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MACEWEN MEMORIAL LECTURE, 1937

# ADVANCES IN MODERN SURGERY

*by*

Professor FERDINAND SAUERBRUCH

DIRECTOR, SURGICAL CLINIC, UNIVERSITY OF BERLIN



GLASGOW  
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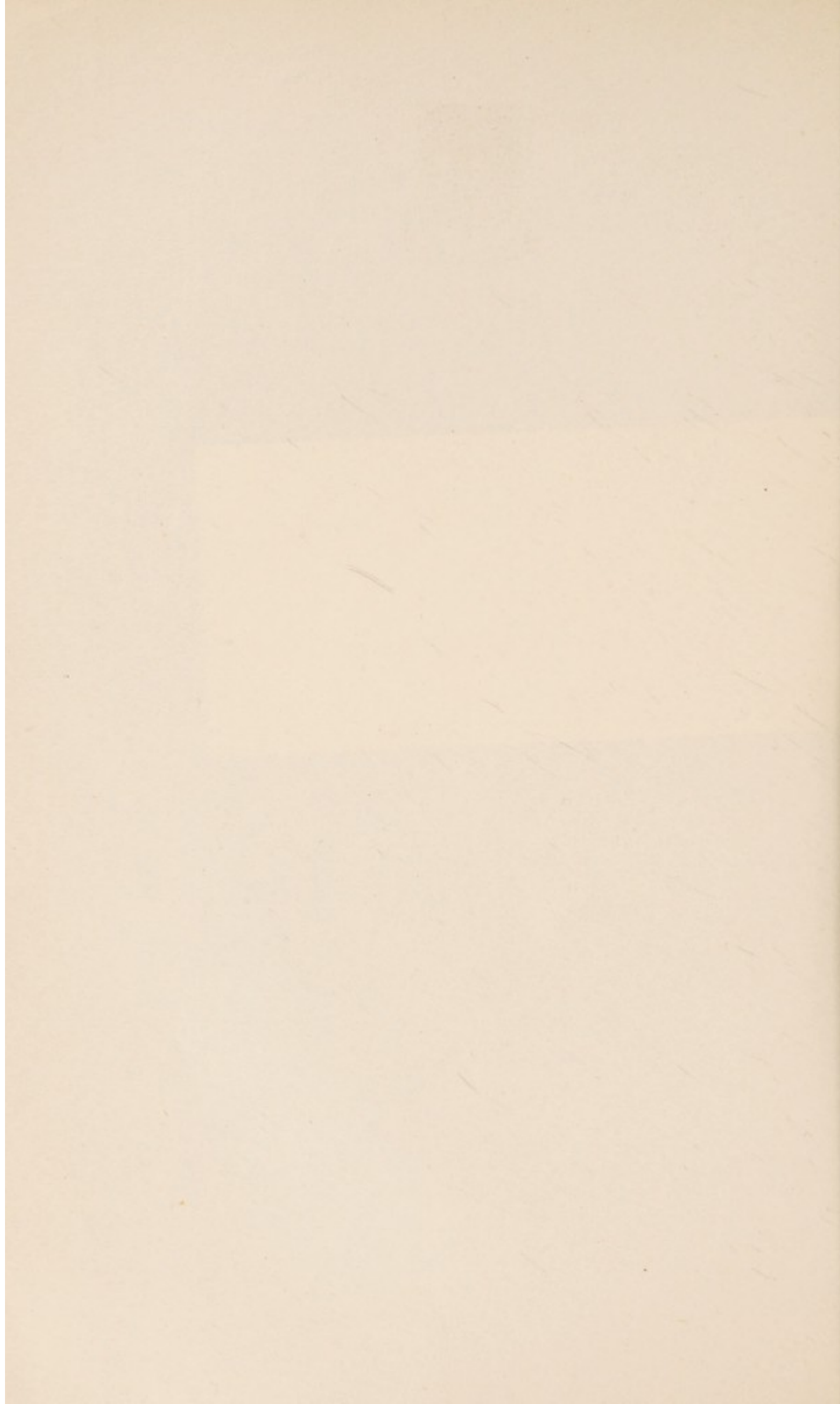
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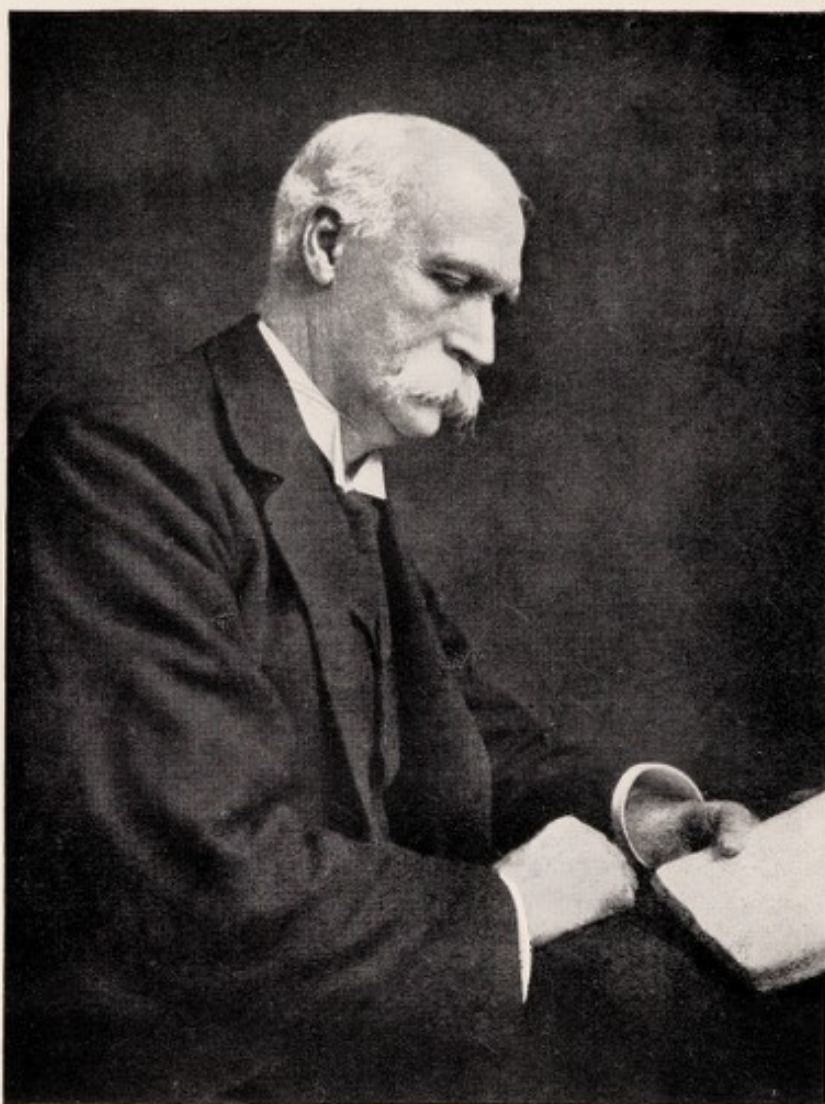




