winter, I found that he was subject to indigestion and head-ache, which generally came after meals. His pulse was regular, but pressure on the pit of the stomach gave him uneasiness. His urine was high-coloured, and his feces were pale. I considered him as pre-disposed to Asthma by a turgid state of the liver, and weakness of the stomach. These organs would press the diaphragm when the patient lay down, and the trachea would be narrowed.

I prescribed mercurial pills and saline diuretics, with absorbents, which took off the uneasiness at the stomach, and lessened the Wheezing,

but did not cure it. He has still symptoms of indigestion ; and I have prescribed tonics which I hope may prevent a paroxysm of Asthma in the ensuing winter. The Wheezing had made him call it an Asthma in the last winter, from his observation of that disease in others ; but if he had been seized with the fit, he would have felt a painful distinction.

CASE.

Mr. HERMAN, of Hamburgh, had been affected with Wheezing for three years, and a straitness at the præcordia, with occasional Coughs for one year, before he was seized with a fit of the Convulsive Asthma. He had general good health till he was upwards of forty years old ; and the wheezing came in consequence of travelling in wet cloaths in Westphalia. It was always confined to the night, and grew worse after some hours of rest. In the winter of 1798, he had a paroxysm for the first time. The astonishment he expressed at the seizure, sufficiently shewed, that he had been previously unacquainted with this violent re-action of the muscles. It occurred after he had long made use of antimonial diaphoretics, and tepid bathing, which were advised by a German Physician, probably, in consideration of the remote cause of his complaint.

In the spring of 1799, when he had had three paroxysms, I was consulted by letter. I recommended iron rust, and bitter infusion, twice every morning: warm cloathing, and the flesh-brush; a continuance of the tepid bath every other day, but with the caution of lowering the temperature gradually, till it was reduced to sixty degrees of Fahrenheit, at which he was to continue its use. He was enjoined to keep his stomach free from indigestion, and to use regular exercise. I have received favourable accounts in several letters since this plan was commenced: he had no paroxysm in the summer-months of 1799, but he had a slight one in November, after exposure to great cold. His complaints were, after that, confined to Wheezing, and occasional Cough. He still pursued his plan; and these remains of disease were entirely overcome in January 1800.

I was assured in a letter, dated the 10th of May, that, he was perfectly free from every symptom, was robust in his body, and capable of any exertion.

The first of these cases only offers negative evidence; but it is so strengthened by the last, that the mind is as well convinced of the tendency

to Asthma in the one, as of the actual existence of the disease in the other.

If it be said then, that the increased exertions of the muscles are *motus medicati* to remove a disease, and not the disease itself, it may be answered, that though nature employs the re-actions for her safety, it does not follow, that the injury previously felt was Asthma; or that the re-actions do not become morbid by excess. The convulsive actions in ileus, may be *motus medicati*; but they counteract their purpose by their violence. The re-actions in Asthma are so far morbid, as to exist by habit, after the cause has been removed, as in the Fourth Species. And they are so essential to the character of Asthma, that if all the other symptoms existed, these would not be acknowledged as Asthma, whilst they were absent.

REMARKS ON THE TREATMENT.

THE confidence which I had placed on tonics in the cure of Asthma is not lessened by the circumstance of having seen their action resisted, in some cases, apparently favourable to their exhibition. In these the patients failed in requisite perseverance, or they counteracted the effect of medicines by irregular modes of living.

How important it is to attend to regimen, appears from dyspepsia making a part of the predisposing state in the First Species, and from its being a proximate cause in the Third, if the habit were not passive under the single irritation of the stomach.

Many cases of the Third Species may be the consequence of excess, and in these indulgence is an enemy always in arms, to which rules can only be opposed at intervals: we are not to wonder then, if medicine, in such instances, be useless, and even the instrument of its own discredit.

The following example shews the difficulty of conquering inveterate habits, and the uncertainty of reckoning on a cure from the steadiness of the patient.

CASE.

A young man had suffered Spasmodic Asthma eight years. He had been a very free liver, and had drunk malt liquor in large quantities. His first complaints were in the stomach, which had been long disordered with wind and uneasiness before he had a fit. He has now almost constantly the heart-burn; and when this has been worse than usual, a fit still follows with great certainty. He is of a strong make: his pulse is regular, and he coughs and spits but little.

June 19, 1799, I prescribed pills of rubigo ferri, rhubarb, and pepper, to be taken night and morning, with elixir vitrioli in a glass of water. I also ordered pulv. test. ostreorum, and magnesia usta, to be taken in peppermint-water at dinner-time. He was restrained from malt liquor, but allowed a small portion of spirit in his water.

