

CHAPTER I

INTRODUCTION

THE war has indeed revealed grave shortcomings of detail in English education . . . ; but on the whole it has been a vindication of its essential soundness. It has proved us a nation not only sound and strong in character but far more adaptable, both in soldiering and in industry, than either we or our enemies suspected. . . .

The grave defect of our national education is that there is not enough of it. *The Round Table*, Sept. 1916.

THE nation is discontented with itself and with its education. It is probably too discontented. Self-criticism is a constant trait of the Anglo-Saxon, and his dark views of himself are always to be accepted with reserve. None of us would really exchange our governors, with all their vices, for those of any of the other belligerent countries, and this is a real, though unconscious testimonial to them. Nor could we in two years have created our present Ministry of Munitions, and have organised an army of four millions, if our science

and education had been as bad as some people suppose. When the black fit passes, we shall take a more reasonable view of our deficiencies ; still, no one would deny that they are there. What is the cause of them?

The classics are favourite scapegoats. And this view is the more odd, because it is one of the few which can certainly be disproved. It is very hard to assert anything definite in education, because of the great difficulty of knowing the precise effect on a boy of any particular branch of study. We teach our pupils, as doctors prescribe for many diseases, without any certainty as to the exact effects of the treatment ; and education is an even less exact science than medicine. But in denying that the classics are responsible for our 'want of science,' we are for once on absolutely certain ground ; for here we have definite facts to go upon.

Whatever faults the Germans have, nobody denies that they are a 'scientific nation' ;¹ this quality of theirs is continually held up to our admiration, and it is implied that they have become

¹ A critic has warned me that to quote Germany is to prejudice my case ; but such persons as are likely to read this book will be able to judge dispassionately, even in present circumstances, of what is good and what is bad in German

‘scientific’ by giving physical science a predominant place in their higher education. Nothing could be further from the truth. On the contrary their secondary education is far more classical than ours, and they have far more compulsory Greek and Latin. Let me briefly review the development of their secondary schools since 1870. Before that date it was impossible to enter a German University, except through the classical *gymnasium*, which exacts a high standard in Greek and Latin; but in 1870 it became possible for students from the purely modern *Realschulen* to proceed to the University if they wished to study *Mathematics, Natural Science or Modern Languages*. Students of all other subjects were still under the yoke of compulsory Greek or Latin. This yoke was removed in 1901 from all, except students of medicine, who must know Latin, and theologians, who must know Latin and Greek.

Now there are three points to be noted here :

(1) The makers of the greatness of modern Germany are the generations educated before

education. Here I have only to deal with its power to produce certain intellectual qualities, and not with those features of it which stifle independence of political opinion and stimulate a maniacal nationalism.

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1900; the vast majority of these were educated in the classical *gymnasium* with its compulsory Latin and Greek.

(2) Even in 1911, of over 400,000 boys receiving secondary education in Germany, 240,000 were at schools in which Latin is compulsory, and 170,000 of these at schools where Greek is compulsory also.

(3) In the remaining, purely 'modern,' *Realschulen*, so far from physical science occupying the chief place in the curriculum, only two hours out of twenty-five per week are allotted to it in the lowest forms and six out of thirty-one in the highest.

The moral of these facts is that the highest scientific eminence can be attained by a nation in whose secondary education physical science is subordinate. They prove with absolute conclusiveness that a classical education is not in itself the obstacle which prevents our becoming a 'scientific' nation. It is surely not too much to ask that our critics of the classics should attend to these figures, especially if they criticise in the name of science. In their own subjects they would consider it a duty to collect and weigh all the available facts before they arrive at a con-

clusion. They are not exempted from doing so, when they come to talk about education ; but if anyone reads the Report of the Conference at Burlington House, he will find no trace that these elementary and accessible facts had ever been considered by the speakers who attacked the classics. Yet they are very instructive. They do not prove that all boys should learn Latin and Greek, or that modern schools are unnecessary, or that physical science can be ignored, or that everything is for the best as it is ; but they do prove that a nation can be 'scientific,' though compulsory classics are the staple of its secondary education, and though the majority of its youth is trained in classical schools.