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Sir William Macewen

MACEWEN MEMORIAL LECTURE, 1937

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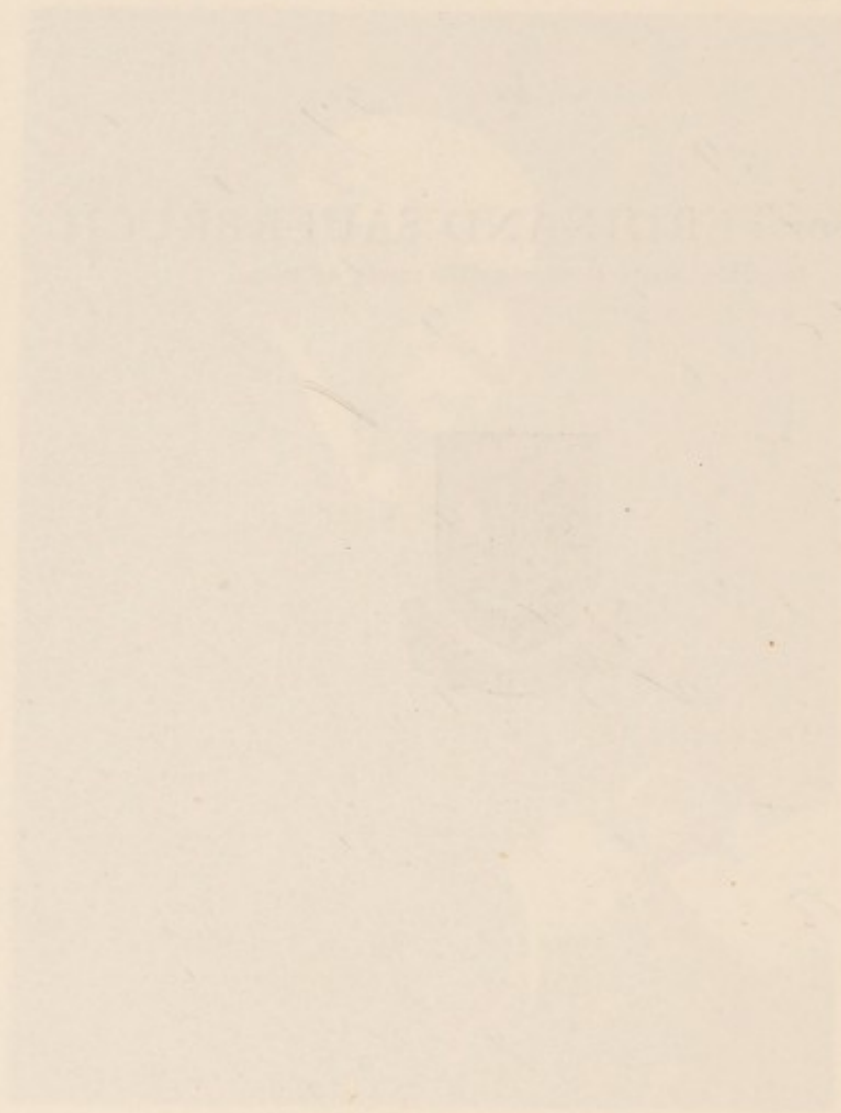
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JACKSON'S MEMORIAL LECTURE 1917

# ADVANCES IN MODERN SURGERY



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Portrait of Sir William Macewen      -      *frontispiece*

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## ADVANCES IN MODERN SURGERY

MR. PRINCIPAL, LADIES AND GENTLEMEN,

Before I begin to speak on the theme of my honorary lecture, I wish once more to thank the chairman of the prize board and his advisers for the great honour that I have received. I see in it both an appreciation of German surgery and a proof of the broad conception of the British universities that, while national work in the various countries must mould progress, the complete picture of our knowledge in each faculty can only be presented by considering the whole volume of international work.

In a personal sense, I am specially pleased to have the distinction of giving this lecture in honour of a man who will be remembered for all time as one of the great surgeons. Macewen was a pioneer in many realms: in the surgery of the brain, in the surgery of the lungs, and in the surgery of the extremities. His investigations found acknowledgment in the whole world, and furnished the basis for important advances.

I may also say that it was an encounter with Macewen which very decisively influenced my career, and which, by long winding paths, finally conducted me to this ceremonial hour. One day Macewen visited his German friend Trendelenburg, who was my teacher. The students were enthusiastic about



his appearance, his bearing, his goodness and kindness. He demonstrated to us a Macewen osteotomy, and the basic ideas of his plan of operation.

Some years later I saw the master again at the Breslau hospital, with my teacher Mikulicz. At that time, the first operations on the thorax, by the method of differential pressure, had been successful. Macewen was interested in the method and its results. In the afternoon, I had the honour of demonstrating the method to him in our laboratory. Our talk, first concerning the subject alone, turned to the personal side. I was at that time determined to become a general practitioner. His kind advice not to abandon surgery, but to stick to it, and most of all the wonderful way in which the great man spoke to his young colleague, essentially contributed to my going the way which led me to this place to-day.

And still one last meeting with Macewen may I describe. In the year 1913, the International Medical Society held a meeting in London. I greeted the esteemed man; he remembered our talk, and said with a smile: "Thus I may call you, in the wider sense of the word, my student." I was, and am, proud of this offer to belong to his school, and in this feeling I may add to my general thanks the expression of a special personal gratitude.