After having seen this patient once only, I was ignorant of his state till the month of May,

1800, when Mr. COLEY, of Bridgnorth, in whose judgment, and accurate observation, I have very great confidence, favoured me with the following account: "He is very unwilling to allow
" that he received benefit from the medicines and
" regimen which you prescribed, except that they
" cured him of the Cardialgia; but as this evidently preceded, or accompanied every Asthmatic attack, and as he was actually during the
" three weeks of six, in which he took the medicines *entirely free* from any disease of respiration,
" and continued so with very little occasional disturbance for as much as two months after
" this, I have myself very little doubt, but if he
" had persevered in the *regimen*, and only occasionally had recourse to the medicines, they
" would have effected a radical cure."*

He then adds some particulars, which shew the intemperate conduct of the patient, and its influence, in bringing on the paroxysm. "He has
" now a fit upon him, which has continued with
" very little intermission for three days, and was
" certainly brought on from the over-night's boun-

* This patient came to Birmingham after this report for daily direction. The use of medicine with foda water gave him freedom from disease for a long period, but I do not know what his present state is.

“ tiful ingurgitation ; and, probably, inebriation
“ with spirit and water.”

An inference may be drawn from such practices, that where it has been judged necessary to forbid the use of malt liquor, the latitude which is granted of adding spirit to pure water, is likely soon to be abused, and at last to become as great a bane to the patient as the more glutinous beverage. I know of no secure medium but that of directing the number of ounces of spirit to be mixed with proportions of water in a certain number of hours ; and the quantity should be progressively diminished, till pure water, the best of friends to digestion, when the stomach is in its natural state, be used alone.

The practice recommended by former doctrines, or experience, has very seldom produced an effectual cure of Convulsive Asthma.

Of the Four Species, the Second is the only form that has been overcome, by plan or accident, within my observation. In the instances of this disease having disappeared, the patient's residence was changed from the town to the country ; and the only medicine found to be beneficial, was opium. Cures have been spoken of in the other Species, but it would have been prudent to have

deferred such conclusions till they could have been supported by longer intermissions.

I attribute the general want of success to the almost entire neglect of the intermissions. This may be partly owing to the limited views of the disease hitherto taken by practitioners, and partly to the circumstance of Asthmatics permitting their attendance only in the paroxysm. An Antispasmodic that had been once useful, is considered as the only friend, without reflecting on the improbability of any good resulting from its exhibition, unless the first passages had been previously cleared of acrimony in the Third Species, or the lungs relieved of obstructed lymph in the First. To shew this, we will suppose a patient to be seized with a paroxysm after having eaten roasted goose, pastry, turtle-soup, bacon, or raw vegetables, which I have known to bring it on. I should think that the muscular re-actions were caused by these materials; having seen the fit, in some instances, at its height, before the indigestible matters could have been removed from the stomach; and in many more when they had not passed the bowels. In all cases, great inflation and acidity must add to the irritation. A considerate man would not direct a dose of opium at the first attack before the acrimony had been discharged, though afterwards it may be very useful.

In the First Species the lungs may be gorged with lymph, as frequently happens to Asthmatics who have taken cold. Here the exhibition of opium cannot be reckoned generally safe, till the expectoration is free, when it may abate the reaction, which often continues strong after the bulk of the fluid has been removed.

In the same intention as opium, ardent spirit may be useful. In the Third Species it has been taken during the state of indigestion, and with advantage. It may excite the feeble stomach to contract, and thus remove one obstacle to free respiration, in cases where opium would not answer: but diluting the contents of the stomach with repeated draughts of cold water, has a far better effect, and is a more innocent custom.

When the Third Species has been founded on obstructions in the lower viscera, alcohol, and tonics of a stimulant quality must evidently do injury; these causes, therefore, must be carefully distinguished from simple debility of the first passages, occasioning acid matter to collect and stagnate.

But the practice should not be confined to these limits. If iron and bitters, with the means before recommended, be used in the intermissions, the

paroxysms will not only be more distant, but the stomach and lungs will contain less of the causes of irritation.

After the first delay of the paroxysm, it generally happens, that the next return is more violent; a circumstance that the patient should be prepared for. We may hence infer, that the muscles are strengthened, and capable of more action. The convulsions of an hysterical female are generally vigorous, in proportion as she is athletic: and the force of a paroxysm of Asthma may be estimated by the same rule. There is also a proof that some progress is made in the cure; for, as the intermissions increase in length, we approach nearer to the object in view. Antispasmodics may be then used with greater freedom, and tonics with less. For these reasons, which I think very important, as they regard the practice, I may have insisted more on a material cause, than to others may appear necessary: and I have endeavoured to divest the theory of every invisible movement, not because a spasmodic constriction of the bronchia is impossible, but because it took up so much attention in general practice as to exclude more certain means pointed out by real indications.

CASES AND REMARKS.

I SELECT the following Cases farther to elucidate the above distinctions, and to shew their influence upon the practice. I think they prove, that the outline of our Inquiry is capable of improvement; and that, however imperfect it may be at present, it offers an important object of consideration to the Practitioner.

CASE I.