It is generally assumed by the critics of the classics that they are at any rate useless to the future scientist. Here again it is interesting to glance at Germany ; not that German education is perfect, but that it exhibits the results of experiments that bear on our present dispute. In 1870, as we saw, the universities became partly open to students who did not know Latin and Greek. In 1880, after ten years of trial of the new system, a manifesto was addressed to the Prussian Minister of Education by *all* the members of the Philo-

sophical Faculty of Berlin University ; it records the opinion of the results of the change which was entertained by the most eminent teachers and savants of Germany. It should be remembered that the Philosophical Faculty in Germany includes Mathematics and Physical Science ; the manifesto was thus signed not only by historians like Mommsen, Droysen and Curtius, philosophers like Zeller, and scholars like Vahlen and Nitsch, but also by the leading men of science in Germany, among them men of world-wide reputation like A. W. Hofmann (chemistry), Helmholtz (physics), Kiepert (geography), and by many other scientists. Here are some extracts: "It is also emphasised by the instructors of chemistry that graduates of *Realschulen* (Modern Schools) do not stand upon the same level with graduates of *Gymnasia* (Classical Schools). Professor Hofmann observes that the students from *Realschulen*, in consequence of their being conversant with a large number of facts, outrank, as a rule, those from the *Gymnasia* during the experimental exercises of the first half-year, but that the situation is soon reversed, and, given equal abilities, the latter almost invariably carry off the honours in the end ; that the latter are mentally better trained, and

have acquired in a higher degree the ability to understand and solve scientific problems. Professor Hofmann adds . . . that Liebig expressed himself at various times to the same effect.”¹ Similar testimony is given by the professors of Mathematics, Zoology, Modern Languages, Economics and Statistics. Professor Hofmann’s own opinion is given elsewhere, “that all efforts to find a substitute for the Classical Languages, whether in Mathematics, in the Modern Languages, or in the Natural Sciences, have been hitherto unsuccessful, that after long and vain search, we must always come back finally to the result of centuries of experience, that the surest instrument which can be used in training the mind of youth is given us in the study of the languages, the literature, and the works of art of classical antiquity.”² This testimony is the more striking, because it is not mere dogmatising without experience by men who might be supposed to have a personal prejudice in favour of the classics. It is the considered opinion of all the science and mathematical professors in

¹ *Inaugural Address* delivered by A. W. Hofmann on Oct. 15, 1880, with appendix, translation published by Ginn & Heath, Boston, 1883, p. 49.

² *Ib.* p. vii.

the chief university of Germany, after ten years' trial of the 'modern' schools. Similar views were expressed in 1897 by the professors of the Technical High School at Karlsruhe, who declared that "the systematic study of Latin as a school discipline was of the highest value for engineers, botanists, zoologists, mineralogists, chemists and physicists. The memorialists indeed advocate the study both of Greek and Latin at schools, in the case of a boy intending to follow any of the above scientific pursuits, but of the two ancient languages, they emphasise Latin as the more indispensable." There again we have a considered opinion of scientific specialists, with no axe to grind, and with experience of the results of both classical and modern education.¹

¹ Sir M. Sadler, *Problems in Prussian Secondary Education* (*Board of Education Special Reports*, vol. 3, p. 218). In the same place is quoted the interesting protest by the late M. Jaurès in favour of classical education. "He spoke against giving equal recognition to the classical and modern sides in secondary schools on the ground that, in the headlong competitive struggle of the present time, the sterner mental discipline afforded by Latin and Greek will give way before what Americans call 'soft options' in school curricula, unless a premium is set on the former. He pleaded for the preservation of classical studies... as a memento of disinterested culture. Otherwise even the field of education would be submerged under the rising tide of commercialism."