\* \* \*

Since the turn of the century, we have witnessed remarkable advances in the science and art of surgery. Diagnostic methods have been revolutionised,



indications for operations more correctly and rigidly defined, and remarkable progress has been made in operative technique. History shows that medical progress both assisted in general and scientific development, and played its own important part in this development. There is no doubt that the lessons of physiology and general pathology, themselves a part of a general scientific development, have brought about a radical alteration in our appreciation of disease, as manifested in the patient.

The last century witnessed the victory of science; in all its divisions, physics, chemistry, biology and medicine, the concrete results were so important that the spirit of the time was forced to appreciate its value. Unfortunately, this enormous technical advance, unequalled in the previous history of man, was not supported by a philosophical system equal to the burden of the new knowledge, so that material results were perhaps valued too highly, and even religion had to conform with the new teaching, just as it had done after the discoveries of Copernicus.

In these days, even the layman is familiar with the great advances in medicine. The spectre of sepsis was laid by the perspicacity of Semmelweiss, and by the courage and persistence of Lister, who was responsible for the most radical change in surgery which the world has seen. The scourge of pain had already been conquered by the discovery of general anaesthesia, and the surgeon was free to develop his art with calm, unhurried hand. The new science of bacteriology made rapid strides, and, with the



development of the theory of immunity, an important weapon became available for the elucidation of the cause of various surgical disorders.

In this brief review the importance of the experimental approach to surgery must not be forgotten, and this method, of which John Hunter had been the founder, was exploited to the full by such British surgeons as Macewen, Horsley and Ballance, while surgery also owes a debt to the great experimental physiologists like Sherrington, Starling and Roy.

Of equal importance with the new discoveries of narcosis, antisepsis and asepsis was the lesson of the anatomical localisation of disease, first propounded by Morgagni, developed further by Rokitansky, and finally brought to perfection by Virchow in years of patient and unremitting toil.

Once the surgeon could be assured that the key to many diseases could be found in some localised pathological change, surgery received an enormous impetus. It was a happy chance that, just as this lesson had been appreciated by studies on the cadaver, Röntgen provided us with a method of localising disease in the living subject. So began planned abdominal surgery—such diseases as appendicitis and diseases of the gall passages could be healed. Soon surgery made its own contributions to medicine and pathology. For example, modern understanding of thyroid function owes much to the post-operative observations of surgeons like Kocher, and only surgical exposure of the living parathyroids has finally elucidated the problem of osteitis fibrosa.



In this brief historical survey one important point must not be forgotten. Despite the fundamental importance of the anatomical theory of disease, a tendency soon became apparent to neglect the many other general factors concerned in disease—inheritance, constitution, temperament—"Lebensform" and "Lebensstil"—and the dominant influence which external circumstances may have on the development of disease.

The infections at this date were being arranged in orderly sequence according to their specific microorganisms, and for a time it seemed to be forgotten that the progress of an infection is dependent not merely on the number and virulence of infecting organisms, but on the resistance or susceptibility of the individual whom they attack. A true judgment of disease can only be attained by consideration of these two factors, and the surgeon experiences in his daily work the impossibility of forming a correct estimate of the true state of his patients merely by the collection of scientific data, however accurate; for he so often observes differences in the progress of what seems to be an identical disease—differences which can only be determined by the individual reaction of the patient. Modern study of endocrinology, and more exact knowledge of the laws of inheritance are gradually providing the empirical concept of constitution with an exact scientific explanation.

One important example of a revolt from too strict an adherence to the new bacteriological teaching is



given us by the history of the surgical treatment of tuberculosis of the bones and joints. For at least twenty years after Koch's momentous discovery, operations for this disease became more radical and much more frequent, but, on the whole, results were disappointing. Then came the knowledge that natural methods of healing—light, sun and climate—could enable the organism to overcome what was, after all, a systemic disease, and even the foremost advocates of active surgery again adopted conservative treatment, save in the exceptional case.

As knowledge of the hormones increased—and it has already been pointed out that surgery could make its own contribution to this knowledge—it became clear that functional disturbance of an organ need not of necessity have its pathological counterpart, and so attention was again focused on constitution. Surgeons had been led into the gross error of attempting mechanical repairs of such lesions as "dropped stomach;" and operations such as plication, fixation, and even gastro-enterostomy were frequently performed for the condition. To-day we know that visceroptosis is a constitutional disease, and that the patient's suffering can never be alleviated by isolated surgical interventions.

Another example of our changed views on these lines is provided by modern teaching on megacolon and congenital hydronephrosis. No longer do we believe that these conditions are due to an early structural defect in colon or ureter, but we consider that these remarkable deformities result from



some specific defect in their innervation, so that there results disordered peristalsis which moulds the canal into its deformity.

Graves' disease and peptic ulceration are two syndromes which may serve as classical examples of our changed views on surgical therapy.

At one time we saw in the isolated chronic ulcer of the stomach a localised disease, which should be attacked directly; and when it appeared that local extirpation left the patient unrelieved, the surgeon became even more radical, and resection of a large part of the stomach became the vogue. To-day we know that a chronic peptic ulcer is not the cause of a disease, but merely the local expression of a general bodily disturbance. Its location is determined by disorder of the normal function of the stomach, which may affect its secretion, its motility, or its local circulation. Even the foremost protagonists of gastric surgery are now reserving the knife for such cases as are complicated by perforation, repeated haemorrhage, or penetration into the surrounding viscera.

