In the afternoon Dr. Watt gave a careful exposition of "Some Main Principles of Integration." Prof. Carveth Read followed with an analysis of "The Conditions of Belief in Immature Minds." The chief relevant characteristic of the mind of the savage and the child, he pointed out, is the unusual influence of illogical inferences, or imaginations, and of non-evidentiary causes of belief. This characteristic depends upon (1) an unusual vividness of imagination; (2) an absence of exact knowledge as a standard; (3) an inability to make comparisons, either because of the influence of desires, or because of the imperfect development or education of the mind; the mind is consequently in a state of incoordination, and its beliefs form relatively isolated systems.

On Friday the subsection held a joint sitting with Section I (Physiology). In the morning Prof. R. M. Ogden (of Knoxville, Tennessee, U.S.A.) gave an account of "Some Experiments on the Localisation of Visual Images." The images were suggested by a series of fifty words. It was found that the images of memory tended to be located at their proper place and distance, while the images of imagination tended to be placed upon the disc fixated during the introspections.

Dr. Myers described "Experiments on Sound Localisation," carried out in the sound-proof room of the new psychological laboratory at Cambridge. The sound was usually a fundamental tone of 200 vibrations, accompanied by overtones separately emitted; these were led into the sound-proof room by a tube ending in a movable funnel carried by a noiseless perimeter. In the end, timbre and loudness proved the only trustworthy criteria whereby his subjects localised the sounds; laterality and medial incidence, exploited at first, were eventually abandoned. Alteration in the intensity of the several overtones, and in the loudness of the whole sound, increased very distinctly the number of erroneous localisations. In the case of a medial sound, just as in the case of a lateral sound, the spatial (and, sometimes, tactual) impressions seemed illusory. In reality they appeared to be of auditory origin. And in each case the spatial experience seemed to be a cue leading to a head movement, whereby the sound is more correctly localised.

Miss E. M. Smith described a series of observations, carried out in the same laboratory, upon "Habit Formation in Guinea-pigs." The tests used—(1) labyrinth test, (2) a new sensory test discrimination test—formed part of a larger scheme to test inheritability of learning, &c., and incidentally brought to light hitherto unrecorded points of interest concerning the behaviour of guinea-pigs. Miss May Smith reported results yielded by tests of Bergson's two forms of memory. The correlations tended to show that rote memory is distinct from pure memory (recognition) and more closely allied to physiological memory or habit. Dr. Shrubsall briefly discussed "The Relative Fertility and Morbidity of Defective and Normal Stocks." On examining the family histories of several thousand children, he found that the correlation between the size of the paternity and the number dead is much higher in defective stocks than in normal. In spite, therefore, of the notorious fertility of defective stocks, by adult age the disparity in size of family has, owing to higher morbidity, almost disappeared.

In the afternoon papers upon "Variations in the Spatial Threshold" and "A Simple Method of Demonstrating Weber's Law" were read by Mr. Godfrey Thomson and Mr. Shepherd Dawson respectively. Two important contributions to the study of fatigue were given by Miss May Smith and Mr. J. H. Wimms.

On Monday a joint meeting was held with Section L (Education). The morning was chiefly occupied with a discussion of spelling. A full report of the proceedings has appeared in the account of the work of the Education Section (December 25, 1913, p. 491).

The appeal of Dr. Kimmins (chief inspector, L.C.C.) for educational research may be mentioned as of special interest and importance. In the afternoon Mr. Valentine gave a paper on the phonic method of teaching reading, Mr. E. D. Lewis upon analytic and synthetic methods in learning, and Mr. Burt upon the mental differences between the sexes.

On Tuesday the greater part of the morning was occupied with papers on tests of intelligence. Dr. McIntyre and Miss Rogers described "The Application of the Binet-Simon Scale to Scots Children," and Mr. Moore and Mr. Winch described some "Tests of Reasoning" carried out at Liverpool and London. Mr. Fox recounted a series of experiments upon "The Conditions which arouse Mental Imagery in Thought." Imagery, it was found, appeared to arise chiefly when thought was momentarily hindered or obstructed.