The facts and opinions just cited should keep us from the dangerous mistake of supposing that we are simply suffering from the predominant position of classics in our public schools, and that we have only to expel them in favour of physical science and modern languages, to be cured of all our ills. This idea, which was fostered by the Science Manifesto last February, seems to be losing ground, and it is well that it should, for if we base our reforms on it, we shall be like doctors who mistake a minor symptom for the real disease. It is no doubt true that we need more physical science in industry and elsewhere ; but that is only a symptom of a more serious weakness. What is really wrong with us is that as a nation we do not believe in knowledge.

The slowness of some of our manufacturers to use science in industry is one sign of this. But there are other and much more serious signs. If an account is ever published of the work done by a certain section of the Admiralty Intelligence Department since the war began, we shall have plenty of evidence of our indifference to knowledge in departments as important as industry. Under the pressure of the war a branch of that Department has been amassing ethnographical

and geographical information, which we now find essential, and which we have hitherto neglected to collect.¹ It might have been supposed that a great empire would have had some kind of a Civil General Staff, which would collect such facts, and pigeonhole them for the time when they should be needed, instead of having to improvise hurriedly a practically new Department, and ransack French, Dutch and German periodicals and books for knowledge which bears directly on its deepest interests. But though we have great geographers and explorers, we have never used their services methodically, or thought it necessary to accumulate and store the facts in which they deal, as we accumulate and store munitions or anything else necessary to the conduct of war. That is a sufficiently serious symptom of our national indifference to knowledge. Obviously it does not spring from ignorance of physical science, nor is it to be cured by instituting a preliminary science examination in our universities.

We generally regard this comparative indifference to knowledge as a quality of our breed, as

¹ The branch in question is a new and extraneous development of the Admiralty Intelligence Department, which, no doubt, in its own work has from the first been efficient and prepared.

natural as the blue eyes and light hair of a Northman, and, resigning ourselves to being less thorough than the Germans, hope to make up this deficiency by other qualities which they do not possess. But our weakness is surely nothing mysterious. It is neither an ineradicable strain in our blood, nor a consequence of too little physical science in our education. It is the natural result of insufficient education of any kind. "In Prussia," wrote Mr. Sadler in 1899, "the machinery for the organisation of secondary education has been at work for more than seventy years. In England it is still, both locally and centrally, incomplete." And again: "There is little doubt that, so far as wide range of all-round intellectual attainment goes, a higher average is reached in the average German secondary school than is the case with us. There secondary schools of high quality are more uniformly spread over the whole country than is the case in England. They are cheaper and more accessible to poorer families of the middle class."¹ In fact, a smaller public is educated in England than in Germany, and, as a whole, it is less well-educated. It is the same with university education. There are twenty-one universities in

¹*o.c.* p. 94.

Germany, of which the latest was founded in 1826. There are eighteen in Great Britain, but of these seven have been founded since 1900 (the University of Wales was founded in 1893), and only six were in existence in 1830.¹ Consequently in Germany a much larger proportion of the population has had a university education than in England, and, it is not surprising, if the Germans, having had more education, and knowing better its value, prize knowledge and use it more than we do.²

¹ It is characteristic that Scotland, the most intelligent part of Great Britain, possessed four of these.

The significance of these figures can only be appreciated, if we remember that *the full effect on a nation of any improvement in its educational system is not felt for at least 20 years after it has been introduced.*

² According to the *Statesman's Year-Book* the statistics of university education work out as follows :

	Population.	University Students.
Great Britain, 1913-14.	46 million.	35,175
Germany, 1912-13,	65 „	69,277

These figures need further analysis ; for Britain, they include in some cases evening students and undergraduates who have finished their studies, but have not taken a degree ; for Germany, they include nearly 10,000 unmatriculated students, but take no account of over 16,000 students at technical high schools with power to grant degrees. And examination might reveal other discrepancies.

There are obviously many other imperfections in our education contributing to the same result, which are not mentioned here.