Graves' disease (*Morbus Basedowi*), according to our present view, is not due to an increased secretion of the thyroid gland, nor to the presence of some abnormal and poisonous substance in that secretion, but is a constitutional disease following some severe nervous shock, which produces a general disturbance of the hormonal regulation of metabolism, in which the thyroid, together with the other ductless glands, are affected. Resection of the glands is carried out, not in the belief that a radical cure of the syndrome can



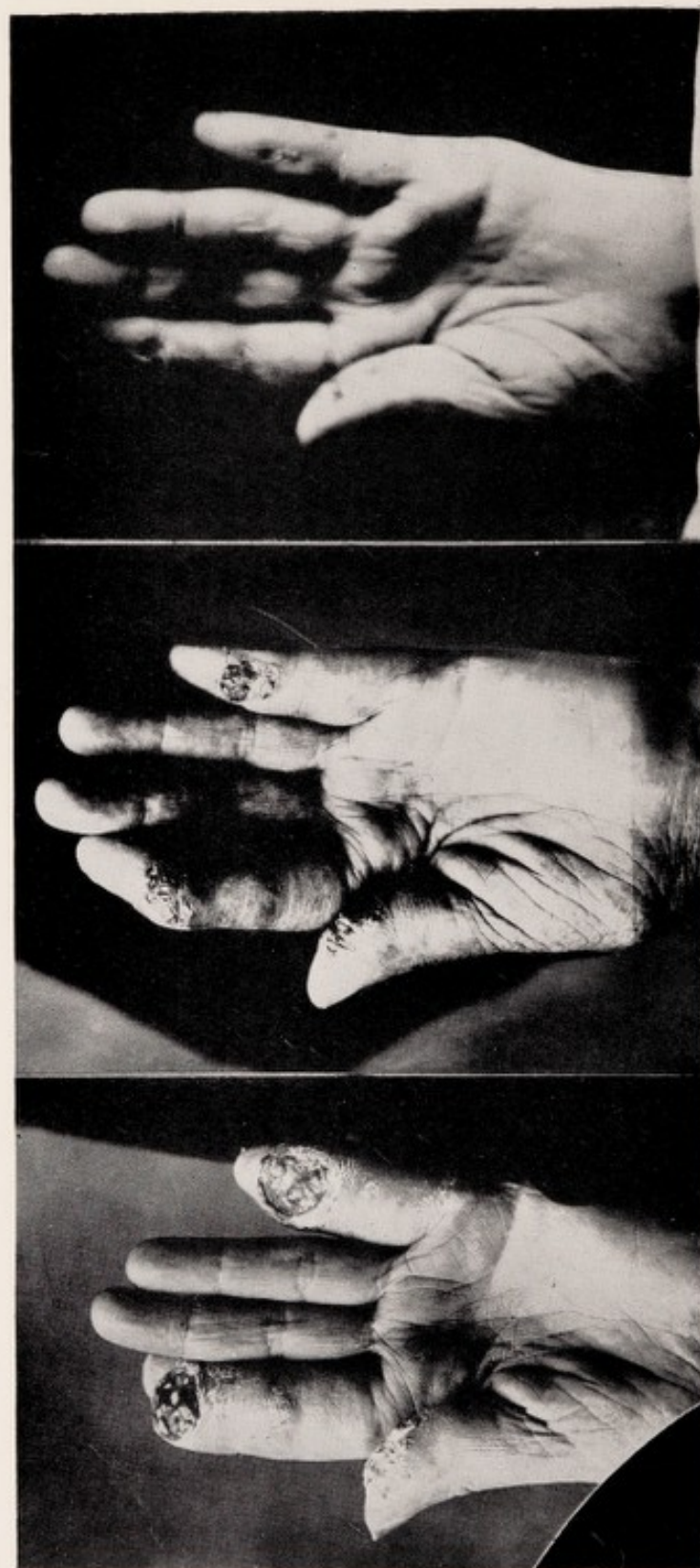
suddenly be attained, but in the knowledge that reduction of its "multiplier effect" will assist the organism to regain normal control of metabolism.

New research on the ductless glands has enabled some remarkable surgical achievements. One of the most striking is the treatment by operation of generalised osteitis fibrosa—once an incurable disease—which can now be relieved, and often brought to complete healing, by excision of an adenoma of the parathyroid gland. In this way, a restoration of the normal calcium metabolism is achieved.

Very recently, fresh light has been thrown on certain obscure cases of infantile convulsion. It has been found that the seizures often coincide with hypo-glycaemia and that in such cases there may exist adenomata of the pancreas, surgical removal of which can cure the disease. Finally, a definite relation has been established between myasthenia gravis and the thymus. A hyper-secretion of this gland appears to condition the syndrome, and the possibility of relieving this relentless disease by thymectomy is now before us.

Recent advances in endocrinology have been accompanied by a similar progress in our knowledge of the vitamins, and this progress is rapidly revolutionising the therapy of many surgical diseases. The prevention and treatment of rickets is one of the most important of these advances, and now the surgeon is also able to modify calcium metabolism by the administration of selected vitamins, in such conditions as pseudarthrosis and delayed union of fractures.





C

B

A

FIGURE I

*Tuberculous Disease of the Fingers,*  
Showing progress of improvement under salt-free diet.



These few words on vitamin therapy bring us to consideration of the important results which may be attained by exact control of the diet in various diseases. Modern application of the Gerson salt-free diet in the treatment of tuberculosis provides us with one of the most striking examples. It is unfortunate that there has been so little general recognition of the excellent results which can be obtained with the method, and from long experience I feel it my duty to emphasise the value of a salt-free diet, especially in cases of tuberculosis of the skin, secondly, in cases of bone, joint, and renal tuberculosis; and to state that it is also possible, in selected cases of pulmonary tuberculosis, to modify the type of disease in such a way as to render otherwise hopeless cases fit subjects for collapse therapy.

*[At this point pictures were shown to illustrate cure of an advanced case of tuberculosis of the hand, and of another severe case of tuberculosis of the face, by diet treatment. Fig. I, A, B and C.]*

It has been the great service of Leriche, who lectured to you in this place three years ago, to establish general recognition of the extreme practical importance of the nervous control of the peripheral blood vessels. Before his time, attention had been centred too exclusively on the gross organic changes in the arterial wall, to the exclusion of the important factor of local vascular spasm. Leriche has shown, by exhaustive clinical and experimental work, that it is possible to improve the local nutrition of an area



threatened with gangrene by operative intervention on the autonomic nervous system.

It is on the basis of his work that modern surgery has dared to intervene on the great nerve trunks in the chest—both vagus and sympathetic—in bronchial asthma, in functional disturbances of the heart, and in angina pectoris. It is true that the value of these interventions has been called in question, but they may yet form the basis of a surgery which seeks to modify function rather than form. The important contributions of Prof. Archibald Young to the surgery of the sympathetic are known to all surgeons, especially in the treatment of chronic arthritis.

