There are only one or two other remarks which I shall offer in regard to the mechanism of the reduction; and first, I would observe that, as the transverse and right oblique diameters are the greatest, the longest diameter of the uterine tumour ought to be made to correspond to one or other of them in performing the operation of reduction. We know how difficult it is to return a retroverted unimpregnated uterus in the direction of the promontory of the sacrum; and how easily it may be accomplished, if there are no adhesions, by tilting the fundus round in the transverse or right oblique diameters, particularly if done with the aid of the uterine sound. The obstruction likely to be caused by the promontory of the sacrum is thereby avoided. Besides, the length of finger required in reducing the uterus in the transverse or right oblique diameters is much less than in that of the conjugate. In fact, in the transverse or right oblique diameters, we have the greatest possible space; we can apply the greatest leverage, with the greatest muscular power; and in these diameters we have the least obstruction to overcome. Finally, by raising the fundus and leaving the cervix to itself, the abdominal wall above the symphysis will yield, or the abdominal cavity itself will afford the cervix more space than could possibly be gained for it within the osseous circle of the true pelvis; more room will be gained thereby, and less obstruction will be offered to the reduction of the fundus, the main object to be attained.

[To be continued.]

Original Communications.

ON CERTAIN CHANGES IN THE FORM OF THE RED CORPUSCLES OF THE BLOOD, PRODUCED BY CERTAIN FLUIDS.

By WILLIAM ADDISON, M.D., F.R.S., Fellow of the Royal College of Physicians, London.

[Continued from p. 798.]

EXPERIMENT III. Take a fluidrachm of sherry wine (or of fresh urine), and render it slightly alkaline with solution of potash; also, take a fluidrachm of the sugar solution, acidulated with hydrochloric acid (*Experiment 2*). Receive a small drop of blood upon a slip of glass, and place near to it on one side the same bulk of the acidulated sugar-fluid, and at the same distance on the other side of the drop of blood place an equal amount of the alkaline vinous or urinous fluid. Let fall a thin piece of glass, so that the one fluid may come into contact with one side of the drop of blood, and the other fluid into contact with the other side of it. Upon examination, the forms of the corpuscles on the alkaline side will be found quite different from those on the acid side. That is to say, the corpuscles which float out into the alkaline fluid have roughened outlines (Forms 2, p. 798); whereas those which float out into the acid fluid have a smooth outline, and a bright matter of sundry forms conspicuous in their interior (Forms 3). Towards the central parts of the drop of blood, where the fluids have scarcely penetrated and where the corpuscles are massed together in rolls, the edges of the rolls will be found to partake of the characters due to each fluid. On the alkaline side, the edges of the corpuscles composing the rolls will have a confused, irregular, jaggy aspect, strongly contrasting with the smooth, neat outlines of those rolls of corpuscles which on the other side have been influenced by the acid fluid. If we follow the corpuscles as they continue to float out in the two fluids, we shall find them experiencing further but different changes of form. In the alkaline fluid, the subjoined phases 2, 4 and 5 of the alkaline series, and in the acid fluid the phases 4, 5, and

Alkaline Series.

6, of the acid series, will be seen. Moreover, if corpuscles, which have been changed to Forms 2 by the alkaline fluid, should float out into the acid fluid, they may be seen to assume, first, their normal form 1 (p. 798), and then a form of the acid series, 3, 4, or 5. Now, it will be seen that Forms 5

are very nearly alike in both series, the only difference being that Forms 5, resulting from contact with the alkaline fluid, are darker or more deeply coloured than Forms 5 the products of the acid reaction. Ultimately, in alkaline fluids, Forms 5 burst

Acid Series.

open and are wholly dissolved; in acid fluids, Forms 5 may burst suddenly, or suddenly enlarge their dimensions, the contents of the corpuscles partially escape, but the enlarged capsules remain (Forms 6). Various contortious movements may occasionally be seen in the corpuscles when they float out from a slightly acidulated part of the fluid into a part where it is strongly alkaline, as when liquor potassæ is added to an edge of the thin covering glass (*Experiment 1*).