Mr. M—— had been a free liver, and particularly attached to women. He suffered severely in consequence; and before he was 35 years old, had been much used to bougies. A few years afterwards he had such an irritation in his bladder, as occasioned the suspicion of a stone, but none was found by sounding. Discharges of purulent mucus appeared in his urine, and he was troubled with tenesmus. At 44 years of age, it was determined that the prostate gland was diseased; but it was still uncertain if there was a stone in the bladder. He now began to cough more than usual, and to be affected with

diarrhœa at times. He had no expectoration, and little or no increase of quickness of pulse. This was nearly his general state, when, after much irritation in his bowels with liquid stools, a fit of the Convulsive Asthma seized him, which lasted two or three days, with morning remissions.

In February, 1798, he was well acquainted with these attacks, and assured me, by letter, that they had always been preceded by particular irritation in the lower bowels and bladder. Sometimes blood appeared in the urine, but generally there was purulent matter, mixed with dark-coloured particles, but no concretions of gravel. His urine was of a bad smell.

I saw him in May, 1798, for the first time; and have seen him frequently since. His paroxysms are purely convulsions of the external muscles, unattended by straitness, anxiety, or wheezing; a cough often, but not always occurs; and he spits very little at the termination of the fit. I was so satisfied as to the cause of this disease, that I made no attempt to cure the Asthma but by moderating the irritation in the bladder. I prescribed *uva ursi*, and pills of opium; and starch glysters, with *tinct. opii*. These means have greatly abated the Convulsive Asthma, but not cured it.

CASE II.

Mr. R. is 32 years of age, and has had calculous complaints as long as he can remember. When he was 16 years old, a stone was taken from his bladder. This stone appears to have adhered to a concretion that could not be extracted, and nephritic symptoms have been habitual to him ever since. He was seized with a paroxysm of Convulsive Asthma thirteen years ago, and it has returned very frequently since. He has attended particularly, from my suggestion, to the connection of Asthma with the fit of the stone; and says, he believes the latter, constantly brought on the former, or accompanied it: and this, he thinks, must have long been the case, though the irritation of the stone being more habitual, his observation had formerly been less accurate. He is certain of a particular fact of long standing:—his water was always deep red, or coffee-coloured preceding a paroxysm.

This young man possessed unsubdued vivacity and courage; and great activity in the business of wire-drawing for many years. His diseases are now tending to phthisis. He has had spittings of blood in the last year, and expectorates pus at intervals, which give relief for a time. Digitalis, and opium have been useful. The calculous complaints still keep him in constant torment,

with some abatement from opium and soda. Since the hæmoptoe and hectic began, he has had no distinctly periodic fits of Asthma, but his habit seems generally diseased.

The obstructed state of the urinary passages, and of the vessels connected with them, has probably induced the pulmonary disease; but the muscular re-actions took place long before this complication.*

The two preceding Cases are assigned to the Third Species of Convulsive Asthma; and it appears probable, that the re-action is frequently occasioned by diseases of the kidneys and urinary passages.

I have seen several Asthmatics who were much harassed with nephritic complaints; and stones have been found in the bladder or kidneys of others. These cases seemed only to admit of occasional relief. Mr. R. had used alkaline aerated water for a considerable length of time; and afterwards soda with opium.

The case of Mr. M. is not less hopeless in any intention of cure; but I have seen opiates

* Since the first publication of this case, the patient died.

give him relief; and these are the only means he now applies to.

CASE III.

Mrs. T. aged 49, had been several years subject to Dyspnœa in the winter. Since the menses ceased two years ago, she has been considerably worse. Paroxysms of Convulsive Asthma have been frequent, and violent, preventing her lying down in the night. She wheezes, her bowels are costive, and she has frequently the piles. She expectorates in a morning, but not freely.

March 19, 1799, I directed an expectorant mixture of ammoniac and acetum scillæ, but it seemed to increase the disposition to cough, without promoting spitting.

March 27, I prescribed gentle aperients with asafetida, camphor and opium, but with no success in moderating the paroxysm.

April 5, after having considered her habit, and period of life, I applied to saline medicines, with tinct. opii. and bleeding. These means were most useful, but she still suffers returns of the paroxysm, though more distant, and comparatively mild.

CASE IV.

Mrs. P. aged 52, a delicate woman, but previously strong and muscular, had been affected with an Asthma for some time past. The menses became sparing when she was 45 years old: and after they had ceased for eight months, they returned, and have been profuse about once in three months, for the last two years. In every instance the discharge was preceded by a paroxysm of Asthma. Between the fits she is disposed to hysterical symptoms, and has great pains in the back and loins. Her pulse is full and strong before the paroxysm, which she knows when to expect, as it has lately attacked her every six weeks with considerable regularity.

I advised a quiet life, saline medicines, with tinct. opii. and venesection once in two months. Soon after she stood in the shower bath every other day. The plan was manifestly useful, and in six months the menses ceased to appear, though she had a slight paroxysm in that time; but nine months have elapsed since without one, and she has a shew of menses, at long intervals, without inconvenience.

