and location of points suitable for attack or necessary to be taken.

The war, the end of which the unpolitical majority of us are now longing to greet, was, however, grimly scientific in its every aspect. Aviation commandeered the mechanical engineer, the astronomer and the photographer. The submarine demanded that the physicist tell us all he knew. Without the chemist gas could not be used. Camouflage confused and confounded enemy mathematics: there were no lines straight in the right way, nor rectangles by which to calculate ranges and set guns. The wireless in its manifold applications made the skilled electrician work. Men were selected—they had to be—according to tests determined by the psychologist. And so on, until the colleges used "direct action" and took the young soldier under their immediate supervision, an act in itself necessitating a coordination between the army and the university that was undreamed of twenty years ago.

In an illuminating article in the *Columbia University Quarterly* Mr. Frederick Paul Keppel, until recently Third Assistant Secretary of War, has detailed some of the achievements of academic men (to use an adjective which the War Department affects to loathe) that helped us to win the war. The archeologist designed the best trench helmet; the tropical botanist told us how to get charcoal for gas masks; the astronomer showed us that it is the shape of a moving thing's tail and not its head that determines its course; the lawyer directed war finance; the physicist and chemist brought our production of field glasses up from 1,800 in 1914 to 3,500 in a single week in 1918; the physician greatly decreased our death rate by chemical sterilization and the splinting of fractures; the anthropologist showed that it is the breadth of a soldier's hips and not the length of his legs that gives him marching ability; a doctor of philosophy established conferences for the discussion of technical problems, and thereby prevented excellent suggestions from dying a quiet death in the pigeonholes of the War College.

SCIENTIFIC BOOKS

Menders of the Maimed: The Anatomical and Physiological Principles underlying the Treatment of Injuries to Muscles, Nerves, Bones and Joints. By ARTHUR KEITH. London, Oxford Medical Publications (Henry Frowde; Hodder and Stoughton). 1919. Pp. 335.

Those who had the good fortune to hear Professor Keith during his tour of the United States in 1915 will need no further introduction or incentive to read this book than the statement that the author has written it as he speaks—in the same delightful conversational style which characterizes his public lectures in the college of surgeons.

The subtitle, far too cumbersome for a book heading, gives the substance of its contents which are the written records of the lecture course for 1917–18. "Menders of the Maimed" rightly interprets the book, the inspiration of which is a renewed interest in treatment of the locomotor and nervous systems elicited by the war.

"Men of business find it necessary from time to time to take an inventory of the goods they have in stock; occasions arise when medical men must do the same thing and make a survey of the means of treatment at their disposal. That is the case now; surgeons are being called on to restore movement to thousands of men who have been lamed or maimed in war; they find it necessary to reexamine the foundations of their science and practise. In this book I have sought to help them by a restatement of the principles which underlie the art of orthopædic surgery." Thus the author expresses his mission and he carries it out in a way at once characteristic of himself and appealing to the reader for he builds the history of orthopædic surgery around those who themselves made the history. As we read we actually feel the presence of John Hunter's restless active figure. We see Hilton, sarcastic and independent, his waistcoat with its decisive pattern linked from pocket to pocket with a heavy gold chain. H. O. Thomas is in his workshop fashioning splints. Little seeks

help for his deformed foot and Lang for his injured knee. Duchenne walks the streets of Boulogne, his Faradic battery under his arm, and declaims against his critics. Lucas-Championnière, the ankylophobe protests eloquently against splints. Sayre captures his little patient in the New York slums still incased in his plaster jacket and triumphantly carries him off to his lecture theater.

"To assist myself," said Watts, the painter, "I converse with the sitter, note his train of thought, his disposition, his character and so forth, and having made myself master of these details, I set myself to place them on the canvas, and so reproduce not only his face, but his character and nature." So in this volume the author has absorbed something of the spirit of each pioneer and interprets that.

The general plan of the book is not a simple one with successive chapters following in orderly sequence for, as in a play, characters come and go and, whereas some cross the stage but once, others return again and again.

For instance the first chapters are biographical studies of Hunter, Hilton and Thomas.

Then follows the history not of a man but of a movement—that movement which led surgeons to practise tenotomy. The natural sequence to this, namely, the consideration of tendon transplantation and kinoplastic surgery is postponed until the story of the nerves and the control of muscles has been unravelled by Marshall Hall and those who followed him. The reason for this postponement is not far to seek. Scientific discovery and the application of principles are in history a disconnected sequence. Tendon transplantation has to be postponed in the book because the book is the interpretation of history and not a mere recital of events.

Later in the book when movement as a method of treatment finds its champion in Lucas-Championnière it turns out that the first three studies which appeared biographical are really historical phases of the contrasting doctrine of rest. Thus, being led to look at the subject from different viewpoints, we find the book full of surprises which arouse and renew our interest.

Only toward the end when dealing with bone and cartilage do we find a certain order, prescribed indeed by history but none the less stimulating because unexpected.

Valuable also is the last chapter on the history of bone-setting with a well-judged warning against the type of practitioner who, unsound in his fundamental knowledge, plays into the hands of charlatans.

In the rush of modern scientific life we are apt to ignore those who laid the foundations of our knowledge and even a discovery is often, as history shows, a rediscovery. "Our opinions," said Montaigne, "are grafted one upon another. Whence it followeth that the highest mounted hath often more honor than merit. For he is got-up but one inch above the shoulders of the last save one."

No student, seeking to know the history of investigation in the structure and function of the locomotor and nervous systems can afford to neglect this book and the story of "the last save one."

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THE PROGRESS OF UNDERGRADUATE RESEARCH IN MEDICAL SCHOOLS

Modern medicine is a scientific subject, and, in order to understand it completely, students must understand the methods by which the facts and theories of medicine have been acquired. The best way to learn the scientific method is by undertaking some research problem and so learning it first-hand. This is required for the degree of Ph.D. in a scientific subject, but students of medicine in some schools find it difficult or impossible to obtain the opportunity to do any research at all.

The faculty of the University of Pennsylvania are almost without exception believers in the educational value of undergraduate research, but the question of how properly to combine the time required for research and the exactions of the regular course remains an open one. Therefore, during the past session (1918–19) the William Pepper Medical