I have said, when examining a drop of blood in the usual way, without anything having been added to it, that corpuscles may be observed of the Forms 2; I may now add, that those which, flowing out in streams, become closely encompassed by films of air, often change their form to 2, or 4, or 5, of the alkaline series. A dilute solution of common salt, and fresh urine, notwithstanding its acid reaction, both produce Forms 2, 4, or 5 of the alkaline series. Sherry wine produces a mixture of Forms 2, alkaline series; and Forms 3, acid series. A neutral solution of refined sugar produces forms of the acid series. The forms which the corpuscles of the blood are most prone to assume, then, are those of the alkaline series: they assume these forms when nothing has been added to the blood, and their proneness towards these forms will sometimes counteract a slight acid quality in an added fluid.

OF THE LIQUOR SANGUINIS.

In the last Experiment 3, there is no stirring together of the blood and the extraneous fluids, therefore, there must be various degrees of intermingling between the liquor sanguinis and the added fluids; and it would be rendering an imperfect account of the phenomena were I to omit a special reference to the fluid in which the corpuscles of the blood naturally swim. In the experiments I have related, those corpuscles which come into contact with the added fluid, acid or alkaline, undiluted by admixture with the liquor sanguinis, are destroyed, and the fluid may be rendered turbid or reddened thereby. Where the added fluid and the liquor sanguinis are mingled in about equal proportions, there the Forms 4 and 5 are found. It is only in those places where the action of the added fluid is restrained by a large admixture with the liquor sanguinis, that the characteristic Forms 2 and 3 are to be seen. Now there is a difference, whether we consider the changes in the form of the corpuscles as the result of the application of the extraneous fluid, omitting all consideration of the natural fluid, the liquor sanguinis; or whether we regard the changes as the result of a small change in the quality of the liquor sanguinis wrought by the added liquid. It is more correct, we conceive, to look upon the changes described in the corpuscles of the blood as produced by slight changes in the liquor sanguinis, than to regard them as a result derived from the extraneous fluid, and omit to take into consideration the fluid element of the blood. It is a mixture of the added fluid and the liquor sanguinis which determines the specific changes in the form of the corpuscles. Our conclusion, therefore, is:—That changes in the properties of the liquor sanguinis dispose the corpuscles to change their form; and corpuscles which have changed their form to Forms 2, may be restored to their normal form by the gentle influence of an acid: and it follows, that a disposition in the corpuscles of the blood to change their form as a conse-

quasms of an abnormal state of the liquor sanguinis, may be counteracted by the appropriate remedy.

Finally, none of the liquids mentioned in these experiments produce any troubling or deposit from the liquor sanguinis. A molecular matter, or a red colour appearing, is a proof of the destruction of many corpuscles; and the place where the destruction has occurred may always be found, unless there be streams flowing fast in the liquid. And it is very necessary, in repeating my experiments, to allow for the effect of these streams. In using the high powers of the microscope, rapidity of manipulation is impossible: the addition of the smallest quantity of an extraneous fluid to a drop of blood destroys some corpuscles, and alters the form of others, so that by the time the object can be placed in the focus of the object-glass, streams of fresh corpuscles may be flowing over the place of the destroyed ones; hence, the extremes between destruction and no alteration in the corpuscles may, perchance, be brought together. The observer must follow out the course of the streams, which frequently give important assistance in the observations.

Norfolk Square, Brighton, November 1860.

OBSERVATIONS ON THE MORBID ANATOMY, PATHOLOGY, AND DETERMINING CAUSE OF EMPHYSEMA OF THE LUNGS.

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[Read before the Royal Medical and Chirurgical Society.]

PART I.

Views of Pathologists before the time of Laennec, and of the latter author. Frequency of the Disease. Importance of a knowledge of the Minute Structure of the Lung. Ultimate Pulmonary Tissue; its Arrangement and Structure. The different kinds of Emphysema. Vesicular Emphysema; its various forms. Modes of Preparation of Lung Tissue for examination. Changes which take place in the Air-Sacs in the different Stages of the Disease. Condition of the Blood-Vessels; of the Bronchial Tubes. Is the Disease attended with any Degeneration of Tissue? Interlobular Emphysema.

PREVIOUSLY to the time of Laennec, pulmonary emphysema was considered by pathologists as produced by an infiltration of air into the areolar tissue of the lungs. An imperfect knowledge of the anatomy of these organs, led to the supposition that a rupture of the air-cells would give rise to extravasation of air into the tissue, by which they were connected with each other. An improved anatomical knowledge and further pathological inquiry, have shewn us that the quantity of areolar tissue in the lungs is very small, that extensive rupture of the air-cells may take place without infiltration of that tissue resulting, and that the only parts where such infiltration does occur are those in which the above-named tissue surrounds the various lobules.