I have already provided you with enough examples of our changing outlook in surgery to show that the surgeon, as well as the physician, must take a wider view, both of disease and of the way in which it may be modified in each individual patient by such factors as inheritance, constitution, and the particular circumstances under which the individual must live. It no longer suffices for the surgeon to take a purely mechanical view of his art, but, while recognising the importance of this view, the surgeon must be careful that he is not led too far away from the older surgical laws. He must always bear in mind that some of the signal victories of surgery were won in a day when the surgeon was faced by a clear mechanical problem soluble only by mechanical means—one may instance the thousands of lives saved by tracheotomy, or by the relief of a strangulated hernia.

In that regard, Macewen played a great part in the



development of three divisions of surgery,—the surgery of the extremities, the surgery of the brain, and the surgery of the chest. I will afterwards demonstrate a film to show how the application of well-founded anatomical and mechanical principles have still their place in the modern surgery of the limbs.

Some years ago, Cushing of Boston lectured in this place on cerebral surgery, and in his lecture laid down the clear mechanical principles the recognition of which has allowed cerebral surgery to make its remarkable strides. Although I now have also an interest in this field I will content myself with the privilege of telling you, from my own experience, how the application of quite simple and indeed primitive physical principles opened the way to modern thoracic surgery.

Thoracic surgery was hampered in its development by one very obvious physical difficulty. Free exposure is an essential preliminary to any planned surgery, but, in the moment when the chest wall is opened, and the lung exposed to the atmospheric pressure, there is an elastic recoil of the lung, as an open pneumothorax forms. At once there are symptoms of distress, especially marked when the mediastinum is soft and mobile, for at each respiration there is "a to and fro movement" of this vital structure. Mediastinal flutter distorts the course of the great vessels as they near the heart, the diastolic inflow of blood is diminished, and so grave circulatory disturbance results. Up to the end of the last century no safe and simple method of dealing with a wide open pneumothorax had been devised.



In 1904, at the Breslau Clinic, the first negative pressure chamber was brought into operation. The body of the patient was contained inside the chamber, while his head, emerging through an aperture in one wall, remained outside. In the interior of the chamber, a negative pressure of 10 m. of Hg. was produced. It was now possible for the surgeon, who also stood within the room, to open the chest as widely as he desired (if need be entering both pleural spaces) without collapse of the lung taking place, and without disturbance of the normal circulatory and respiratory processes.

From this negative pressure chamber was developed the positive pressure chamber, which contained only the head of the patient and in which a positive pressure of 10 m. of Hg. was maintained, while the body remained exposed to atmospheric pressure; and from this it was but a step to the mask apparatus (Tiegel-Henle) which is in common use to-day. To the modern surgeon, now that exposure of the vital thoracic organs may be so safely achieved, even such mighty interventions as total excision of the lung are possible, and the amputation of a diseased lobe, or the eradication of a mediastinal tumour, have become almost routine measures. Modern English surgery has made its own important contributions in the hands of surgeons like Professor Young, Morriston-Davies, Mason, Roberts and Tudor Edwards.

Time does not permit of an exhaustive review of thoracic surgery, but I will mention one or two important recent advances.



Bronchiectasis is a chronic and progressive disease of the lung with the most serious consequences, for few of its victims survive beyond their thirtieth year, and only too often their last years are rendered unbearable, for they themselves are plagued by their cough, and those around them distressed by the copious and foul-smelling sputum. It was once thought that bronchiectasis was always the result of some chronic infection of the lung, but stimulus to the surgical treatment of the disease was provided by the discovery that, very frequently, bronchiectasis is a congenital anomaly, and that the structural defect is often limited to a single lobe. Extirpation of this lobe will achieve complete and lasting healing.

At a recent congress, I demonstrated a series of patients, to illustrate the satisfactory end-results of lobectomy for a localised bronchiectasis. Patients were shown in good health, and leading normal lives, five, ten, and even twenty years after lobectomy. In selected cases a total extirpation of one lung for bronchiectasis may be contemplated. It will be remembered that it was Macewen who, first, in the year 1897, successfully carried out this operation; and it was not until 1931 that the second successful extirpation was done in our clinic in Berlin. Since that date, both in England and in America, the operation has frequently been performed.

At one time, operation for abscess of the lung could only be undertaken when adhesions had formed between the lung and the chest wall. To-day our improved radiological technique makes it pos-



sible for us to localise an abscess in the lung with accuracy, whatever its site; and we usually operate in two stages. At the first operation, ribs are resected, and a paraffin plombe is inserted over the abscess. Under the influence of the plombe, pleural adhesions form and, at a second operation, the abscess can be safely opened, and free drainage provided. Making use of this technique, our mortality in the course of the last ten years has been lowered from 50-65 per cent. to 12-15 per cent.

Differential pressure anaesthesia also opened the way to the safe surgery of the heart. It is now many years since we first excised the pericardium in cases of *concretio cordis*. This operation is now finding world-wide application. In a lecture given in Newcastle some two years ago, I referred to a case in which I was compelled to carry out radical removal of an aneurism of the right ventricle in a young woman. This patient is still—after six years—in good health. In Britain, the recent work of O'Shaughnessy has demonstrated the practical possibility of cardiac surgery by his series of grafting operations for the relief of cardiac ischaemia. Most of his patients have been between sixty and seventy years old, many of them bedridden for long periods, and yet for the most part they have not merely survived the intervention, but all the earlier patients in his series have now regained activity. Naturally the final therapeutic value must await further observation, but I have just had the opportunity of examining a number of his patients, and, in my opinion, the



method is sound, and clinical improvement is undoubted.

Last year, at the French Surgical Congress, I dealt at length with the surgery of the diaphragm. Here I will only say that the transpleural approach, so easily possible with the aid of positive pressure anaesthesia, has revolutionised the surgery of diaphragmatic hernia and similar disorders.

It is no longer necessary, in lecturing to an informed audience, to enunciate in any detail the principles on which the surgical treatment of pulmonary tuberculosis has been established. You all know that the ground idea was to relieve tension of the diseased lung, so that the organ might retract, and allow the walls of its contained cavities to approximate and heal.

The simplest operation is the induction of an artificial pneumothorax, but this measure is only possible when there is a free pleura. If the pleura is obliterated, then a multiple rib resection, planned according to the site and extent of the disease, is indicated.

