sity of various epidemic visitations of the same disease in their power of supporting loss of blood, and the other more important remedies, would thus be brought prominently before the practitioner; and we should hear less of the stupid dogmatisms from time to time put forth by men of limited experience, and still more limited powers of reasoning, as to their own infallible modes of treating febrile diseases now by bleeding, now by purges; and, with more modest theories, and more cautious practice, we doubt not but that the results of treatment at the commencement of an epidemic would be far more satisfactory.

REMARKS

ON

DILATATION OF THE BRONCHI AND AIR-CELLS.

By G. CALVERT HOLLAND, Esq., M.D.,

Physician-Extraordinary to the Sheffield General Infirmary.

A gentleman (J. S. Waterhouse, Esq.), in treating of the pathology of the grinders' disease, in this Journal (No. 155), has endeavoured to expose what he conceives to be the fallacy of our views, in accounting for the dilatation of the bronchi and air-cells. We had remarked* that "the violent and full expirations occasioned by coughing are, of course, immediately followed by inspirations correspondingly ample, by which the air is introduced in large quantities into the lungs. When ten times the amount of air, not only in individual acts, but in a given time, enters the lungs, these organs are expanded in a correspondingly increased proportion; the air-tubes and cells are under the necessity of doing ten times the amount of functional duty; and it is a law in the animal system, that the *development* or *enlargement* of an organic apparatus is according to the exercise of it. We know of no exception, nor can we imagine one." In objection to these views, he observes, "This is certainly a law of universal operation, but it must have a sound and proper application. It is one thing for organic structure to develop from increased action, but an *increment of space* is another thing. This law refers *only* to structure, and, in its operation, only to the development of structure."

We hail with pleasure the exertions of a fellow laborer in this path, and one whose industry and talents give him a just claim on the consideration of the public. In his strictures he has not clearly apprehended our views, and much of what he advances is entirely hypothetical. In reference to this law, we make use of two terms—*development* or *enlargement*—in order to include two organic conditions, which may either exist apart or in combination—the increase of an organ from the activity of nutrition, as the muscles by exercise; the enlarged capacity of an organ, as the stomach, the bladder, an artery, or a vein, without being necessarily accompanied by an obvious thickening or attenuation of parietal structure. An increment of *space* is taken into consideration in our views, and so far from being excluded from the

law, which is stated, it affords a remarkable illustration of its truth. He admits the universality of the law, but says, "It must have a sound and proper application."

We must be allowed to express our astonishment on being told that an *increment* of space cannot be embraced by this law. The opinion is certainly original. We had previously imagined that, when the principal artery of a limb is tied, the subordinate arteries take upon themselves additional action, in consequence of which they acquire a capacity several times greater than what is natural; that a vein, in cases of long-continued congestion of the venous system, has its capacity considerably increased; that the bladder in individuals who, from peculiar circumstances, frequently neglect the first suggestions of nature, has its capacity also permanently enlarged; that the stomach in gross feeders, and in persons whose pursuits, from the position of the body, interrupt or long retard the process of digestion, presents generally the same condition; and, lastly, that the heart, from inordinate action, is, in numerous instances, not only enlarged by the addition of new matter, but its several cavities likewise acquire additional capacity—in other words, exhibit an *increment* of space; indeed, this increment of space is the remarkable condition in passive aneurysm of the heart. He further says that the "law refers *only** to structure, and, in its operation, only to the development of structure." We presume that an *increment* of space must always arise from the modification of structure, and, therefore, he remarks truly that the law "refers to structure." The law was not intended to refer to spirit, but to organised matter in its diversified conditions. One *function* of the bladder is to retain the urine, but if repeatedly necessitated to retain more than what is natural, and for a longer period than is agreeable, the capacity of this organ is greatly increased; is not this *increment* of space evidence of the law which has been laid down—viz., an enlargement of an organ from additional functional duty? An increment of space, so far from *not* being embraced by this law, is generally observed in the structural development of *containing* organs. It is not an invariable result, but it is the rule rather than the exception. Why an increment of space should occasionally take place in the heart, the bladder, or the stomach, without being accompanied by a *corresponding* development of parietal structure, is not easy satisfactorily to explain. We may assign plausible reasons. An increment of space, without this condition, is no evidence, however, that the organ which exhibits it has not been called upon to perform additional functional duty of some kind.

The writer has evidently had his attention concentrated on the development of organs, from an activity of nutrition, as in purely muscular structures; hence the strangeness of the doctrine which he advocates. The law of increase, from undue action, is not to be circumscribed by this condition, and, in imagining such to be the case, he has clearly overlooked the comprehensive character of the law. He is right in saying that this "must have a sound and proper application;" but we have yet to learn that an incre-

* In a paper in the London and Edinburgh Monthly Journal of Medical Science, for June, 1843.

* His own italics.

ment of space, in *containing* organs, is no evidence of previous activity, or indeed, that it is not, as a rule, the consequence of such activity, especially when it occurs in the bronchial tubes and air-cells. If he had had an enlarged and just conception of the universality of the law, and of the numerous modifications which it embraces, illustrating its wide application, a higher spirit of philosophy would have pervaded his strictures.