Laennec was the first to draw the distinction between the two kinds of pulmonary emphysema; viz., vesicular and interlobular. The former he recognised as consisting in a dilatation or distension of the ultimate portions of the air-tubes. Subsequent researches have tended to prove the correctness of the French physician's observations in this respect, although the theory he advanced of the determining cause of the disease, as I shall have hereafter to show, has given way under an improved knowledge of the physiology of respiration, and more extended pathological inquiry.

Since the time when Laennec wrote, many able observers have directed their attention to this disease; nevertheless, the information we possess with reference to it is insufficient to enable us to generalise with certainty on its essential nature; and there are numerous points in connection with its pathology and determining cause on which investigations are necessary, in consequence of the diversity of opinion which exists thereon.

Of the great frequency of the affection in varying degrees of severity, no one who has been engaged in extensive public or private practice, can entertain any doubt; and, considering the gravity of the symptoms the disease produces in its progress, and the tendency which exists for other organs to become

secondarily involved, we cannot but admit the great importance of an early recognition of its symptoms, and a more accurate knowledge of its essential nature.

In speaking of the disease, Lebert has the following remark in his *Pathological Anatomy*. "Few diseases have given rise in the last twenty years to so many theories, so many explanations, more or less conjectural, and as no one of them appears to us satisfactory in the present state of science, it is the more essential to describe in a rigorously exact manner everything which relates to this affection, in order that for the future these materials may serve to establish doctrines more generally satisfactory on the subject."

Again, writing on the same subject, Rokitansky observes:—"The conditions giving rise to the production of emphysema, and its pathology in general, although much labour has been devoted to the affection, are still far from clear."

To the study of morbid anatomy and pathology, a knowledge of minute structure is essential; hence the rapid strides which these sciences have made since the microscope has revealed to us the intimate arrangement of the various organs of the body; but, important as such knowledge is to the full appreciation of all diseased structure and function, its value becomes doubly manifest with reference to the disease now being considered, for there is probably no affection of the body, the symptoms and physical signs of which are so readily explicable from an acquaintance with the structural changes and modifications from the conditions of health by which it is accompanied, as that of pulmonary emphysema.

Strongly impressed with the force of Lebert's remark, that it is "essential to describe in a rigorously exact manner everything which relates to the affection," and therefore to detail minutely the progressive changes which take place from the earliest periods of the disease to the time of its full development, it becomes necessary for me briefly to describe the intimate structure and arrangement of the ultimate pulmonary tissue, in order that the changes above alluded to, of which it is the seat, may be the more readily understood.

The bronchial-tubes of the lungs, after several divisions and sub-divisions, which for the most part are of a dichotomous nature, terminate in a dilatation, into which open a number of cavities, which constitute the ultimate expressions of the air-tubes. These cavities, to which various names have been given, I have elsewhere called *air-sacs*, as being, in my opinion, more appropriate to their shape and arrangement than any term hitherto used; and the series of air-sacs connected with the extremity of each bronchial twig, with its system of blood-vessels, etc., I have called a *lobulette*.

Every lobule of a lung is composed of a number of lobulettes, and thus the description of a single lobulette will suffice for that of the entire lobule.

Each lobulette consists of a collection of air-sacs, which vary in number from six to twelve. The air-sacs are somewhat elongated cavities, communicating with the dilated extremity

Fig. 1.—Healthy Human Lung. Drawing of a terminal bronchial tube, with a group of air-sacs, or lobulette, connected with it. *a*, the terminal bronchial tube; *b*, the dilated extremity of the terminal bronchial tube; *c c c*, individual air-sacs. At *d*, a bristle is seen passed into an air-sac; one end is seen opening into the common cavity in which the bronchial tube terminates. At *c c c*, are seen the openings of other sacs which lie beneath those which are exposed; six sacs are seen converging to the common centre. The markings in the air-sacs denote the boundaries of the alveoli.

of a bronchial tube by a circular opening, which is usually smaller than the sac itself, and has sometimes the appearance of a circular hole in a diaphragm. When this is the case, the