There are also patients whose general condition precludes a large operation, who may still be healed by pneumolysis and plombage, and, if used with caution, the operation of phrenicectomy has also its place in the surgical treatment of phthisis.

We have operated on thousands of patients suffering from pulmonary tuberculosis, and I can state with confidence that, in chronic pulmonary disease limited to one lung, we can bring about permanent



healing in seventy to eighty per cent. of cases; and it may here be remarked that some of my patients subjected to thoracoplasty more than twenty to thirty years ago are still well and active. In less favourable cases, where the disease is not well localised, a forty to fifty per cent. healing rate is still possible, and even in the severely affected patient, with disease in both lungs, improvement may be obtained in at least twenty per cent. of cases.

The general results of the surgical treatment for chronic pulmonary tuberculosis are so good that it is now almost a duty of every surgeon to give the benefit of operation to a suitable case. At the same time I do not agree with those who would operate too early for a disease which may under favourable circumstances heal itself.

\* \* \*

Mr. Principal, ladies and gentlemen, allow me to show you a few pictures to illustrate some features of modern chest surgery.

*[At this point slides were projected to show the surgical cure of chronic pulmonary tuberculosis, hilar abscess of the lung, aneurism of the heart, myoma of the oesophagus, mediastinal tumour and diaphragmatic hernia. Figs. II and III.]*

\* \* \*

Ladies and gentlemen, we have found it difficult to find a correct English expression for the subject of my film, "Die Umkipplastik", but I will briefly explain to you its principle.







FIGURE II  
Radiogram of Thorax,  
Showing Mediastinal Tumour (Congenital Cyst).



FIGURE III  
Same case as Fig. II,  
After operation.





FIGURE IV  
Radiogram of Sarcoma of Femur.



FIGURE V

Radiogram from same case as Fig. IV after the operation of "*umkip*p"-*plasty*,  
Showing Tibia and Fibula articulating with the acetabulum.



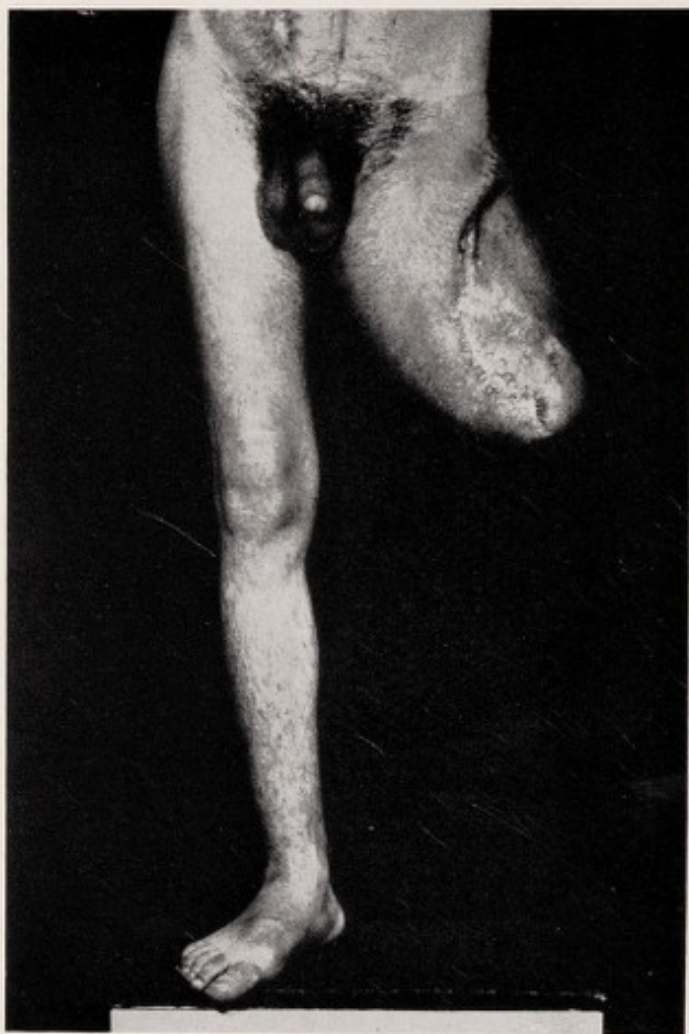


FIGURE VIa

The stump after "*umkip*p"-*plasty*—as in case illustrated in Figs. IV and V.



FIGURE VIb

The stump after "*umkipf*"-plasty—as in case illustrated in Figs. IV and V.





In former days, we were accustomed to carry out amputation through the hip joint for sarcoma of the femur in young people. In many ways this is an unsatisfactory operation. The duration of life is usually short, and activity during the short remainder of their life is severely curtailed. In our new operation a different method is adopted. The entire femur is excised—it is shelled out from the soft tissues of the thigh and then, after amputation of the foot, the tibia and fibula are swung up and placed in the bed, formerly occupied by the femur. In this way a long and mobile stump is obtained which is very suitable for the fitting of an artificial limb, and, of even greater importance than this, the duration of life is appreciably lengthened. It would appear that this mighty operation in some way induces a general constitutional change which is inimical to the further spread of the disease.

*[At this point slides were shown of a radiogram of the femur with a large sarcoma of the shaft, and of a radiogram from the same case, after "umkipf"-plasty, showing tibia and fibula articulating with the acetabulum. Figs. IV and V. Two further slides showed the long and mobile stump provided by such an operation. Fig. VI, A and B.]*

\* \* \*

Before showing you my final film (*Cinema film No. 1*) to illustrate the mechanical artificial hand, it may be of interest to recall the history of the ground