In the afternoon the president of the Economics Section (Rev. P. H. Wicksteed) appealed for a study of "The Psychological Basis of Economics." Mr. Pear followed with an "Analysis of Some Personal Dreams," and Dr. Brown with a discussion of "Psycho-analysis." Dealing with the psychological doctrines of the school of Freud, the afternoon's discussion perhaps aroused a more general interest than any other.

On Wednesday morning the chief feature was a couple of papers by Mr. Pear and Mr. Wyatt upon testimony. Mr. Pear described the chief "Modern Experimental Investigations of Testimony," and emphasised their legal significance. Mr. Wyatt described experiments upon normal and defective school children in Manchester and Liverpool. He found that normal children, when uninfluenced by cross-examination and the personality of the questioner, can give testimony of a high degree of accuracy, but of small range; the testimony of defective children differs in quality more than in degree, but the difference is not very abrupt.

The chief impression created by the meetings of the subsection was a sense of the great and varied activity now going on in the various psychological laboratories recently established throughout the country, and the eagerness of the public and of the Press to recognise the "new" science and to emphasise (often to over-emphasise) its possibilities of development. The interest in practical applications was marked. But it was equally clear that the applications already attempted themselves pointed to the urgent need of further work the character of which shall be more purely scientific.

CYRIL BURT.

ON THE HIGHEST UNIVERSITY EDUCATION IN GERMANY AND FRANCE.[1]

IN the beginning of the nineteenth century Napoleon crushed the spirit and power of the Germans for a time, but the nation soon recovered from the blow through the stirring appeals which their great men, many of them professors in the universities, made to them, and their politicians and wise men, men of deep thought and strong will, deliberated earnestly in what way they could rescue their country from the depression under which it lay and restore it to independence and to a high place amongst the nations of the earth. They became convinced that one of the most effective means for this purpose was education, and

[1] From an address delivered at the University of St. Andrews on October 13, by Principal Sir James Donaldson.

they formed the following plan of carrying out this education. Their eyes were fixed on the young men of the country and they thought the best way to train them for civil and political life, and for the discharge of all the highest duties of statesmanship, was to divide their education into two periods. Thus arose the gymnasium and the present form of their universities. The idea of the gymnasium was that the boys should remain at school from eleven years of age until they were about twenty, under the strict discipline of the schoolmasters and be guided by them in all their studies. In these schools the young men were to be instructed in all the important knowledge which previous generations discovered and acquired. It was deemed that young men up to that age should not be invited to specialise. They were to be the recipients of the best ideas and methods which had come down to them through tradition.

The universities were to be the means of educating the young men from twenty to twenty-three, twenty-four, or twenty-five. It was at once seen that the method of education must be different. The experience which had been carried out successfully in the University of Halle gave the cue to the new work of the universities. This work assigned to the universities was to give a scientific education to all the young men who were fit to receive it. Science is the key-note of the system. There can be no good scientific training except on certain conditions. First of all the professors or teachers must themselves be men who pursue the scientific method of study and are advancing the boundaries of scientific knowledge. They must show in all their lectures the scientific spirit. Then there must be no restriction in the liberty to teach. Every man who is following the scientific method with adequate acquirements and capacity must be invited to teach; and, finally, the teacher must be untrammelled in his scientific investigations. He must search for truth solely for its own sake, and he must be allowed to express the conclusions to which he comes, whatever they may happen to be. This is what the legislators called Lehrfreiheit—the freedom of the instructor and the instruction. But along with these there must be Lernfreiheit—the freedom of learning and the learner. The learner must be free to choose the professors whose lectures he is to attend. There must be no restriction. The parents may advise him, but the State imposes no limitations. He goes where he has reason to believe that he will get what will stimulate him and guide him best. Of course, it was only those young men who had shown ability to whom a continuance of study would be profitable. They must be the best young men of the nation. Then these young men were no longer to be under the discipline of schoolmasters, but were to be free to choose for themselves how they were to study. No compulsion was to be used, but they were to select for themselves the teachers that would suit them, and the State was to supply them with all the best teachers or professors who could be found willing to teach and to lecture.

