it must be diminished. This is best effected by Hegar's method; traction is made on the tumour, which is at the same time incised in a spiral manner with scissors. The tumour is thus (as it were) unwound, till finally the pedicle is reached and divided.

"Chloroform is not necessary for the removal of smaller polypi. The section of the pedicle is painless; if pain be present on tightening the *écraseur* round the neck of a polypus, the operator should examine carefully again to make sure that the wire is not constricting the inverted fundus. Where the polypus is large and the operation tedious, it is better to have the patient anæsthetised, as the operator has then more freedom.

The Physiology and Pathology of the Blood. BY RICHARD NORRIS, M.D., F.R.S.E., Professor of Physiology, Queen's College, Birmingham. London: Smith, Elder & Co. 1882.

Note on the Formation of Fibrine, and Dr. Norris's Third Corpuscle of the Blood: A Criticism and Refutation. By MRS. ERNEST HART, reprinted from *Quarterly Journal of Microscopical Science*, July 1882, and *London Medical Record*, 15th October 1882.

THE name of Professor Norris is well known in connection with a number of researches, which bear the marks of originality and ingenuity, and are of much physiological interest. His memoirs on the aggregation of blood corpuscles, the extrusion of blood corpuscles, muscular irritability, and rigor mortis, prepare us to yield careful attention to the present volume. The title scarcely tells the nature of Dr. Norris's book, which is not a handbook setting forth in detail all that is known concerning the blood in health and disease, but an account of curious original researches, which have led the writer to conclusions altogether different from those which are usually held. It is beautifully illustrated, with a large number of microphotographs, and everywhere gives abundant evidence of the author's ingenuity. The only criticisms which we feel inclined to make as to the style in which, as a book, it appears are, that it would have been well if, in every instance, references had been made sufficiently precisely, that is to say, mentioning the name of the work, and the page referred to; and that it would have been convenient if the headings of the pages had given some

information, instead of always repeating the unnecessary legend, "Dr. Norris on Mammalian Blood."

The subject of Dr. Norris's book is, as he tells us, a research based on the discovery of "the existence in mammalian blood of a previously unknown corpuscle, which explains the origin of the red disc, and the formation of fibrine." This corpuscle he calls by the names "invisible" and "fugitive," and describes as a disc similar to the red disc, but uncoloured, and of a refractive index the same as that of the liquor sanguinis, so that in ordinary circumstances it is invisible. He discovered it while engaged in experiments on microphotography. In some of the photographs corpuscles were observed which, although obviously in the same plane with the others, were barely visible, and were not to be seen at all in the original specimens, however carefully looked for. But what was in these cases seen under the microscope was a clear space, round which the other corpuscles were clustered, a space which was of just the size to have contained one corpuscle like themselves. Our author proceeded to seek for some plan by means of which the new structure, which he believed he had thus detected, might be separated from the liquor sanguinis which masked it, and he made the subject of further observation. One plan, which he calls "packing," is to strap a slightly convex cover to a slide, placing the convexity downwards, then, by capillary attraction, introducing the blood at one side, so that the corpuscles are arrested where the glasses are in contact, while the fluid is allowed to flow on to the other side of the convexity. In this way he gets corpuscles closely packed in a single layer, and his photographs show multitudes of clear discs prepared in this way, which come out white and circular, surrounded by red masses, which come out dark, and are compressed at their margins, so as to exhibit angles and concavities where in contact with the uncoloured discs; while another photograph of blood to which salt has been added exhibits mutual compression of dark and light discs. "Ordinarily," Dr. Norris tells us, "these (the unseen circular bodies) are more limpid than the red ones, and are indented by them;" and he appeals to photographs of blood prepared by other methods in favour of this statement, which, however, amounts to an acknowledgment that the "packing method" induces changes in the physical constitution of the corpuscles. We have no doubt that this really is the case, but are still more firmly persuaded that change is likewise induced by the other method which Dr. Norris resorts to, and terms "isolation," and which consists

in making the corpuscles adhere to a glass surface, so that they may be freed from the liquor sanguinis, taking advantage of the observation, that "the adhesiveness of the blood corpuscles to foreign substances, *e.g.*, glass, was inversely as their degree" of colour. In fact, it soon emerges, that it is not simply one new corpuscle which we are asked to take to our bosoms, but a whole blooming family of different ages, the youngest of which are the invisible, while others differ in degree of colour, till at last we arrive at the oldest flushed with the strength of their hæmoglobin.