The cases of these two females appeared to be much influenced by their respective periods of life. The Convulsive Asthma of Mrs. P. seemed

to be entirely caused by the state of the uterus, as a discharge from the uterine vessels terminated every paroxysm; and she had not experienced Asthma till the change of life had commenced. The treatment was agreeable to well-known rules applied to her circumstances, and the Asthma went off as the constitution settled. I am aware, that it may be said, the turgescence was in the lungs, which the uterine discharge relieved; but there were always great pains in the loins and neighbouring parts preceding the paroxysm; and she had no cough, wheezing, or straitness.

If Mrs. T. be cured of Asthma, it must be when her constitution has passed the change, and a better calculation can be made of the probable effect of medicine.

CASE V.

Mrs. D. is about 30 years of age, of a brown complexion, and a thin irritable habit, with a disposition to accumulations of bile, followed by sickness or diarrhœa, or both. She had a Catarrhal Cough in the winter, without a paroxysm. This was nearly gone, when she was seized to her surprize with an acute fit of Asthma, after eating pastry, and other improper things, which from the state of her stomach, had been forbidden. She complained of a pain at the

sternum, and below the ensiform cartilage. Her bowels had been very irregular; her eyes were yellow, and her urine high-coloured; and, at the time of my visit, she had been costive two days.

March 30, she had great dyspnœa in the day. The preceding night she had no sleep, and it was the second paroxysm that she had suffered. I prescribed, with the intention of bringing on nausea, or purging, which had, before her present attack, been natural means of relief.

R Pulv. Scillæ siccatae.—Ipecacohanæ \overline{aa} ʒi

Calomel ppt. gr. v. Saponis albi ʒss. Mucilag. q. s.
ft. Pilulæ 20—capiat duas ter in die.

These Pills provoked a nausea only. I therefore ordered Ol. Ricini, to open the bowels more completely. Believing there was congestion in the liver, I thought it useless to give antispasmodics till it was removed, and the discharges were free. In two days she was greatly relieved of uneasiness at the stomach, having had stools freely.

April 5. I found she had had a most violent and distressing fit the evening before, which had continued all the night, and caused great alarm to herself and friends. I questioned her narrowly, and found that her stools had been clayey the pre-

ceding day, and that she had had great oppression at the stomach after dinner, having imprudently eaten of fat roast beef. I prescribed an emetic, and a saline mixture, with a pill of calomel to be taken when the emetic had operated. The next day she had high-coloured bilious stools, with relief. Her cough, which previous to the Asthma had been so vexing, now gave her little trouble, which evinced that the cause was not in her lungs. She, however, wheezed in the fits; and her pulse became quick every evening. Every day I promoted a discharge from the bowels; and after three days she lost the paroxysm under means which would have prolonged it in the First Species. Opiates did not suit her; and bitter infusions seemed ineffectual, without free discharges. She is now in the habit of taking pills of *Pilul. aloes cum myrrha*, with ammoniac and soap, and remains well.

I do not, however, expect, that she will continue to be free from Convulsive Asthma, because she has been long subject to biliary obstructions, and is of an irritable habit, with causes of continual uneasiness, that disorder her stomach, and the secretions of the liver.*

* This lady has, however, continued free from the disease, by punctual attention to the state of her bowels.

Collections of viscid sordes in the duodenum are probably frequent causes of Convulsive Asthma, in which wheezing and uneasiness at the præcordia and sternum may be symptoms, as the stomach must suffer very much from flatulence and indigestion. In these cases the feces are not regularly mixed with bile; and the bowels, of course, are subject to costiveness.

CASE VI.

Mr. J. aged 40, had suffered this state of the bowels, more or less, for five years; and, unfortunately, as it became more habitual, he more neglected it. At length he had a paroxysm of Convulsive Asthma, accompanied with a bilious countenance, and some tenderness at the pit of the stomach. He had also previously experienced pains shooting from that part to his back. He had had many fits in the preceding eighteen months before he applied to me, in the spring of 1799. Tinct. opii. relieved them, but they did not go off till he had had stools, and they soon returned. I found he had lived luxuriously without sufficient exercise. I recommended him to go to Cheltenham:—he complied, and had relief from the dyspnœa that had affected him in the remissions, almost directly. On his road from Ireland to this town he had a severe paroxysm; but he staid at Cheltenham six weeks drinking the water,

and had none. He had also been free from any return in June 1801, when I was informed he had taken a great deal of exercise, and had vigorous health.

Dyspeptic disorders are much connected with affections of the liver, as may be supposed from the uncertain discharges of bile into the duodenum in these cases.

The properties of the bile are sometimes so offensive, when it has obtained a free passage, as to occasion the re-actions of Asthma.

CASE VII.

