when the fistula is moderately small, endeavour if possible to place the wires on each side, and not through or over the opening. When the aperture is large, this, of course, will be impracticable. In such a case, a plate with a number of holes, according to the size of the fistula, may be used; and in the event of non-union or partial union, the operation might be repeated as often as necessary, the plate and sutures being diminished according to the amount of contraction that may have taken place from the previous attempts at closure. I would be strongly disposed, however, from the history and progress of the case just detailed, rather to recommend that the treatment should be commenced with the actual cautery, and that, after cicatrization and contraction had advanced to a certain extent—say to the diameter of a quill—recourse should be had, without any further delay, to the plan now brought under review. With such means in his reach, I am convinced that the surgeon will now be able to bring to a successful termination, and without much difficulty, many cases which he has hitherto been led to look upon as incurable.

VI. *On the Escharotic Action of the Sulphate of Zinc.* By EBEN. WATSON, M.D., Surgeon to the Royal Infirmary, Glasgow.

THE cases of ulcer of the leg, admitted into the chronic wards of the Glasgow Royal Infirmary, are very numerous and of all different kinds. In some of these cases the simplest local and constitutional treatment suffice for a cure, rest and cleanliness being, in fact, the chief agents in the process of restoration; in other cases, however, more active measures are required. In many, the inflammation from which the ulcer has already resulted is still going on around the sore; and in these cases local, or even general antiphlogistic measures may be necessary. Another numerous class of ulcers consists of those in which the combination of syphilis, with the abuse of mercury, lies at the origin of the local malady; and in them the iodide of potass is markedly beneficial. But by far the largest class of cases is composed of old and callous ulcers, with elevated margins and pale unhealthy granulations covering the excavation in the centre.

In this last class of cases I have tried many plans, and have had considerable success with several of them, for the very good reason that the same ends were accomplished by all, though in somewhat different ways. I have treated very many callous ulcers in Mr. Syme's method, viz., by the application of a blister over the sore and neighbouring parts. I have found that this is not such a painful treatment as one would at first suppose,

and under it the elevated margins are often speedily discussed, and the granulations entirely altered in their character, no longer running into unhealthy pus, but rising up in the ulcer, and becoming organized there into healthy fibro-cellular tissue; a little pressure with straps and a bandage greatly hasten, after a time, the skinning of such a mass of granulations.

I have also tried several stimulant applications, such as the solid nitrate of silver, and the dilute nitric acid, both of which I have found act well in certain cases, where the granulations were unhealthy, but the neighbouring parts not much altered; in strumous ulcers, and in some secondary syphilitic sores, I have found them of especial advantage. I have chosen several cases of very callous ulcers, for a trial of the sulphate of zinc as an escharotic, and shall now state the results of this trial.

Case I.—The first case in which it was tried was that of a man who had five callous ulcers on the left leg, apparently of syphilitic origin.

On the 20th January, an ointment, consisting of anhydrous sulphate of zinc, mixed with glycerine, was spread upon bits of lint the size of the ulcers, on which they were then laid; they were retained in apposition with the sores for eleven hours, during which the man suffered very acute pain, and when the dressings were removed the parts beneath were found corroded. A poultice was applied and opiates freely administered, but the pain continued very severe for several days and nights; by the fifth day the sloughs had all separated, they were peculiarly tough and leathery in their consistence, and about $\frac{1}{8}$ th of an inch thick; the surfaces thus exposed were healthy and granulating, they speedily rose to a level with the neighbouring parts, and became skinned over so as to diminish the size of the ulcers fully one-half; but owing to some cause which I cannot satisfactorily explain, and which was probably of a constitutional nature, the healing process was then arrested, and on the 3d March most of the ulcers remained still uncovered, but filled up with indolent granulations, while in one case these had been partially destroyed by secondary inflammation.

Case II.—In this case the ulcers were larger; they were situated on both legs, of fully a year's duration, and also of apparently syphilitic origin.

January 21st, ointment of sulphate of zinc, the same as in former case, was applied on lint over the ulcers; the pain occasioned was so great that the dressings were removed in an hour and a half after their application; the ulcers were, however, already corroded; poultices were applied and opiates administered. Two days afterwards the sloughs began to separate, and the sores were then dressed with camphorated oil, over which poultices were applied. By the 25th all the sloughs had separated; they were thinner, but of the same character as those in the other case; the

surfaces exposed were healthy and granular, and by February 3d they are reported to be "nearly closed." In a few days afterwards the patient was dismissed cured.

Case III.—The powder of the anhydrous sulphate of zinc was sprinkled over an old and callous ulcer of leg; it caused immediate and very acute pain for five hours, when a draught of morphia put patient asleep; he awoke free from pain; the ulcers were corroded and rendered brown on the surface; beneath this crust they rapidly healed without the separation of more than a very small slough, which left a healthy granulating surface. In this state the man was dismissed at his own request.

My friend, Dr. M'Ghie, had the sulphate of zinc fused and run into moulds, and in this form it was applied to several ulcers, acting as a good but very painful escharotic. On the suggestion of the same gentleman, I gave a trial to the bisulphate of potash as an escharotic. I employed it in the form of powder, and also in that of an ointment with glycerine, but its action was found to be very feeble; it gave little pain indeed, but the sloughs were very slight and long of separating. I then used a mixture of the sulphate of zinc and bisulphate of potash; this mixture acted more powerfully than the bisulphate alone, but its action was probably due to the presence of the sulphate of zinc, the other ingredient only acting as a diluent. In one case I had the powder of sulphate of zinc mixed with gypsum, in the manner in which Dr. Ure long ago applied the chloride of zinc, and I believe this to be a useful mode of applying it; the action of the escharotic is thus rendered more gradual, and perhaps less severe than when applied in any other form.