In the following extract from his article we have some observations not unworthy of comment, and intended to show the fallacy of our views:—

"It is true that the bronchial tube does dilate from increased action, but not from increased action of the tube; indeed, the air-tube becomes more than usually a passive agent. The air-tubes are dilated from the increased quantity of air that is brought into the lungs, also into particular parts of the lungs. But before even this can operate, other conditions are required. There are two classes of tissues—the muscular and non-muscular. It is the inflammation of these that is the *primary* cause of the dilatation. In the case of the non-muscular, from continued irritation, there is a loss of *elasticity*, and the tube is exposed to the distending influence of the air; and in the instance of the muscular, there is a loss of *tonicity* of the part, followed by *innervation* and *paralysis*, similar to that of the intestine in ileus. We can thus account for the difficulty of expectoration, the contractile power being gone, also the dyspnoea—one very important adjunct in expiration being lost."

He remarks that the dilatation of the bronchial tube does not arise from the increased action of it. We agree with him; the supposition is an absurdity. To imagine the tube acting, and independently of all influence exercised by the air inspired or expired, and to acquire an *increment* of space, is an impossibility. Neither the heart nor any part of the arterial system, is dilated by its own activity; the activity is always conjoined with another circumstance—the blood; and when the heart, or any given artery, loses its tone, or when the force exerted on the parietes from *within* is great, the subsequent dilatation is the consequence of this force. So it is precisely with the bronchial tubes, with this difference, that the additional circumstance is air, and not blood. He evidently charges us with a doctrine which cannot belong to this age, and it would be unjust to refer it to the last. We are informed that before dilatation of the bronchial tubes can take place, other conditions are required, such as "inflammation, which is the primary cause of it;" and besides, according to his view, we have, in "the non-muscular tissue," a "loss of *elasticity* from irritation," and in the muscular, a "loss of *tonicity* from *innervation*." These distinctions are pure assumptions on the part of the writer. The muscular tissue does not usually lose its nervous energy from excited action. It generally gains; and when inflammation exists in an organ that is unduly exercised, the nervous energy is always increased. In some of the advanced stages of the grinders' disease, presenting unequivocal symptoms of dilatation of the bronchi and of the vesicular structure of the lungs, the expectoration is often exceedingly copious. We cannot imagine that the morbid condition of the

mucous membrane, which pours out such secretion, or the muscular tissue with which it is in juxtaposition, is in a state of *innervation*. Our doctrine is, that the nervous energy, as well as the blood, flows in the direction of diseased organs, according to the activity or expenditure of their vital powers. The almost constantly distressing cough, the hurried and difficult breathing, the inflammation which frequently exists in different parts of the lungs, and the occasionally copious expectoration, are not conditions which we should expect to be associated with innervation of the organs implicated. We can imagine innervation where the vital action of parts is greatly diminished, but not where an aggravated morbid action is gradually inducing disorganisation of important structures, as in the progress of disease of the lungs. When the writer has established, as he conceives, a loss of elasticity, tonicity, and nervous energy in the air-tubes, brought them, in fact, into a *paralytic* condition, "similar to that of the intestine in ileus," he says they are "then exposed to the distending influence of the air," and an *increment* of space is the result. There is no occasion to make these organs paralytic, in order to cause or explain such effect. The artery, the vein, the stomach, or the bladder, does not become paralytic before it admits of an *increment* of space.

He endeavours to illustrate the condition of the air-tubes in this disease by stating that they are affected with paralysis, "*similar to that of the intestine in ileus*." We are aware that it is usual to attempt to explain what is obscure, or difficult of clear apprehension, by reference to matters which cannot admit of misconception, and in this consists the great value of analogical illustrations. We must confess, however, our inability to perceive the slightest analogy, even on the views of the writer, between the condition of the air-tubes and that of the intestine in ileus. These tubes, even if paralysed, are inevitably modified in form by every act of respiration. In inspiration they are expanded; in expiration they are contracted by the subsidence of the lungs. If the expirations are violent, as in a fit of coughing, the pressure on these tubes, from *without inwards*, is proportionably increased; and in the succeeding inspirations, the pressure from *within outwards* is also proportionably augmented. It is scarcely possible to imagine any change in the structure of these tubes that would prevent them being so influenced by the two acts of respiration. To throw light upon the condition of these tubes, under such circumstances, the writer remarks, that they are paralysed like "the intestine in ileus," which we presume is regarded as in a state of distension. To say that the air-tubes, modified in capacity by every act of respiration, are analogous in their condition to the distended intestine, is to compare things so much unlike, we half suspect that some fine stroke of wit is intended to be conveyed by the comparison, for wit has been defined the discovery of analogies between the qualities of objects which have no obvious similitude, until pointed out by the mind of quick perceptions. We candidly admit that we neither see the force of the illustration, nor do we feel the poignancy of the wit.