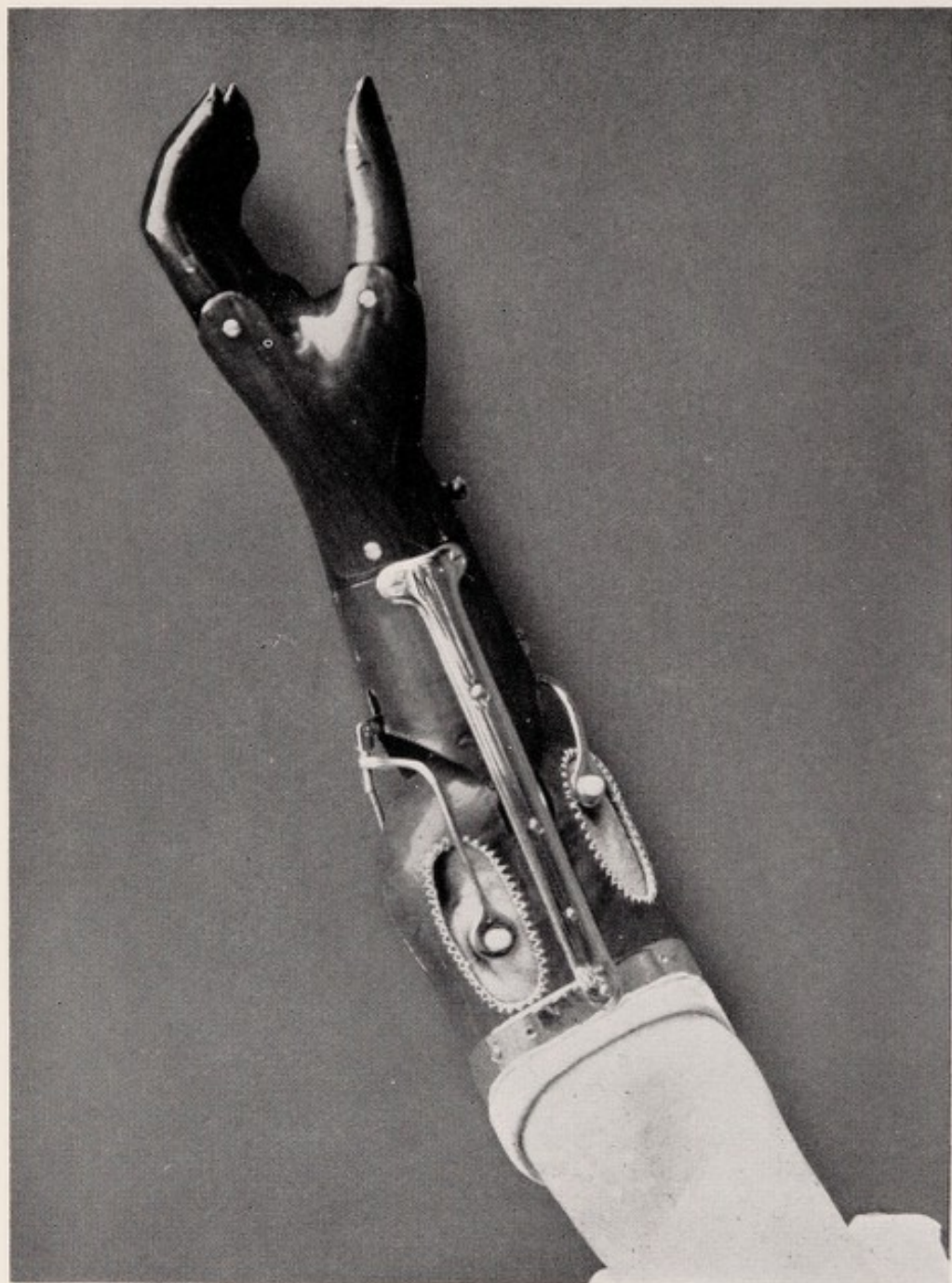


FIGURE VIII  
The Mechanical Hand in position,  
Showing range of movement.



FIGURE IX  
The Mechanical Hand in position,  
Showing range of movement.