A young lady, aged 22, had had a stomach complaint for a considerable time. Suddenly she had a diarrhœa, in which the feces were nearly black. The first impression created a fainting fit; but, after one copious discharge, she was greatly revived. In two hours after she had convulsive respiration, which was relieved by more stools. Two months afterwards she had a true paroxysm of Asthma, which came on after dinner. I saw her in this state, and was then made acquainted with previous circumstances. She had had warning at the same hour in two preceding days, by pains of the stomach, which were disregarded, as her spirits and health were apparently good. Her

bowels were costive; she had not been troubled with cough, or any dyspnœa; and had never wheezed. She had now the external re-actions in a violent manner, but only complained of stricture at the stomach. I directed an enema; after which she had a puke, but she discharged only the dinner she had eaten. I then directed a dose of opium, with æther; but the symptoms continued with violence. The time of the attack, and her previous complaints, then induced me to think that all means would be superfluous before the first passages were emptied. I therefore directed a bolus of calomel and rhubarb; and a camphor mixture with kali tartarizat. and magnesia. The enema was repeated in two hours after the bolus. In three hours she began to have motions, highly fetid, and dark coloured: every motion relieved her breathing, and by night the paroxysm was finished.

My views in this case were assisted by a recollection of Dr. PERCIVAL's remarks on the Atrabilis, in which he introduces some similar instances, with a suggestion, that the bile might be a cause of the Convulsive Asthma, rather than an effect. (See his Essays, Vol. II. p. 112.) There seems to be no reason for dissenting from his opinion, which is sufficiently defended, *a priori*, by the laws of muscular re-action, however little they may have been noticed.

All the preceding cases appeared to depend upon affections of the Abdominal Viscera, many of them not readily to be cured; or, where a cure could be obtained, the affected organ might probably be again diseased, and the re-actions return.

The treatment of Convulsive Asthma, in such instances, cannot be therefore answered by a certain event; but it may be laid down upon principles leading to a cure, and its progress will be attended with relief.

In the following cases, of the First and Third Species, greater advantages were obtained; shewing the effect of medicine in a clear point of view.

CASE VIII.

WILLIAM MILLINGTON, aged 50, March 11, 1799. He had been affected with Convulsive Asthma many years, particularly in the winter. He has been now very bad for six months with constant dyspnœa, accompanied with considerable sickness when he moves. Flatulence and sourness are very distressing. He coughs at uncertain times, and wheezes. At night the fit seizes him in bed, and prevents his lying down; and goes off regularly about five in the morning. He expectorates with difficulty. He is lusty,

and has been used to hard work. His urine is copious and pale; his pulse weak, but regular. He has had no clear intermission for several weeks. I prescribed rubigo ferri, and directed him to take a tea-spoonful three times a-day in any vehicle.

March 15. He has taken nearly two ounces of the rust of iron. His dyspnœa, flatulence, and acidity of the stomach are much less; his appetite is better, and his pulse stronger: he coughs a good deal more, but spits with greater freedom; and his nights are so improved, that he expects to be very soon free from the fit. I ordered two ounces of rubigo ferri, to be repeated.

March 18. His stomach is much better than on the 13th. His cough is not so frequent, but he has a free expectoration. The mucus has a common appearance; but three weeks since it was dark-coloured. He now passes his nights in sleep, and has no difficulty of breathing. His pulse is 65, full and firm. He has no tightness at the præcordia. His belly is regular, and his feces are black. His urine is deeper coloured, and less in quantity. He has always been subject to nervous tremblings, which have increased upon him the two last days, particularly on rising in a morning. This seemed to be his only com-

plaint: I, however, directed him to continue to take the rust of iron twice a-day; and I prescribed some tinct. of opium, with camphor mixture, to be taken at the same time.

April 17. No return of dyspnœa or Asthma. He has taken the powder and the mixture regularly. His tremor is much less, but not gone.

May 15. He has been taking rubigo ferri three times a-day for a month; a tea-spoonful at a dose. He has had no return of Asthma, and his nervous complaint seldom affects him. He is now perfectly well.

CASE IX.

June 26, 1799. Mr. T. aged 36, is an engraver, and has had Convulsive Asthma four or five years. The fits have been most severe in autumn, and in cold damp weather. Sourness, and flatulence of the stomach and bowels had been troublesome for some time: Coughing and Spitting in the night followed these symptoms; and, after a while, a Convulsive paroxysm attacked him in place of his cough. He has now, in the day, a short cough and dyspnœa; and he has had regular fits the fourteen last nights. His

stomach disorder still predominates, and is always worse when the Asthma is worse.

R. Pulv. Cretæ ppt. ʒii.
Vini Ipecachohan. ʒss.
Aquæ Menthæ piperit. ʒvss. m.
Capiat Cochl. largum ter in die.

June 30. Since the first day of his taking the medicine, his stomach has been free from disorder, and his nights have been passed without the fit. According to direction, he has entirely avoided malt liquor, garden-stuff, and tobacco. He had a nausea from the medicine, but did not puke; and the sensation accompanying it seemed to go downwards in his bowels, followed sometimes, but not always, by a stool.

I now prescribed as follows :

R. Rubiginis ferri ʒiii.
Pulv. Rhei ʒss.
Ol. Menth. piperit. gtt. x.
Mucilag. q. s. fiant pilulæ 40.
—Capiat tres mane et vespere. Insuper bibat haustum aquæ puræ cum guttis quindecim sequentis :
R. Elixir Vitriol. Acid. ʒiss.