In two cases I procured the removal of syphilitic warts, one in the neighbourhood of the anus and the other on the prepuce, both covered with skin, by the action of the sulphate of zinc; thus showing that that escharotic will destroy the skin if kept in contact with it for a sufficient length of time.

The idea of attempting to destroy by escharotics certain tumours, and even cancerous ones, of greater size than those just referred to, is by no means a new one, and the practice has been defended on various principles. Thus Dr. Ure thought that the substance of cancer consisted chiefly of albumen, and that, as the chloride of zinc had a strong affinity for that proximate principle, it was fitted to search it out among the tissues of the affected part, in a way that no surgeon could do with his knife. But, unfortunately, other and more recent analyses of cancerous matter do not bear out the opinion of Dr. Ure; and, on the other hand, the substance of most of the tissues and organs with which cancer is usually mixed, consist normally, in great measure, of albumen; besides, we have it abundantly in the blood, circulating in the vessels of the part. On Dr. Ure's supposition, therefore, of chemical affinity, no selection could be

made by the chloride of zinc between healthy and unhealthy parts. This is equally true of the sulphate as of the chloride of zinc. In whatever way it destroys the life of tissues, there is no selection made between the normal and the abnormal. There is no sparing of this part or that; but all are involved in the same destruction, until the destroying agent loses its power, or is removed.

It may be asked if, after all, the sulphate of zinc is capable of removing such a tumour, for instance, as a cancerous mamma; and my answer would be, that it is capable of such an action if the applications are very frequently repeated in immediate succession, so as to maintain the destructive action for a sufficient length of time. But the pain endured by the patient during this tedious process must be far greater than that of excision of the affected organ. In the latter case, chloroform may be used to free the patient entirely from the pain of the operation; and afterwards, in the great majority of cases, the pain of the wound and of its dressing is very little complained of; while, on the other hand, the pain of the escharotic is prolonged over far too long a time to admit of the employment of chloroform for its relief. Indeed, from what I have seen of the action of the sulphate of zinc, I am tempted to think that it is both too painful and too slow an agent to be used for the purpose above referred to, and that the chloride is more likely than the sulphate of zinc to be the chief ingredient in the empirical applications so much vaunted of late. It must be admitted, however, that the process of so-called cancer-curing, is now well known to be both slow and excruciatingly painful—a fact which rather tends against the opinion just expressed, as to the nature of the escharotic agent in the mystical paste. That opinion was founded on the comparative suitableness of the two substances named; but perhaps such an argument has not much weight in reference to an empirical nostrum invented and applied by ignorant persons.

With regard to the question of the superiority of escharotic applications over the knife of the surgeon, there is no doubt in my mind, and I believe there will ere long be no doubt in the minds even of those who are at present forsaking the consulting rooms of scientific surgeons for the abodes of charlatans and cancer-curers. No escharotic can extirpate the disease more surely than the knife, in any case suitable for interference by the surgeon at all. While the disease is local, while the system is little or not at all affected by the cancerous poison, surely removal of the whole organ affected, when performed by a person capable of judging of the soundness of the parts in which he cuts, gives a more rational prospect of cure than leaving the extirpation to the blind operation of a tedious and indiscriminate chemical agent of destruction. Yet I do not mean to say that there are no cases of cancer in which I should use escharotics; but I would

restrict their employment to cases in which no thorough extirpation of the growth was to be attempted, and in which the healing, or, at all events, the modification of some cancerous ulceration was the sole object in view. For this purpose I believe the sulphate is perhaps as suitable as the chloride of zinc; but I cannot say that I think it at all superior.

VI. *On the Phenomena and Mechanism of the Focal Adjustment of the Eye to Distinct Vision at Different Distances.* By Professor ALLEN THOMSON, M.D., F.R.SS. L. & E.

THE explanation of the mechanism by which the eye may undergo a change of its focal adjustment, or be accommodated to the distinct vision of objects at different distances, has occasioned much difficulty and discussion among optical physiologists. Recent researches appear to have thrown considerable light upon this subject; and as I have been led to repeat and extend some of the experiments which bear upon it, I venture to lay before the reader some account of the present state of this interesting question.

It appears strange that some should have doubted the existence of any power of focal adjustment in the eye, and should have denied the necessity of the occurrence of such a change. The error of this opinion, and the fact that an internal change in the refracting media is required in order to render distinct the vision of objects situated at different distances from the eye, may be satisfactorily proved by several very simple experiments.

1. If, for example, closing one eye, we fix the other alternately on a near and a distant object placed in the same line of vision, it will be found that, when the distant object is viewed, the image of the near one is confused, and when, by an effort, we bring the eye to see the near one distinctly, we have no distinct perception, but only a general vision of the more distant object.

2. If, as in Scheiner's experiment (*Oculus sive fundamentum Opticum*, &c., 1619), we view with one eye the head of a pin, or some small distinct body, through two minute holes in a card, placed at a less distance from each other than the width of the pupil, we shall find that there is a certain distance—which is that to which the eye is most easily adjusted—at which the pin head appears single, while within and without that place it appears more and more evidently double. Now, the place at which the image appears single is not altogether fixed; but varies within a certain range, according to the adjusting power of the eye. The reason of this is obvious from a consideration of the nature of the experiment. The two small holes admit to the eye two separate pencils of light at a certain amount of divergence, and at a certain distance these may be brought to fall on the same part of the retina, so as to form