power will be considered preferable to those which former authors have adopted, because it leads to more direct results.

Before quitting the subject it may be right to allude briefly to the applications of which the Hæmodynamometer used in the foregoing experiments is susceptible. It will manifestly be of great use in determining to a nicety the modifications which the respiratory movements produce in the arterial as well as the venous circulation. It will also determine the modifications which the force that moves the blood undergoes from age, from the blood being rendered artificially more watery, from its mass being diminished, from a portion of the arterial system being cut off from the whole by ligatures, from particular substances such as camphor, assafoetida, alcohol, and the like being introduced into the current of the circulation, from the animal being in any way excited by violent emotions, and so forth. I propose in a subsequent memoir to investigate some of these questions, which are of great interest in regard both to medical and surgical pathology.

ART. V.—*A Case of Perforation of the Stomach and Œsophagus, with brief remarks.* By MARSHALL HALL, M. D. F. R. S. E., &c. &c.

THE little girl whose case I am about to describe, had been subject from a very early period after its birth, to attacks of bronchitis.

Early in April it became affected with pertussis. The symptoms of bronchial and pulmonary inflammation called for the abstraction of blood; and three, and then two leeches were applied to the chest on two successive days, with other remedies usual in such cases. This was followed by exhaustion with reaction, the countenance varying, being sometimes pallid and cold, and sometimes flushed, and the pulse frequent and jerking. Soon after the second application of leeches, there were also frequent fits of convulsion, for which a cold lotion was applied to the head; and the warm bath was used frequently. The *hydrargyrum cum creta* was administered, with a mild nutritious diet. There was no sickness, no diarrhoea.

After a variable state of things this little patient sank and expired, having lingered eight days.

Permission could not be obtained to inspect the body until the fifth day after death. The morbid appearances were then carefully noticed by Mr R. Welbank and myself.

The general surface was extremely pallid, but there was little or no emaciation.

The bronchiæ were clogged with mucus, and the lowest lobe of each lung was hepatized.

On looking into the right cavity of the thorax, a small portion of venous blood was observed. The source of this was carefully traced. A small part of the pleura immediately adjacent and above this spot, extending upwards over the convex surface of the vertebræ, was found perfectly removed by erosion; the subjacent veins had been opened by the same process, and their blood had escaped; the nerves were left entire, as it were beautifully dissected. Proceeding with the examination, there was found at a part which corresponded with these appearances, an opening that penetrated into the œsophagus; and through this opening, a portion of the contents of the stomach flowed on raising this organ. At the same moment the rest of the contents of the stomach escaped into the abdomen, through a large orifice at its most dependent part.

On further examination of the state of the œsophagus and stomach, the mucous membrane was found uniformly reduced to a gelatinous mass; the textures constituting the former were pierced by an irregular opening of a size less than that of a pea; the peritonæum covering the latter was destroyed to a considerable extent. But there were no appearances of disease about the edges of either orifice.

The head was not examined. The other viscera presented no unnatural appearances.

The case thus briefly detailed leads to some remarks of great interest.

1. It cannot be doubted that in this case the perforations of the œsophagus and of the stomach resulted from the action of the gastric juices after death. This appears to be proved by the eroded state of the adjacent parts. This fact may therefore be regarded as established by the present and similar cases.

2. It is equally certain that there is one special disease or disorder of infants which leads to similar results, as stated in the interesting and valuable paper of Dr John Gairdner, in the *Transactions of the Edinburgh Medico-Chirurgical Society*, Vol. i. p. 311.

3. It is a point of the utmost importance to state in the account of post mortem appearances, at what precise period after death the examination was made; and it might be useful sometimes to make the examination at two distinct periods, taking care not to disturb the parts at the first.* It is quite plain, that, had the parents of the little girl whose case has been given, earlier consented to an examination of it, some of the ap-

* A pointed experiment such as the author proposes has been already made by Mr Allan Burns.—See this Journal, Vol. vi. 135.—[Ed.]

pearances which have been described would not have been observed.

4. It would be interesting to make a series of observations on rabbits and other animals, with a view of determining the circumstances which favour or oppose the erosion of the stomach by the gastric juice. The observations made by Dr W. Philip, in the third edition of his singularly admirable work on the Vital Functions, pp. 131, 132, appear to be too general on this point.

5. We might possibly employ the gastric juice in the minute dissection of the nerves, since this texture appears to resist the action of this agent, whilst that of the other parts is destroyed by it. The fact itself is mentioned by M. Cruveilhier, in his *Medecine Pratique*, Cahier i. p. 143.

ART. VI.—*Description of Apparatus and Experiments for determining the composition of the Blood in health and disease.* By W. REID CLANNY, M. D. Sunderland.

IN my lecture * upon typhus fever, which was published about sixteen months ago, I necessarily confined myself to the mere outlines, in order that I might not detain the audience more than an hour; and in printing this lecture, I neither added nor subtracted from what was delivered.

I now proceed, for the satisfaction of the profession, to give a brief sketch of the plan which I adopted in these investigations.

I ordered a twenty ounce graduated air-tight flask to be made, to which a stop-cock was screwed, and having attached the flask to the aperture in the plate of the air-pump, by means of a brass tube, I exhausted the atmospheric air from the flask by the air-pump. Having removed the exhausted flask from the air-pump, I attached to it above the stop-cock a tube about the diameter of a swan's quill, bent at a very obtuse angle, and having a ball blown upon the angle.

When the blood flowed from the vein, I held the glass tube as near as I could to the bleeding vein, but not touching it, and kept the flask in a suitable position till the glass bulb was filled. I now opened the stop-cock, and the blood rushed into the empty flask from the glass bulb. In this way I so managed the stop-cock, that, as the blood continued to flow into the glass bulb, it was permitted to rush into the exhausted flask, till I had taken a suitable quantity of blood *in vacuo*.

After some practice, I was enabled to manage the stop-cock,

* For a notice of the contents of Dr Clanny's Lecture, see the Medical Intelligence of this Journal, xxx. 221.