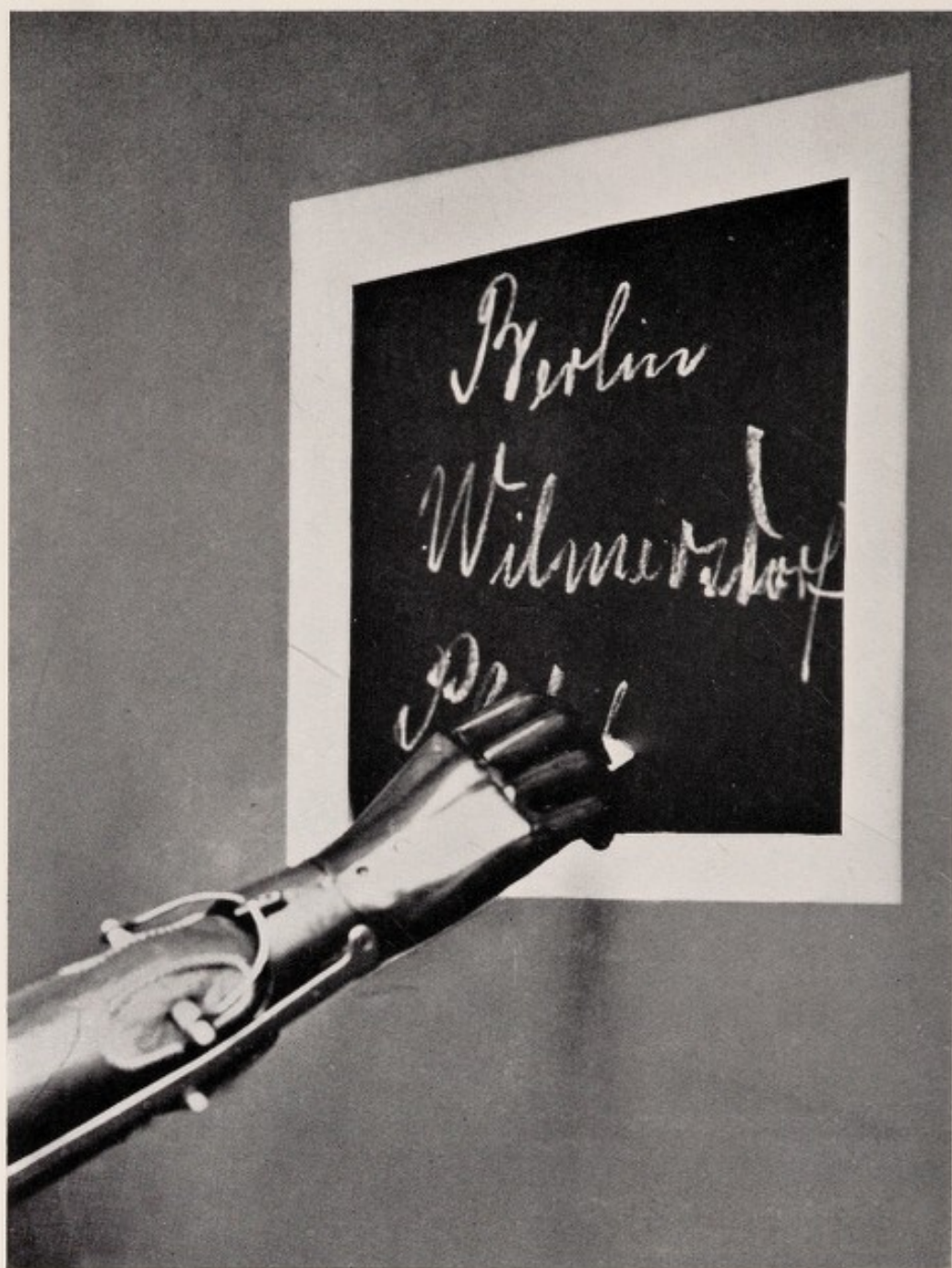
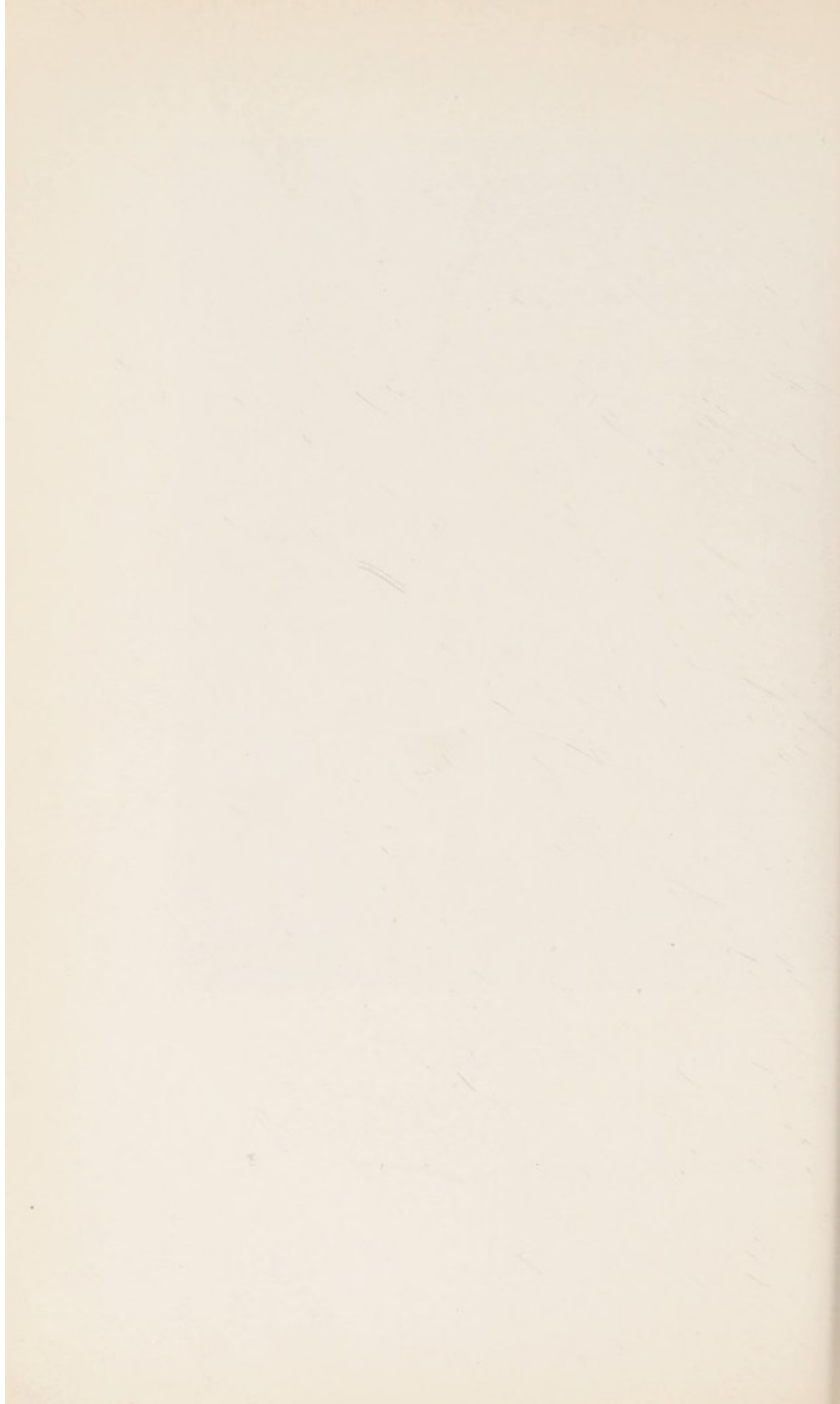


FIGURE XI  
The Mechanical Hand,  
Writing.



FIGURE XII  
The Mechanical Hand,  
Striking a match.





## CONCLUSION

Mr. Principal, ladies and gentlemen, I hope I have been able to show you some of the wonderful results which the surgery of to-day can accomplish when it is guided by sure anatomical and physical principles. But we know now that the mechanical result is only the beginning. Of greater importance are the vital processes of local adaptation and general constitutional change which follow. Modern surgery combines technique with the science and art of medicine—using the word in its widest sense. Technical proficiency is, of course, demanded, and rightly demanded, of every surgeon; but he must always be careful not to overrate its importance, for the future development of surgery depends on its continued harmony with science, medicine and *Weltanschauung*.



## CONCLUSION

My Principal, ladies and gentlemen, I hope I have been able to show you some of the wonderful results which the surgery of to-day can accomplish when it is guided by sound anatomical and physical principles. But we know now that the mechanical result is only the beginning. Of greater importance are the vital processes of local adaptation and general compensation which follow. Modern surgery cannot proceed with the science and art of medicine. The word in its widest sense. Technical proficiency is of course demanded, and rightly demanded, of every surgeon; but he must always be careful not to overrate its importance, for the future development of surgery depends on its continued harmony with science, medicine and the advancement.