June 19, 1800. He has only had two mild fits in the winter from taking cold. He has been much better upon the whole, but has not quite

lost his stomach complaint, which attacks him when he eats salt meats or bacon. He has returned to vegetables, and he takes malt liquor in moderation. This patient may perfectly recover, if he will entirely abandon improper diet, and be less sedentary.

CASE X.

Mr. S. 38 years old. This gentleman retired from London three years since, to a residence in Hertfordshire, in consequence of the attacks of Convulsive Asthma, which had affected him several years. He attributes the disease to a cold taken after profuse perspiration in a public place: but he had previously habitual indigestion, and the first paroxysm came after a luxurious dinner, and a great deal of wine. He has regulated himself by advice, and taken the prescriptions of very eminent Physicians, without benefit. He is still attacked with Convulsive Asthma, and says, the country is only to be preferred to the town, as it gives him a better opportunity of being quiet, and free from the temptations of pleasure. On the other hand, he thinks himself too much affected with cold in the country. He has not taken medicine, except in the paroxysms, in which he took æther, opium, and pukes of Ipecacohan. The paroxysm returns every three weeks in the winter: in the summer months he is

more free from it. He spits at the termination, and sometimes has a diarrhœa. He wheezes in the fit; and has frequently, but not always, dyspnœa in the intervals. He has been cautioned to preserve a proper diet, but often breaks his rules. He was very robust a few years since, but he has lost flesh, and weighs about eleven stone. His bowels are lax—his pulse regular. If he eats garden-stuff, or drinks malt liquor, he is certain of a purging, with dyspnœa, and expects the paroxysm.

May 10, 1798. I had the history of his complaints; and found, that in consequence of some imprudence, the first passages were, at this time, particularly weakened and disordered. I earnestly recommended a rigid attention to diet, and exercise on horseback. I prescribed two grains of rhubarb, with chalk and ginger, to be taken twice a-day, with an infusion of quassia wood.

June 20. He had had a paroxysm. His stomach was less disordered, but he had been purged by the medicines, which was an effect I did not wish for. I directed ten grains of rubigo ferri, with three grains of pulv. ipecac. composit. to be taken twice a-day, with infusion of quassia. After a time, he took the rust alone. In Decem-

ber, 1798, he had a moderate fit ; but this is the only attack he has suffered since he took the rust of iron. In May, 1800, he was in good health, and capable of cold bathing.

CASE XI.

Mr. JONES, a young man of thirty, had been for some time affected with Convulsive Asthma. After the paroxysms he expectorated mucus, mixed with blood. As he had no inflammatory disposition in his habit, I judged that the blood escaped from the pulmonary capillaries in consequence of their weakness, rather than from the force of the circulation. He wheezed, and there was dyspnœa in the day.

June 1798, I prescribed pills of rubigo ferri, with extractum cinchonæ ; the vitriolic acid in water and cold bathing. He slept in the country. The event coincided with my views. Having continued the use of these means for many months, he was entirely free from disease : and for the last year has had no symptom of Asthma.

CASE XII.

Mr. PARISH. This patient is forty years of age. In 1792, he found himself weak and low, and was affected with Difficulty of Breathing.

The dyspnœa increased ; and at length he had a paroxysm of Convulsive Asthma that attacked him by night, generally an hour after he had lain down in bed. It was distinguished by a very particular stifling sensation in the throat, occasioned, as he believes, by the wind in his stomach.

His wheezing in the paroxysm might be heard all over the house ; and this symptom troubled him in the day, if he had taken cold, which he became very liable to do. He had coughing fits, which seemed to come on when the flatulence was most distressing. He expectorated in the morning, but not considerably. Though his first complaint seemed to be in the stomach, he had no sickness, but great oppression, with very sour eructations. He had also very often a scorbutic eruption on his skin. He had been attended by an eminent Surgeon, and a Physician of deserved reputation, in Birmingham. The disease was considered by them as an Asthma, and treated without success. At length he went into the country, apparently incurable, since his wife had been assured, that medicine would be of no use : and that, “ if he lived a month, it “ would be the outside.” Soon afterwards I saw him, and had the history of his disorder. He had been ill six or seven years.

August 6, 1798, I prescribed the following :

R. Rubig. Ferri ʒi

Pulv. Zinzib.

—Rhei aa ʒi

Conserv. Cort. Aurant. ʒvi

Syr. q. s. ft. Elect. capiat. q. n. m. bis in die.

Superbibat guttas xv. Elixir. Vitriol. acid. ex aquæ puræ
cyatho.

After he had taken of this electuary with the acid elixir of vitriol for five or six months, he found himself perfectly free from his complaint, and remains so. His recovery was progressive from the first day. He all the while refrained from vegetables, and was sparing in malt liquor. The eruption was cured also.

