and contains a mixture of granular and ordinary, mucous cells, cylindrical and ciliary epithelium and sometimes pus cells and particles of blood, all united together in dense and elaitic clumps. Leyden, in 1871, discovered in the sputum more or less abundant layers of fine pointed octahedra crystals, the nature of which he was not able to determine, but thought it probable that they were composed of a crystallized substance analogous to mucine. As to the relation of this symptom to asthma, Leyden has advanced the theory that these fine pointed crystals irritate the peripheral terminations of the vagus nerve, and thus through reflex action occasion bronchial spasm. But Leyden's attempts to prove this theory experimentally have not as yet succeeded. As previously stated, the essential condition in asthma is believed to be spastic contraction of the muscles of the smaller bronchial tubes. This proposition is now so generally accepted that it is, perhaps, unnecessary to set about proving it. I will, however, so far trespass upon the time of the reader as to refer to two or three clinical observations in the disease which seem to me quite sufficient to establish the theory beyond all question. First we have dyspnœa of an intense and agonizing character suddenly appearing in a person while in a state of apparently perfect health, and in a short time disappearing equally sudden, without leaving behind any marks of disease. Evidently dyspnœa of this nature points to temporary stricture somewhere in the respiratory organs; and what would more probably explain the nature of this stricture than muscular spasm?

Then, again we have, besides dyspnœa, wellmarked, even shrill sibilant rales, and prolonged expiration, both of which are very prominent symptoms in asthma. Now, we know that when air is forced through hollow tubes of even calibre, no musical sound is produced, but if they are narrowed at certain points, the air in them is thrown into vibration and they become musical Likewise, the musical instruments. sounds observed in the chest in asthma are doubtless the result of narrowing of the bronchial tubes at certain points. And if these sounds appear and disappear with the paroxysm, what would better explain this circumstance than muscular contraction and relaxation of certain portions of these tubes?

Prolonged and forced expiration has been referred to as a prominent symptom in asthma; this symptom also indicates constriction of the medium sized and smaller bronchi. According to Biemer, the inspiratory force acts antagonistically to the constricted bronchial muscles, and forces the air through them in the alveoli; but despite the efforts of all the expiratory forces, the air escapes but slowly and incompletely; hence follows insufficient change of air in the lungs, and distension, which, secondarily,give rise to a sensation of want of air, and to reflex straining of the expiratory forces.

While these and other clinical facts evidently justify the belief that the phenomena of asthma

are dependent upon bronchial spasm, yet the question arises: What is the cause of the bronchial spasm? We may say truly that it is often the result of some stimulus applied to the mucous membrane of the bronchial tubes, or to some remote part operating on the bronchial muscles through the intervention of the excitomotory system, but the same stimulus applied in the same way will not produce asthma were the tendency to the disease does not exist. Agents which act in this way can only be regarded as co-operative factors in the production of the paroxysm; before they can excite asthma there must be present a certain predisposition to the disease, a certain unknown something. We are therefore obliged to confess that the ultimate cause of asthma is as yet unknown. All that we can safely affirm is that the proximate condition is muscular contraction, and that the primary disease consists in some peculiar unknown neuroses. With these remarks we pass to a brief consideration of the second part of our subject.

*Treatment.*—The treatment of asthma, like that of all other paroxysmal diseases, must be divided into the treatment of the paroxysm, and that in the interval. The paroxysm, however, constitutes the principal feature of asthma, and it is for the amelioration of this condition that the treatment is chiefly directed.

The relief afforded to the paroxysm by the use of certain drugs, whose action is well known, furnishes, I think, convincing proof of the correctness of the spasm theory. I refer to that class of drugs known as nauseants or depressants. As soon as their peculiar effect is produced, the spasm relaxes, and the dyspnœa ceases. They act in asthma just as they do in strangulated herina, viz., by causing muscular relaxation. The drugs of this class which have been used are tobacco, tartar emetic, and ipecacuanha. The two first of these are more speedy and positive in their action, but, on account of the extreme collapse which sometimes follows their use they have, 1 think, not met with general favor. Ipecacuanhia, however, is very manageable, and its after-effects are quite innocent. In order to be of most service it should be given in a positive dose-say twenty grains of a powder—at the very approach of the paroxysm. Salter speaks favorably of this drug, and relates a case illustrating its happy action, as follows: A youth, who had asthma from his infancy, was attacked quite regularly, once a week, being awoke with the paroxysm about four or five o'clock in the morning, and it would continue for several hours before he was able to dress himself. About the middle of the forenoon the paroxysm would abate a little, but would deepen in the afternoon, and toward bedtime become so distressing that he was unable to sleep. Twenty grains of ipecacuanha powder was always sure to relieve the paroxysm within half a hour after taking it, and give him perfect freedom from the disease for one week. Salter says "it was clearly