All this was done nearly 100 years ago. The plans of Humboldt and others were carried out consistently, and they now continue to the present day. The uniform opinion in Germany in regard to them is that the universities thus conducted have been of infinite benefit to the State, and have been along with the secondary schools a most important element in Germany's acquisition of extraordinary intellectual influence amidst the nations of the world, and in the building up of a great empire. I have adduced in proof of this in my previous addresses the testimony of eminent witnesses, such as Savigny, Stotzner, Max Müller, and I now adduce the opinion of Paulsen, the best authority on the subject. His little book, "The German Universities," is admirable, and deserves the attention of all who are interested in this subject. "Whoever understands youth," he says, "and knows the circumstances of German universities, will not doubt that all attempts to help along devotion to study by more or less mild expedients would be vain and harmful; vain, because only the semblance of such devotion, not the thing itself, can be forced; and harmful, because they weaken the sense of independence and responsibility. Forced study implies a scholastic system and scholastic relations between teacher and pupil, of the sort which existed in the mediæval universities. Such a condition is to-day inconceivable in the German universities." . . . "In the first place, the relations between student and instructor would be disturbed. At present these relations are throughout most satisfactory, resting as they do on a basis of freedom and mutual confidence, and every attempt to increase attendance on lectures by any other means than the attractiveness of the lectures would necessarily impair their charm. Who could endure to face a circle of hearers to whom he could not say at all times: 'Whoever thinks he does not find here what he wants, is under no compulsion to come'? Again, the student's attitude towards science herself would be altered. She, free herself, must be sought and loved by free men; if forced upon us, she would be detested by all—not only by those whose nature keeps them from intimacy with her, but by those also who now follow her of their own inclination.

"He who is not convinced of this from his knowledge of human nature may learn it from the experience of such measures gained everywhere and always."

No other universities for a long time adopted the methods of the German universities, but in recent times a considerable number of them made approaches without rigorously carrying out the ideal either of the gymnasium or the ideal of the university. In our own country we do a part of the higher work done at a German gymnasium at our universities, and for continuing this state of matters a powerful argument can be drawn from the circumstance that it is advisable that the passage of the boy from the strict discipline of the school to the unrestricted freedom of the university should be gradual and not too abrupt and difficult, as it is believed to be in Germany. In our universities also we have classes where the element of research is important; and so it is with some universities in England and America. But nowhere has there been the distinct difference between the education that treats the lad up to twenty as receptive and the young man of twenty and upwards as following out the desires of his own mind in the search for truth, responsible for his own development and free to do what he deems best for his intellectual and moral progress.

A remarkable start, however, has quite recently been made. From 1870, the French have been firmly convinced that one of the modes in which they can recover most effectively the position which they lost in the Franco-Prussian War is by devoting their attention to education at every stage, but most especially to the higher education. Gradually the French have come to believe that the German ideal is sound and their method of accomplishing it the best, and so they have now set it forth as that by which they are to work. This conviction was brought about by a slow process. It did not spring from a wish to imitate the Germans, but was borne in upon them by their own experience of university work. M. Liard, who has been the most prominent agent in creating the revolution in the French universities, has thus expressed

these ideas:—"This sympathy and help has been found, this action has been forthcoming, and it is possible to-day to say that in spite of some remaining hesitation, inevitable so long as the revolution in progress is not finally carried out, the French universities are fully conscious of their three-fold function, or rather, of the three stages of their functions, in regard to learning. The first stage is to be a centre of general culture, the second to prepare for professions and careers, and, at the top, for picked students, to give opportunity for learned research. It is these ideas which have inspired the new regulations for examinations that have been submitted to the faculties. The best programme for a university is not to have one. The best regulations for professors is full liberty to teach, and for students full liberty to choose, at their own risk, out of the varied teaching of the university, according to their tastes, their aptitudes, and their plans for the future. In France, such a state of affairs is impossible, at least for many long years."

The difficulty, however, of attaining the highest aim in the French universities has not been found so great as might have been expected. In the first place, there has always been a considerable number of students in Paris continuing at their work until twenty-four or twenty-five or even longer, and, secondly, those who are now elected professors, are nearly all men who have devoted themselves to research, have gained the highest distinctions in their researches, and are therefore well able to inspire students with a love of scientific inquiry. It is fifteen years since M. Liard's paper was printed. During that time the University of Paris has made great efforts to carry out the ideal which he proposed, and there is no doubt that it has been strikingly successful.