In several of the above Cases, the state of the stomach was sufficiently morbid to excite Asthma, without additional irritation ; and the re-actions really appeared to be the effect of such state in the XIIth, and to be in part caused by it in the VIIIth, IXth, and Xth ; though these may be more strictly considered Cases of the First Species.

The IXth Case shews, in a striking manner, the advantage which attended the use of the chalk and ipecacohan mixture in the paroxysm.

The patient's numerous engagements in business made him greatly neglect the means of a perfect recovery, which, however, under these obstacles, is far advanced.

MILLINGTON took the rubigo ferri in large doses, and even during the dyspnœa, which was considerable in the remissions. I was not apprehensive of a bad effect from its activity in his habit of body, which was fleshy and pale. The bloody mucus ceased to be expectorated in the case of Mr. JONES, under its constant exhibition.

It would be absurd to detain the Reader with a long list of cases of this description, in all of which the oxyd of iron was eminently serviceable; and in the majority of which it effected cures. It is, in fact, a medicine of such value, that, if it were new, or could be disguised in a new name, it would obtain a general sanction, and the credit of being specific; not for the cure of a paroxysm of Asthma, but of Asthma itself.

I leave the question of the cause of its efficacy to be determined by others: but I have an opinion that oxygen is evolved much to the benefit of the habit; and possibly the evolution is

promoted by giving vitriolic acid at the same time. In No. 96, of the *Annales de Chimie*, oxygen is considered, medicinally, in a disease of the skin. I have often seen the skin greatly improved, and eruptions disappear under a course of oxyd of iron. In the case of Mr. PARISH, this effect appeared.

The oxyd of iron is similar to mercury in exciting the system to new actions. But the febrile state, occasioned by iron, is followed by increased and permanent vigour, whilst opposite effects follow the mercurial fever. It was probably the first action which kept off the paroxysms in a curious instance before me :

A gentleman in the North had been afflicted with Convulsive Asthma a great number of years ; and was advised, at one period, to take an ounce of crude quicksilver every night. He swallowed, upon the whole, four pounds, and had no paroxysm for an unusual length of time. This circumstance being communicated to me, with many others belonging to the case, I thought it prudent to inquire, particularly, if visceral obstructions had attended it ; I was informed, in reply, that no symptoms of obstruction in the Viscera had ever appeared, “ and though the “ quicksilver repelled the attacks, it destroyed his

“ appetite, and he was dissuaded by a Physician
“ from taking any more of it : and, had he con-
“ tinued it, he is persuaded it would have de-
“ stroyed him ere now.”

No such bad consequence is experienced from the use of iron : when it suspends the paroxysm it is operating a cure, and confirming the body against all relapses.

Before the use of this oxyd, it may be prudent to consider the constitution of the patient.

If the body be fleshy, or fat, and the complexion pale, it cannot be injurious ; and in proportion to the degree of dyspepsia, and of mucous expectoration, the Asthmatic of this habit will find advantage in using it. On the contrary, if he be thin and irritable, it may be necessary to combine it with opium, or extractum hyoscyami, which is frequently more effectual than opium in abating the irritation which it sometimes occasions.

By this mode of combination, and in small doses, gradually increased, it may be exhibited in the intermissions of almost every case of the First and Third Species.

Cinchona is less adapted to the weakness which appears in Asthma than any preparation of iron accompanied by bitters, or not; and for this reason I have seldom applied to it.

Respecting vinegar, it may be proper to observe, that, in many cases that have fallen under my care in the last three years, I have not seen such great advantages from its use as I expected from former experience. That vinegar and chalk can be useful in the same disease has caused surprise, but without good reason.

Vinegar conquers the weaker acid of the stomach, and stops the further fermentation of its contents, exciting the vessels in its coats to a better action. Chalk may not do this, but it can neutralize the acidities already generated, and by this chemical alteration make them less acrimonious, or irritating.

When dyspepsia can be considered distinctly as the immediate cause, chalk should be preferred. I should never neglect the additional security of tonics, though sometimes alkalis may so far improve the stomach, as to turn the disease without the necessity of any further means.

Mr. B. P. had been many years affected with Asthma, and had had much advice before he fell under the care of Dr. BACHE, who favoured me with an account of the case.

This gentleman's disease was excited by taking cold after his stomach had been disordered for several years. He appeared to be convinced that the state of his stomach was the cause of his Asthma; and remarked to me in conversation, that he had repeatedly said, "If his Physicians could cure his sour stomach, he should be well." Dr. BACHE removed the disease by alkalies and absorbents, and by promoting insensible perspiration. He observed a predominant acid in the excretions of sweat and urine; but this being a solitary fact in the history of Asthma, cannot be made a foundation for general reasoning or practice. FLOYER tried the urine of Asthmatics, but found no peculiar acid; and his report is confirmed by that of many others.

A sour perspiration has not been noticed by any Asthmatics that I have attended. We cannot suppose that the alkali, circulated through the system, neutralizing the acid fluid; it must have acted beneficially by improving digestion in the first place; and in the second, bodily strength.

