the author duly acknowledges the work of others in the same field with a thoroughness which is by no means invariably a noticeable feature in scientific papers.

Manganese has its applications in other branches of metallurgy, and its compounds have been applied

industrially down the centuries, but enough has been written concerning its value to the key iron and steel industries to emphasise the importance of ensuring that, whether we be at peace with the world or not, our supplies must not be interrupted. W. H. H.

Lister's Methods in Surgery.¹

By Sir W. WATSON CHEYNE, Bart., K.C.M.G., C.B., F.R.S.

IT is curious how events and discoveries fit into their proper place in the history of the world, and how one discovery may often dovetail into another and increase the usefulness of both. I have in my mind the discovery of anæsthesia and asepsis.

Anæsthesia alone was naturally a very great gain to mankind both in saving pain and in reducing shock, but in some respects it was a disadvantage. Before its introduction, the hall-marks of a good surgeon were rapidity in operating and thorough anatomical knowledge. The range of operative work, however, was not very great. But the fact that pain could be abolished and shock considerably reduced by anæsthetics had the effect of encouraging surgeons to perform more prolonged and intricate operations. The consequence was that, as sepsis was as frequent and as dangerous as before, this meant an increase in the number of cases of sepsis and in the mortality in the surgical wards; and surgeons became more doubtful than ever of the advisability of extending the area of surgery.

As soon, however, as Lister had firmly established his aseptic methods, this difficulty passed away; rapid and enormous extensions of the limits of surgery were introduced by him and his followers, and anæsthesia took a permanent and most important place in forwarding this.

The times were indeed ripe for the revolution made by Lister in the treatment of wounds. For ages, those who practised surgery were constantly confronted by the various septic diseases following wounds, whether made accidentally or by the surgeon. Occasionally, some one had a glimpse of the truth, but the wound treatment, whatever its nature was, had as its object the application of dressings and medicaments in order to *make the flesh heal*, as opposed to Lister's principle of *leaving the wound itself alone while striving to remove all agencies which might hinder the wound from healing*.

The cause of the septic troubles was for long looked on as connected with the admission of air to the wounds, and when oxygen was discovered, that gas was generally blamed for setting up changes in the blood and tissues. But towards the end of the eighteenth century, John Hunter pointed out that it could not be the gases in the air which caused harm, for in cases of emphysema and pneumothorax due to fracture of a rib and puncture of the lung, the tissues and the pleural cavity became distended with air; but neither sepsis nor suppuration supervened. Therefore Hunter was in favour

of abolishing the masses of dressings which were most in vogue in those days, and contented himself with applying a piece of dry lint over the line of incision and encouraging drying of the lymph and blood—that is to say, healing by scabbing. His example was followed by others, who tried to aid scabbing still further by blowing warm air over the wound at frequent intervals, or by the use of powders, dusting the line of incision with them.

About the same time Abernethy advocated with considerable success the use of valvular incisions in removing loose bodies from joints and in opening psoas abscesses.

At the beginning of last century, subcutaneous surgery was introduced and Delpach elaborated it. Although its range of action was comparatively small, it still remains one of the important surgical methods of the day.

During last century a number of methods of treating wounds were introduced with a certain amount of improvement in results. Such methods were: open treatment, water dressing, immersion, water bath, irrigation, occlusion, etc. Just before Lister began his work, various substances, chiefly in solution, which belong to the class of antiseptics, e.g. coal tar, carbolic acid, iodine, hypochlorites, perchloride of iron, etc., were being tried, especially in France. Of these, carbolic acid was lauded by Lemaire, but these antiseptics were only used in septic wounds; and Lemaire and others missed Lister's great generalisations which were the basis of his work.

I may mention here Lister's 'slogans.'

1. Destroy the bacteria before they enter and establish themselves in the tissues.

2. Antiseptics are not used as applications to the tissues of the body laid open by the surgeon, but to the bacteria which are present everywhere, in the air and on the objects around.

3. Let as little as possible of the antiseptic enter the wound, but do not be unnecessarily afraid of it because, so long as the bacteria are kept out, any superficial damage done by the antiseptic will be rapidly repaired without any acute inflammation or suppuration.

4. The failure of the previous attempts with antiseptics was due to the fact that they were applied to wounds in which bacteria had already gained a footing and, as there is very little chance of eradicating the bacteria at that stage, irritating antiseptics like carbolic acid only make matters worse.

One would have thought that these principles

¹ From an address delivered at the Lister Centenary Celebrations at Edinburgh on July 20.

were clear and, when taken along with the published results, would have been very convincing. It always was a great puzzle to Lister's staff that surgeons did not rush to Lister's clinic to see his results and to learn his technique. True, there were always some foreigners, chiefly Germans and others of the Scandinavian races present in Edinburgh, but the number of British surgeons was very small indeed. Thus, when Lister migrated to London in 1877 (eleven years after his first publication), the number of London surgeons who were using his methods or were impressed by his teaching was extremely small and could probably be counted on the fingers of the hands.