Let us say at once that we thoroughly agree with Dr. Norris that, keeping the ordinary white corpuscles out of view, the other blood corpuscles are not all alike, and we think that he has done good service in turning attention specially to that matter, and to the probable effect of length of continuance in circulation on the constitution of the corpuscles, and in illustrating the presence in blood, after manipulation, of discs of very different shades of colour and degrees of distinctness. But we are not prepared to admit the pre-existence, in the circulation, of all the invisible discs to which this book introduces us. For a reason which we shall state anon, we hesitate to deny their existence altogether; but that the shoals of them which we see photographed were in their natural condition when their portraits were taken we cannot admit. When we think how often, in preparing blood for class demonstrations, we have had occasion to watch with interest, not untinged with melancholy, the changes which, whether pure and simply imprisoned or mixed with various solutions, it has undergone at daily or hourly intervals, we do take some shame to ourselves that we have trifled over them instead of noting them down, and, like Dr. Norris, making them the subject of a more determined effort of thought. Still, we are convinced that the experience of others will bear us out in what is distinctly impressed on our own recollection, that it often occurs that a specimen of blood, consisting of a single layer of red corpuscles, all of the same tint, will after a time show much more than half of these same corpuscles grown faint in appearance, even to the extent of being only rendered just visible by the most careful adjustments of light, while it may happen that a few stand out redder than ever, but smaller and apparently spherical. This diminution of size and change of form has been attributed by Max Schultze and others to contractility, and it may be due to that cause, though the evidence seems imperfect; but what we have to do with at present is that red corpuscles, in circumstances which do

not produce protrusion or crenation of their margins, behave differently one from another as regards fixation or diffusion of the coloured part of their contents; and this is distinctly favourable to Dr. Norris's view, that there are differences of constitution among the corpuscles, which may reasonably be supposed to depend upon their age, that is to say, the length of time that they have been circulating. Considering, also, the known adhesiveness of white corpuscles to solid surfaces, it is quite reasonable to suppose with Dr. Norris that of the other corpuscles the younger are the more adhesive. But this circumstance, together with the knowledge that red corpuscles will become in many instances almost invisible on standing for some time, goes quite against the idea that the generality of the so-called invisible discs have never had red contents. For in the face of the impossibility of getting blood to circulate through clean glass tubes not previously moistened with alkaline solution, how can it be expected that changes will not take place immediately in a thin layer introduced between two plates lying one against the other? And most of all, how can we be asked to believe that no change takes place in the very corpuscles which at the same time are alleged to take an active part in coagulation, when we know that momentary contact with a foreign body causes coagulation to set in?

According to Dr. Norris, his "invisible discs" are derived from the lymphatic and other blood glands; and few, we presume, have much doubt that the red corpuscles of the blood are derived from these sources. But there is much in the methods of derivation put before us which is open to remark. We are told that the function of blood glands is to produce colourless discs of two kinds, the cellular and the nuclear, and it is elaborately sought to prove that "the primary lymph corpuscle is a cell containing a nucleus, and the advanced lymph corpuscle is this nucleus set free at a certain stage of its development." It is further stated distinctly that this primary lymph corpuscle has a cell wall. The whole story seems to run thus:—That the majority of what the author calls primary lymph corpuscles set free their nuclei to become in succession advanced or nuclear lymph corpuscles, and invisible, pale, and red blood corpuscles; while the remainder enlarge and have their nuclei multiplied within them, thus giving rise to the white blood corpuscles which are alleged, by what he calls the "minor mode" of development of red corpuscles, to be set free as invisible corpuscles within the blood circulation.

For our own part, we are free to confess that, with certain

safeguards, we maintain what Dr. Norris stigmatises as a stereotyped statement, at once incorrect and confusing, namely, that "the products of the blood-glands are identical with the white corpuscles of the blood." Identical they are (those of them which pass into circulatory channels), in the sense in which Britons of all ages and differences of appearance are of identical race; and we do not think that more is meant to be maintained by any one. They are, to our thinking, all to be described as amœboid corpuscles, with one or more nuclei, and differing in size. To speak of them as having a cell wall can no longer be defended when their amœboid properties are taken into account, and we own that we cannot see that they are a different race from the amœboid corpuscles found in the connective tissues, seeing that they originate in a stroma of connective tissue before passing into the vessels, and that they are capable of passing through capillary walls into connective tissue.

Most certainly we cannot admit that the coloured corpuscles are nuclei liberated from such cells. The nucleus of a frog's coloured corpuscle is a true nucleus, and the substance around it laden with hæmoglobin is similar to the substance of the mammalian coloured corpuscle; and it is difficult to understand how at the present day the theory that red corpuscles are free nuclei, promulgated by the late Professor Bennett in days when the notions of the nature of nucleated so called cells were very imperfect, can be maintained.