The fluids would consequently be better prepared, and the vitious secretions of the stomach, which were both cause and effect of the dyspepsia, being conquered, the re-actions of Asthma would cease, of course.

Dr. WOLCOT has obligingly communicated to me the result of his personal experience, which confirms the fact of the very important influence that conditions of the stomach have upon Asthma. He has found it necessary to take animal food frequently, but sparingly, and he generally quits the table with an appetite. He abstains from vegetables, particularly potatoes and greens, and experiences great distress in respiration, if he fasts many hours, and then eats a hearty meal.

I have nearly the same opinion of Bleeding as I before expressed. I do not affirm that the suffering in the paroxysm may not be lessened by this operation in some cases of the First Species, but the paroxysm will not be suspended by it; and the doubtful benefit will be more than balanced by the intermissions being rendered shorter, and more disturbed with dyspnœa.

The observations of many old Asthmatics confirm me in this opinion. A gentleman who had

had the disease sixteen years, (Mr. D. C. in the north of Scotland), had been used to bleeding in the first three years, when his vigour of body corresponded with his age. He says, "though blood-letting produced a temporary mitigation of the symptoms; yet, upon the whole, his distress was aggravated by a frequent repetition of the operation."

In the old practice, blood-letting was much in use. FLOYER prescribed it, but made no cures in consequence. This discharge and purging were often directed at the same time as tonics, an opposition sufficiently explaining why the last were not successful. When there is no real danger from the paroxysm, I think a temporary relief is not worth purchasing at the expence of delaying a cure.

After very numerous trials, I do not lay claim to the discovery of any *certain* means of suspending and removing the symptoms that constitute a paroxysm. What has been done in this way by others, has not answered in similar cases, under my direction. A new medicine will not uncommonly afford relief, and create in the sufferer the sanguine hope of possessing an instrument always to be depended upon. The advantage has not, however, been yet connected with rules of practice

that may be applied to other instances, and no inference from past success can be extended to the future, unless from the previous treatment and persevering care the disease have arrived at the character of the Fourth Species, in which antispasmodics are so useful.

In many paroxysms of the First Species, I have prescribed a form that is entitled to a preference, as being most likely to produce the desired effect. Many patients, who had taken the most powerful antispasmodics, have assured me that none had been so useful; and two Gentlemen now under my direction, inform me, that it is the only medicine that had ever given them relief in the paroxysm.

R. Tincturæ Scillæ, ℥ss.

Extracti Hyoscyami

Acidi Nitrici añā ʒi.

Aquæ puræ ʒviiss—m.

Capiat Cochl. largum omni hora vel horis secundis in labore paroxysmi.

This medicine should not be used too familiarly, and in slight affections of the breath, as the extract of henbane might lose its force, or debilitate the patient. The nitric acid appears to counteract this tendency, without taking from the power of the sedative. And the tincture of Squills forwards ex-

pectoration when the breast is prepared for this relief.

The Second Species of Asthma has occurred very seldom in my practice. Particular situations in the manufactories of this place have caused paroxysms, which disappeared by the patient's removal.

It has been before remarked, that the First Species not uncommonly takes the character of the second in the progress of recovery; but, this tendency in very irritable and thin habits is not without danger, and therefore calls for particular attention.

A young man, was some years ago affected with a spitting Asthma; but he had afterwards the fit without expectoration; and his emaciated habit, with shooting pains in the chest, indicated a tendency to phthisis. It is obvious, that in such cases, tonics must be carefully abstained from.

By pursuing an antiphlogistic plan, which previously had not been applied, the consumptive symptoms left him, and the Asthma did not return.

I have seen the same change in two other cases, in which the First Species with clear intermissions had predominated for several years. Saline medicines twice a-day, and half a grain of Digitalis, with three grains of Camphor every night, perfectly removed the inflammatory state, and after two years the Asthma has not returned in either. One of the patients is so far altered in this period, as to have acquired considerable increase of bulk, and both have the most healthy appearance.

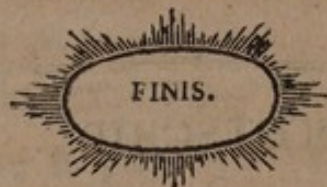
I have not inserted cases of the Fourth Species as the practical difficulty is chiefly attached to the preceding state. Of the last five cases, Anti-spasmodics were only given in Millington's; and then not in the paroxysms, but after the Asthma was overcome.

POSTSCRIPT.

WHEN I began to revise this treatise, for the purpose of publishing a third edition, I intended to add a number of cases. Upon farther consideration, I do not see the advantage of multiplying cases, unless new laws in the animal œconomy made it necessary to elucidate new principles of pathology, naturally resulting from their discovery.

For this reason, it is unnecessary to increase histories of successful practice, though I have a sufficient fund for the purpose.

I shall consider it more honorable to my reputation, and an ample reward for my labour, if Physicians will themselves direct the means of cure, after applying the principles of this INQUIRY, and approving of my intentions in recommending them.



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