If this is the real cause of our weakness, matters are not so unsatisfactory. We have simply to improve our secondary and university education, and to extend them further among the population. This has been done of recent years—since Mr. Sadler wrote, great changes for the better have been made in our secondary education, and seven new universities have been provided—and if we continue on these lines, knowledge, and with knowledge, the belief in it, will grow. The new generations will value it more, and apply it more in all departments of life, and we shall become a ‘scientific’ nation, not in the sense that our education is largely in physical science, but that, whatever we do, we shall realise that the first business is to collect the relevant facts, so that we can base our action on knowledge. And this is the kind of science we really need. The Germans possess it, not because they have more physical science and less classics in their schools, but because they have more education generally. They have used the fertilizer of education widely, and the resulting crops are better than those of nations that have used it less.

There is something, too, in the nature of the particular fertilizer, at any rate in the case of the

universities, which explains how the search for knowledge has become a second nature with the German. Consider the difference between study at a German and at an English university. At the former the student breaks completely with school life and the curriculum of school ; when he leaves his *Gymnasium* or *Realschule*, he is supposed to have received the 'general culture' which is the basis of any sound education, and in his university career he is to learn the means by which knowledge is advanced, and himself to take some part in advancing it. For his degree he must write a thesis, which is a bit of original research, a piece of work that has never been done before, that cannot be derived from text-books, and that involves independent enquiry. The atmosphere is favourable. For a German university is a great workshop of research ; everyone is researching in his own particular subject, whether it is law or chemistry or *Americanismus* ; and the professor, having no private pupils, simply lectures some six or eight hours a week, and for the rest of his time devotes himself to advancing knowledge in whatever branch he has chosen. It is easy to see the effect of this atmosphere and this education on the student. He gets possessed—sometimes obsessed

—with the idea of research, of original work, of advancing knowledge. He learns how to do this in his own subject. He goes out into his profession a qualified, and generally an eager, enquirer ; and we find him as a chemist in the Badische Anilin Fabrik researching into the quality of dyes, as a doctor writing a thesis on some minute question of pathology, as a civil servant enquiring into the causes and prevalence of tuberculosis in the cows of East Prussia, as a scholar investigating the authenticity of a treatise of Plutarch. The particular work varies ; it is often trivial, often bad ; but there is more of the spirit of research, that is, of the spirit of science, in Germany than in any other country. And it springs from the method of study followed at German universities.

Now consider the atmosphere of an English university. We have always taken the view (rightly I think) that an undergraduate is not sufficiently educated to research ; so with us university work is really an extension of school work, more advanced, but essentially the same in that it involves no original investigations. There are the proses and essays of school in a more difficult form, and a rather haphazard examination of original authorities ; but there is nothing like

the thesis which admits the German to his degree. Nor is the surrounding atmosphere one of research. The college tutor cannot, like the German professor, retire at 9 a.m., his lectures for the day done, to devote himself to the advancement of learning. He probably spends twenty-four hours in the week in that most exhausting of occupations, teaching, and though college tutors do original work even under these conditions, from the nature of things it generally lies outside their tutorial instruction, which follows the course prescribed for examinations. Under a university system like this is produced a type more balanced, and in a sense, better educated than the German—a type acute and critical, with a good general culture, and with a fairly wide basis of knowledge, and a capacity for handling it and putting it on paper which Germans rarely possess; its weaknesses are an over-critical mind and a tendency to consider that knowledge consists in getting hold of half-a-dozen salient facts and presenting them skilfully in an essay—the student has done this so often with his tutor that he cannot believe that anything else is required. A succession of essays and examination questions has never brought him into contact with that ‘method of science,’ which

belongs to historical and literary research as much as to chemistry or physics, and he generally leaves the university without the idea of advancing knowledge ever having occurred to him. Such a type is common in England, and can be easily recognised on the Government Front Bench. It has many virtues, but it is not a type that naturally believes in knowledge or pursues it as Germans pursue it ; and its prevalence explains, for instance, why the Admiralty Intelligence Department found so much information ungathered at the beginning of the war, and why the Government, as Professor Poulton complains, often acts on its own ignorance instead of realising that it ought to consult experts.