Dr. Bennett is also quoted to the effect that "in chyle taken from the thoracic duct there are also biconcave flattened discs, exactly resembling the coloured blood corpuscles in size and form, but destitute of colour." These are the structures which Dr. Norris calls advanced lymph corpuscles, and we do not doubt Dr. Bennett's observation, but only would have liked a more explicit statement of Dr. Norris's verification of it, and the circumstances under which the verification was made; whether in fluid taken from a thoracic duct after exposure to the air, or taken from a living animal, and in what circumstances of digestion, or of motion or rest of the limbs. It is because we believe the observation of Dr. Bennett that we are not disposed to deny that some colourless clear discs really occur in the blood circulation, though we are sure that multitudes of them, found after the blood is drawn for some time, are the result of alterations in the ordinary red corpuscles.

Dr. Norris believes that in the course of his microscopic researches he has "accumulated a considerable amount of evidence which goes to show that *the fugitive discs of the blood*

produce by their degenerations and transformations the delicate networks, films, and masses, which constitute the fibrinous deposits of the blood ;” and he gives photographs to illustrate that “the *colourless discs* fuse together and form pools of clear transparent *liquid*, which is immiscible in the liquor sanguinis,” and also that there is “direct conversion of colourless discs into delicate fibres by the combined action of annulation and extension by currents.”

In her “Note on the Formation of Fibrine,” Dr. Norris’s persistent critic, Mrs. Ernest Hart, speaking of the “colourless Norris corpuscle,” says:—“If the glass surfaces be allowed to remain in contact for a moment, the colourless corpuscles are found to have lost their globular form and to have become pyriform and elongated.” Also, “On leaving the glass surfaces still longer in contact, these pale corpuscles are observed to undergo a remarkable change. They send out long processes or tails, which bifurcate and divaricate in every direction ;” and “on allowing a still longer interval to elapse, so that it is more than probable that coagulation would occur in a film of blood lying between two glass surfaces, and on separating those surfaces, perfect specimens of fibrine may be obtained after staining.” Mrs. Hart’s drawings in illustration of these statements are very pretty, and we have no doubt that if we had the honour to examine the preparations, we should concur with the “many critical histologists and physiologists who have expressed favourable opinions of the interest of the results” on inspecting the preparations during the last two years. On the whole, there does not seem to be any radical difference between Dr. Norris’s and Mrs. Hart’s view of the formation of fibrine, though undoubtedly we think Mrs. Hart’s account of what she has seen, and her illustrations of this particular point, much the more satisfactory.

We demur, however, to the theory of both writers, as we understand it, that the substance or enclosed material of those pale corpuscles constitutes the fibrine of the blood. We accept it as proved that the main bulk of the coagulated fibrine is derived from the liquor sanguinis, and that only a substance of small amount, which excites the other to coagulation, flows out from the corpuscles. Not only the researches of Schmidt, but those of Lister, and the old observation of Buchanan, sufficiently show this to be the case. How else could the addition of a few corpuscles coagulate a considerable mass of fluid? The threads which Mrs. Hart depicts are probably streams of substance emerging from the corpuscles, and solidified by the reagents used.

However, considering that Mrs. Hart's views are on this matter so similar to Dr. Norris's, we venture to think she might have adopted a more friendly tone towards that gentleman. While we agree that, for the most part, the "third colourless corpuscle is," as Mrs. Hart alleges, "artificially produced," without committing ourselves by any means to the cogency of all her arguments, undoubtedly Mrs. Hart has derived from Dr. Norris an appreciation of great differences existing among the coloured corpuscles, as well as the ground work of her views, however erroneous, as to the formation of fibrin, and we are sure that her studies would lose none of their scientific importance if their results were put before the world in a form perfectly free from all acridity.

With regard to the substances thrown out by the blood discs, we take this opportunity of drawing attention to a set of researches to which, we venture to think, far too little attention has been paid, namely, those of Beale, Max Schultze, and Arndt, of which an account will be found in the memoir by Arndt in *Virchow's Archiv*, vol. 78. In these memoirs there is a full account of the remarkable power which the red corpuscles have of throwing out threads of their substance. They are excited to this by rise of temperature, and the threads separate and show vibrionic movement, and a higher temperature induces division of the corpuscles into smaller discs. Both the giving off of threads and the division of the discs we have ourselves verified, and we count these phenomena of the utmost pathological importance in connection with the evil effects of increased temperature in disease, and possibly also in connection with appearances seen within the vessels too liable to be hastily assumed to be foreign organisms.

REPORTS OF HOSPITAL AND PRIVATE PRACTICE.

WESTERN INFIRMARY.

REPORTS UNDER THE SUPERVISION OF J. LINDSAY STEVEN, M.B.

FROM PROFESSOR MACLEOD'S WARD'S.

SIX CASES OF PARTIAL EXCISION OF THE TONGUE—[Reported by Alexander Jarvie Hood, M.B., House Surgeon.] ✓

I.—John Scott, æt. 44, clerk, admitted on 11th August, 1882. Patient was a healthy, well nourished man apparently,