ratus which, though they have passed out of current use, are none the less valuable. A spring-cleaning of the laboratories would result in many useful discoveries of this kind, and the dedicating of them to this purpose would "bless him that gives" as well as "him that takes."

WILLIAM SOMERVILLE.
FREDERICK KEEBLE.

Germany's Aims and Methods.

THOSE of us whose educational experience has taught us to see behind the scenes of English official life in scientific matters for the last two or three decades will be prepared to endorse the scathing indictment brought against English officialdom by Sir William Ramsay in his article in NATURE of January 27, on "Germany's Aims and Methods." My own experience, extending over eighteen years as the senior science master of Wellington College, led me to form conclusions which were put forward in the 'eighties and the 'nineties through the editorial courtesy of NATURE, and are therefore easily accessible. To give pointed illustration of this, I may quote a remark made more than twenty years ago to me in a letter from a professor at the Royal Military Academy, Woolwich, where cadets were trained for the artillery, and (prospectively) for the Royal Engineers. He spoke with just indignation of science being treated as the "fifth wheel of the coach." Germany has made it the *first* wheel of her coach, and has startled the British public by the discovery that the Germans seem to be very clever people, as the scales have fallen from unwilling eyes, and the academical nose has learned that experimental chemistry and research are something more than "Stinks."

Sir William Ramsay rightly condemns the principle of selection for the Civil Service, and no one with first-hand knowledge of the facts will gainsay his conclusions on that head. But that covers only a part of the ground; and we need not hesitate to say that, if the brain-energy expended in the controversies about the retention of Greek at Oxford and Cambridge in the past twenty or thirty years had been directed towards making *some one branch of science essential* (along with the present minimum of mathematics) *for all degrees*, the outlook for England in this war would have been brighter than it is to-day. The country would also have been saved from the evil results of blank vacuity of mind on elementary matters of science on the part of the majority of our statesmen and legislators, who receive their 400*l*. a year as members of the House of Commons, while the more general application of scientific ideas and methods to commerce and manufactures might have saved us from the disadvantage at which we are placed in this world struggle, as this war is opening people's minds to see (not without alarm) how many things we had allowed ourselves to become dependent on Germany for in the course of a generation.

A. IRVING.

Bishop's Stortford, January 31.

Instruction in Science for Military Purposes.

IN response to requests from a number of important centres, I subjoin a syllabus covering the essential points to be taught to officers, N.C.O.'s, and men who have only a limited time at their disposal taken from other military duties. Experience has shown that much valuable work may be done by following on the lines suggested, all extraneous matter being excluded. The scheme has been found to be satisfactory for all ranks; in the case of officers, however, who have had some previous training in science, the matters may be treated in a more advanced manner. Teachers will find N.C.O.'s and men very keen and intelligent, and completely useless men quite rare. An excellent chance is now afforded by the men called up under Lord Derby's scheme, of which all teachers who can should avail themselves.

In arranging for a class regular attendance should be insisted on. Reports on the abilities of each student are much appreciated by commanding officers, who are thereby assisted in making a correct choice for special duties. All lectures should be illustrated by experiments so far as possible, and parts of instruments described by reference to good-sized models, or, failing these, well-executed diagrams. A class should not exceed twenty in number, and questions should be freely invited.

FIELD TELEPHONES.

Time required, about twelve hours, of which the first three should be devoted to the elements of electricity, as required for this subject. The general ground is covered by the writer's lecture, published in the Journal of the Royal Society of Arts for September 3, 1915. All practical details will be found in "The Field Artillery Telephone," by J. Young, obtainable only from Cattermole, Woolwich, price 9*d*. The necessity of learning the Morse code should be strongly impressed on all.

Preliminary.—Vibrations; sound—analogy between gramophone and telephone. Elementary idea of electric current; pressure, rate of flow and resistance. Conductors and insulators—function of a tapping-key. Permanent magnets—action between similar and opposite poles. Electromagnets—rule for polarity.

Induced currents—induction coil—how alternating currents are produced in secondary.

Cells—meaning of + and − poles. Description of "inert" dry cell; how to test for efficiency; useful life. How to couple cells in series. Condensers—elementary notion, action on direct and alternating currents.

Service Telephones, chiefly the "D Mark III." (If the actual instruments are not available, models will be found useful.) Typical circuit for field telephones. Earth returns. Description of microphone and receiver (service patterns). Action of a single-reed buzzer. Polarised double-reed buzzer of D Mark III.: adjustments, current required for efficient working. Complete circuit of D Mark III. telephone. Circuit of Stevens's telephone. Tests for efficiency of telephones: likely defects; how remedied.

Lines.—Single and multiple lines. Repairing broken lines. Causes of overhearing. How to tap into an existing line. Telephone exchange, simple form.

Practical Work.—Examination of cells with voltmeter; connecting in series. Rewiring a transmitter and receiver. Repairing a broken line of stranded steel wire (very important). If instruments are available, one or two exercises in the field in laying lines and communicating by speech and Morse code on the buzzer may be given.

POISON GASES.

Full details of this subject are not made public. The teacher must use his judgment as to gases likely to be used; chlorine may be taken as typical. The best absorbents of each gas should be stated, together with information about helmets and their proper use. Stress should be laid on the necessity of complete absence of exertion and administration of oxygen in rendering first aid to a sufferer. A description of oxygen apparatus as used in mines should be given. Two or three hours may be given to this subject.

RANGE FINDERS.

Lectures on this subject should be directed to an understanding of "one-man" range finders, and par-