It is not easy to account for this state of matters. Among other things it was very difficult to convince surgeons that tiny pieces of protoplasm about $\frac{1}{20,000}$ inch in diameter could be the cause of the septic diseases; the surgeons of that day were interested in keeping up their anatomy and in acquiring great rapidity in operating, and minute germs and processes of fermentation seemed very far removed from practical work; before Lister's time, carbolic acid and other chemicals had been applied to wounds without any benefit.

Lister's statement as to what he had achieved was so contrary to the experience of other surgeons that they felt that there must be a fallacy somewhere, and they were quite sure that the fault did not lie with them. They noted that Lister was constantly changing his technique and dressings, and came to the conclusion that this was because his results were not good. They apparently did not listen to his statements, that he did so with the object of reducing or removing the irritation of the antiseptic and at the same time simplifying his technique. They also pointed out that primary union of wounds was not a very uncommon occurrence before Lister's time, but they ignored his statement that it was the rule in his wards; they further pointed out the disagreeable effects of carbolic acid on the hands of the surgeon and its occasional poisonous effects.

In spite, however, of these and other objections which need not be recalled, Lister went on with his work. When he retired there was little to find fault with as regards irritation of the wounds or skin by the antiseptics, and sepsis had become a matter of the rarest occurrence when his methods were adhered to rigidly.

News and Views.

To the exhibition galleries of the British Museum (Natural History) have recently been added two exhibits of exceptional interest, both concerned with the elephant family but otherwise quite different. In the Palaeontological Gallery has been erected the huge skeleton of the great fossil elephant which was brought to light by a party of Royal Engineers when digging practice trenches by the Medway opposite Chatham Dockyard about 1911. The importance of the bones that had been dug up was, however, not realised until 1913, when Mr. S. Turner sent some of the bones to the Natural History Museum for identification. Efforts were then made to secure the whole of the skeleton that remained, and Mr. L. E. Parsons, under the supervision of the late Dr. C. W. Andrews, spent several months at Upnor carefully excavating and packing the specimens for removal to the Museum. Further work was necessarily prevented by the War, and afterwards progress was gravely hindered by the death of Dr. Andrews. Fortunately, Mr. C. Forster Cooper, of Cambridge, a well-known authority on this group of fossils, lent his aid, and Dr. W. Rushton Parker generously defrayed the heavy cost of the ironwork fitting. Finally, in spite of the difficult times, money was found for the base and the rail, and at last, after fourteen years, the public are enabled to see the remains of this huge creature, which stood over 12 feet high.

THE other noteworthy new exhibit in the Natural History Museum is a habitat group of the South African elephant (*Elephas africanus capensis*), once widely distributed over South Africa but now nearly extinct. At the time of the destruction of the Addo Bush herd, the Union Government presented the Trustees with the skin and skull of an immature

female and of a young male from the Addo Bush, and of an immature male from Knysna Forest. These three specimens, which were mounted in the Rowland Ward studios, compose the group, and the scene has been laid in the Knysna Forest because of its greater picturesqueness. The Union Government enhanced the value of the gift by the addition of timber—yellowwood (*Podocarpus elongata*) and ironwood (*Olea laurifolia*)—and vegetation—tree-fern (*Hemitelia capensis*), fern (*Aspidium capense*), palm (*Strelitzia augusta*), and "Tangles" (*Helichrysum*)—all carefully collected and packed by the Forestry Department. The Thesen and Union Castle Steamship Companies generously conveyed the material free of charge from Knysna Harbour to Cape Town and thence to London respectively. The exhibit has been designed and arranged by Capt. J. G. Dollman, and the lighting effects planned by Dr. G. F. Herbert Smith.

ON Thursday of this week, July 28, Sir William Thiselton-Dyer reached the age of eighty-four years, and his many friends rejoice to offer affectionate tribute to one who has done so much to promote and extend the plant resources of the British Empire. Nearly two years ago (Sept. 26, 1925) we published an appreciative article upon Sir William's work at the Royal Botanic Gardens, Kew, and its influence upon both pure and economic botany, and we are glad to know that its importance is widely recognised. He and Lady Thiselton-Dyer celebrated their golden wedding on June 23, and among the messages of congratulation were one from Mr. L. S. Amery, Secretary of State for the Colonies, and another from Prof. von Goebel, the doyen of German professors of botany. Mr. Amery referred appreciatively to Sir William's studies in the field of botanical enterprise,