It is not easy to change this. The German thesis system, in its unmixed form, has many evils, and more is seen of them than of its virtues when it is transplanted to foreign soil.¹ Yet the introduction of some real research work into our degree course would counteract its present tendencies. We have too little research at present, while the Germans have too much ; and the recent reform in the Oxford Chemistry School, by which a piece

¹See an account of the working of the thesis system in America in Mr. S. Leacock's *Essays and Literary Studies*, p. 63 ff.

of original work is necessary for high honours, is more likely than any other change hitherto proposed to make for the advancement of 'science' in every sense of that word. The Government might do something if they encouraged Indian civilians to do some suitable research during their 'long leave,' instead of spending their time in travelling or tennis; many Nigerian civil servants do at present take diplomas in anthropology during their leave, and their example might be imitated, *mutatis mutandis*, in other branches of the public service.

These are big subjects on which to touch cursorily: but it was necessary to allude to them, because the root problem is: what is wrong with us, and in what way is our education at fault? I have tried to shew how superficial it is to suppose that our one defect is ignorance of physical science, and that we have only to remedy this, and to abolish what some critics like to call our 'mediaeval system' of education. Our disease goes deeper, and the neglect of science by some manufacturers is only a symptom of it. Practical experience, as we have just seen, shews beyond the least possible chance of doubt, that classical education, however compulsory and widely extended in a nation, is

perfectly consistent with that nation being highly 'scientific'; and, as we have also seen, many men of science consider that the classics are a better preparation for a scientific career than is a 'modern' curriculum.

Now, passing from facts to theory, I wish to ask on what qualities are based the claim of Latin and Greek to a place in education, and what are the virtues which have made great scientists prefer their training to that of 'modern' subjects. In doing so I shall try to meet the stock objections that they are not 'modern' (p. 186 f.), that the ancients, being far more ignorant of science than we, are not worth study (p. 101 f.), that it is absurd for those boys to learn Latin, who will never learn to read it fluently (c. 5), that modern languages can take the place of Latin and Greek (c. 4 and c. 5). To guard myself against certain criticisms, I would say that nothing in this book is inconsistent with a belief that everyone ought to know some science, that we need more science in national life, that a narrow classical specialism (like all narrow specialism) is bad, that a classical education does not fully meet the needs, or suit the capacities, of every boy, and that the teaching of classics

needs continual improvement—in which point it resembles the teaching of all subjects.¹

¹ Nothing would be more useful than for competent and experienced teachers of science to put forward their views on a satisfactory science curriculum, stating what branches of science they thought suitable to boys at what ages, and how they should be taught. Laboratory work with big classes is for most boys a pleasant, but otherwise unprofitable, way of wasting time; and it is difficult not to feel that sciences like physics and chemistry, where it is essential to grasp abstract laws, are far less suitable for the concrete mind of a boy than geology or perhaps physiology. It would be a great improvement if some science could be included, possibly as an alternative subject to philosophy or to ancient history, in the Oxford Greats School; philosophy and science illuminate each other, and such a change would give a chance for clever boys, whose interest in science developed late, to take it up properly. Whatever changes are made, it is to be hoped that science will not be given a preferential place in the Civil Service examination. That it is not unfairly treated, is shewn by science men occupying the first and third places in the list in 1913, and the second place in 1914. But it would be disastrous for the nation, and very inconvenient for business men, if our young scientists were tempted away from commerce, research and teaching into a place for which their training was not designed, and where their peculiar gifts were only occasionally exercised. The Civil Service, with its security, its pension and its excellent salary, already absorbs talent which might often be better used elsewhere; and if it took the ablest young men of science, the nation certainly would not gain.