Thus these two great nations have come to the conclusion that this is the best way to educate the men who are to have the highest influence in the State and the nation.

In Germany every professor has to deliver public lectures for which no fee is demanded. The French go beyond this, and many of their best professors deliver lectures suitable for the general student who may not wish a degree but simply a knowledge of the subject discussed, and, of course, they can also attend the classes which have been arranged for the qualified students. Now surely if this is the way in which two great nations believe that they can best educate their highly endowed citizens, is it not time that we should attempt something of the same kind? I have again and again said that there would be no great difficulty in accomplishing this in the University of St. Andrews. We have many students who are eager to continue their studies at the University. In fact, the great majority of those who have obtained the highest honours would gladly remain behind if their studies could have been so arranged as are the studies for the doctor of philosophy of Germany or the doctorat d'état of France, and in this way we could bring up some of our men to reach the highest excellence in the comprehension of the various problems which arise in the government of the people and in the amelioration of society. The same remarks could be made in regard to the other three Scottish universities.

But a very serious question emerges when we think not of Scotland alone, but of the British Empire. Are the universities of England and of the British Dominions to remain in a position unquestionably inferior to that of Germany and France? Is our Empire to fail in providing the culture requisite for the highest minds? Are we to take no means to supply the most perfect training to those who are to exercise supreme influence on the mass of men in the nations under our sway—the teachers, the legislators, the governing officials, and the literary men who guide the Press? Surely something is far wrong, if we do not at once look into this matter with the view of establishing at least an equality with Germany and France.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—A memorial fund raised by the friends of the late Humphrey Owen Jones, F.R.S., fellow of Clare College, who, with his wife, was killed in the Alps in August, 1912, has been gratefully accepted by the University, and a Humphrey Owen Jones lectureship in physical chemistry has been established. The General Board of Studies will shortly proceed to appoint a lecturer. The stipend arising from the memorial fund is about 150*l*. Candidates are requested to send their applications to the registrary of the University on or before January 17.

IN connection with the development of the forestry department in the University of Edinburgh, a second lectureship has been founded, and Mr. J. Lyford-Pike has been promoted to the post.

A COURSE of five advanced lectures on generating stations will be given by Mr. W H. Patchell, at the Battersea Polytechnic, London, S.W., on Mondays, at 7.30, beginning on January 19. Admission to the lectures is free, and no ticket is required.

THE council of the Society of Engineers (Incorporated) may award in 1914 a premium of books or instruments to the value of 10*l*. 10*s*. for an approved essay on "The Status of the Engineering Profession." The competition is open to all, but, before entering, application for detailed particulars should be made to the secretary, 17 Victoria Street, Westminster. The last date for receiving essays is May 30, 1914.

COURSES of lectures in science and in literary subjects will be given in the University of Leeds on Tuesday, Wednesday, and Thursday, January 13–15. These lectures are intended primarily to meet the needs of teachers who find it difficult during the school term to keep in close touch with the most recent developments of thought in regard to their subjects. The courses will, however, be open not only to teachers, but to all students, whether former members of the University or not. Among the subjects of the courses are:—"The Rôle of Enzymes in Plant Metabolism," Prof. J. H. Priestley; and (1) "Artificial Parthenogenesis," (2) "Regeneration in Animals," W. O. Redman King.

THE Bulletin of the Massachusetts Institute of Technology, Boston, for December, 1913, contains a catalogue of the officers and students of the institute, a statement of the requirements for admission, and a description of the courses of instruction. In the account given of the facilities for research particulars are included of the Hawaiin Volcano Observatory. A gift to the institute in 1909 made provision for special research in seismology and other branches of geophysics. On January 1, 1912, the Hawaiin Volcano Research Association cooperated with the institute to establish an observatory and laboratory at the volcano Kilauea. Investigations are carried on by a resident staff, and properly qualified investigators are received at the observatory for special studies. A limited number of advanced students engaged in research dealing with the problems of volcanology and seismology are received also, and the work is described as specially suitable to candidates for the doctorate. Among topics suggested as thesis subjects we notice the spectroscopic study of volcanic flames, collection and analyses of volcanic gases, and optical pyrometry applied to molten magma in the field.