He contends that the dilatation of the air-tubes is to be ascribed to inflammation of their muscular and

non-muscular tissues, and that this is an indispensable condition, inducing a loss of *elasticity*, *tonicity*, and *nervous energy*. The dilatation of these tubes, and of the vesicular structure of the lungs, does not require such conditions. In the horse it is frequently produced by hard riding and severe exercise, without having been preceded by any indications of inflammatory action, or the other supposed necessary changes. It is, also, frequently caused, in the same animal, by the vicious habit of crib-biting, which is known to consist in a sucking in of the air, by which the bronchi and the air-cells are permanently dilated, the animal becoming what is commonly called *broken-winded*. As we have already remarked, there is no occasion to imagine the bronchial tubes to be in a paralytic state, to account for the dilatation of them. The vitality with which they are endowed is not unfavorable to the production of an *increment* of space; it is this vitality, indeed, which allows *containing* organs to accommodate themselves, temporarily as well as permanently, to many peculiar circumstances. This increment of space is not, in the bronchial tubes, associated with a proportionate attenuation of their parietal structure; but, on the contrary, this structure is often thickened, especially in the minute subdivisions of these tubes, and such effect demands increased vitality of the parts, and not a paralytic condition of them.

The distressing cough, with which many of the grinders are afflicted, necessarily disturbs the ordinary functions of respiration. A series of violent expirations, by which the air in the chest is diminished to the greatest possible extent, is succeeded by full inspirations, causing deep heavings of the whole thorax; and it can scarcely be a matter of surprise that these irregularities, in the admission and expulsion of air, should at length cause serious structural changes in the bronchial tubes and air-cells. It will not be denied that these tubes and cells undergo some change at every admission and expulsion of air, in the ordinary process of respiration. When this, however, is disturbed, which it is, in the highest possible degree, by the distressing cough of the grinder,—a cough against which the constitution, in numerous cases, struggles for years—the tubes and air-cells will clearly be called upon to perform a greatly increased amount of functional duty, connected with the reception and expulsion of air; and we should expect some structural modifications as the result. How far the result may be produced by the violent efforts which expel the air, as the subsequent efforts of inspiration, which keep up, for a considerable time after every severe fit of coughing, a manifest *distension* of the chest, we do not presume to say. We can imagine the co-operation of both causes in the production of the structural changes.

We regret that the remarks of the writer, in reference to our views, show that he has not given them much attention; and we equally regret the tendency, which he displays, to assume facts, and the dogmatism with which he reasons upon them. Inflammation, elasticity, tonicity, and innervation, are very useful terms, in the explanation of phenomena; but “a sound and proper application” of them demands peculiar qualifications.

CASE
OF
PURPURA HÆMORRHAGICA.
TO THE EDITORS OF THE PROVINCIAL MEDICAL
JOURNAL.

GENTLEMEN,—The following account of a case of purpura may probably be acceptable to some of your readers.

I remain, Gentlemen,
Yours obediently,
T. H. STARR, M.D.

Kettering, Northamptonshire, Sept. 2, 1843.

Henry Corbett, a youth, aged nineteen years, applied to me on the 26th of June last, laboring under the following symptoms:—The gums were turgid and their surface seemed, as it were, lacerated, presenting a spongy appearance, and resembling more than anything else the broken crassamentum of venous blood; a sense of extreme and unremitting nausea, with frequent vomiting of bloody fluid from the stomach; great depression and lassitude of mind and body, with considerable oppression about the epigastrium and both hypochondria; the urine was not sanguineous, but it deposited an abundant pinky sediment. Not having hitherto made use of the alkaliescent saline treatment in cases of this kind, I hesitated in so doing without first of all resorting to the older principles of practice—viz., by means of acids and other astringents, &c., exhibited with a view to curb the hæmorrhagic disposition. I ordered the subsequent mixture:—

Infusion of roses, six ounces;
Alum, one drachm;
Sulphate of magnesia, three drachms;
Dilute sulphuric acid, two drachms;
Compound camphor tincture, one ounce and a half.
A sixth part every four hours.

I advised the medicine to be taken in combination with some *eau sucrée*.

This plan was persisted in for two days, at the close of which I found the gums in the same condition as when I first saw them; indeed, the only sign of improvement consisted in a partial abatement of the distressing nausea. The bowels were now moderately open; the stools still mælenic. In addition to the earlier symptoms I found purple spots of various sizes numerous scattered over the trunk of the body, as well as the extremities; indeed, the disease assumed the complete characteristics of purpura hæmorrhagica. I now resolved to employ alkaliescent salines as the basis of the remedies I was about to adopt, and had recourse to the following formula:—

Sesquicarbonate of soda, half a drachm;
Chlorate of potass, six grains;
Camphor mixture, one ounce;
Spirit of nitrous æther, twenty drops;
Tincture of hops and compound camphor tincture, of each one drachm. To be taken in effervescence, with eighteen grains of citric acid, every four hours.

This altered method of management proved instantly beneficial, and the amendment steadily advanced until in the course of a week every leading symptom had vanished. The gums had recovered their integrity, the nausea had subsided, the dejections had regained