THIRTY YEARS OF UNIVERSITY EDUCATION IN FRANCE.

THE modern conception of a University in France dates from the Revolution. In place of the old Sorbonne, veritable Bastille of scholasticism, the new University was conceived as a kind of laboratory and clearing-house in which every form of knowledge was to be pursued or dispensed. Yet in spite of the multiplicity of the subjects, unity was to be secured by the natural connection between the different branches and the common aims and ideals of the teachers themselves. Unfortunately the Revolution failed to realise the grandiose ideas of Talleyrand and Condorcet. With the exception of the Institute, the only establishments it created were the so-called "special schools" limited to the study of a single science or group of subjects, such as, for instance, the school of mathematics, the school of medicine, the school of Oriental languages, &c. To these the Consulate added the schools of law and altered the title of many of these schools into that of "faculties." It further increased the number of faculties by adding those of letters and of science. The research side of university work was ignored, the faculties were mere examination machines for turning out professional men. The only university was the University of France, which, though made a corporate body by Napoleon, was above all things an institution for the propagation of an official education most favourable to Imperialism. To this university all the different faculties in the different towns were subordinated. But here all connection ended. Although often existing three and four together in the same town, they were completely strangers to one another, having no unity or even relationship with one another, almost entirely devoid of the necessary resources, not merely for original investigation, but also for their ordinary work.

The evils arising from such an excessive centralisation combined with the practical isolation of the local faculties were certain to make themselves felt in the long run. "Paris," wrote Guizot in his "Memoires," "morally attracts and absorbs France." For this, in his eyes, the only remedy was the creation of a few large provincial universities. Recognising the impossibility of creating seventeen complete and fully equipped universities, he proposed to limit their number to four. Unhappily he was in advance of his time. The second Republic reduced the status of the university itself from that of a corporation to a mere branch of the central Government. The most enlightened Education Minister of the Empire, Victor Duruy, seeing the impossibility of reforming the faculties, determined to establish alongside of them a scientific institution called the École des hautes Études, which reminds one, though its scope was wider, of the Royal College of Science, inasmuch as the savants who formed the "personnel" were chosen on their merits alone, and no question was made as to whether they were members or not of the university. The school had no fixed quarters, but any professor of ability in the Sorbonne, the Collège de France, the Museum of Natural History, or in any laboratory, was pressed into the service of this new corps of learned and scientific teachers. The effect of the opening of this "opposition shop" was most beneficial on higher education throughout the whole of the country.

Nevertheless the general condition of higher education was, in the words of M. Liard, "very lamentable, and what was most lamentable of all was not the insufficiency of the buildings, the poverty-stricken state of the laboratories, collections and libraries, or the dearth of resources, but the almost absolute misconception of their real functions by the professors of those faculties which ought to have been above all the instruments of scientific progress and of the propagation of scientific methods. With a few exceptions, in the faculty of letters the teaching was above all rhetorical and fashionable, in that of science it was nearly everywhere limited to the mere popularisation of discoveries. The highest work of university education, the training and formation of the man of science, was almost unknown. The admirable savants of the time were self-taught persons without a university degree."

Such was the state of things when the disaster of 1870 occurred. With the conclusion of peace, savants and patriots joined forces in favour of a radical reform of the university system. It was felt that inefficiency in higher education had been one of the causes of national defeat.

The most competent judges were agreed that the essential defect in university education was the multiplicity and isolation of the faculties. The remedy in their eyes was the concentration of the faculties of the different orders into a limited number of "powerful centres of study, science and intellectual progress." Jules Simon affirmed the necessity of "having a certain number of intellectual capitals in which are to be found united all the necessary resources for the complete development of the young." Again, according to M. Laboulaye, universities were the one thing needful. "Let them cease to scatter over the surface of France faculties the isolation of which condemned them to sterility."

Some of the strongest arguments in favour of reform came from the men of science of the day. It was pointed out that the duty of the Universities was not merely to distribute the existing stores of knowledge, but also to lead in the van of discovery. "Close the laboratories and libraries," said Bertholet, "stop original investigation and we shall return to scholasticism." Insistence was also laid on the extreme value of scientific discovery as a factor in the industrial struggle between the different nations, while at the same time the importance of introducing the scientific spirit into the mental life of a people only too often swayed by sudden emotions was strongly emphasised.

But the advocates of university reform had a very serious difficulty to encounter at the outset. Alongside of the faculties there already existed the big scientific establishments like the Collège de France, the Museum of Natural History, and the professional schools, such as the École Polytechnique and the École Normale, in which the flower of military engineers and university professors were being trained. All these bodies were bitterly hostile to incorporation. Fortunately they were all situated in Paris, where in reality there was room both for themselves and the University. The main problem after all was the creation of provincial universities.

Here the difficulties were far more real and pressing. To begin with, many of the existing professors in the faculties were by no means in sympathy with the reformers. For them the function of the faculties was to turn out lawyers, magistrates, doctors, pharmaceutical chemists (the calling of chemist in France ranks as a liberal profession), not to conduct original research. Did not the Collège de France and the Museum of Natural History exist specially for these purposes? The answer was one which has since been given in higher technical education in England and elsewhere, that science should be the centre of professional training. Practice without science was pure empiricism, and empiricism was out of date. Claude Bernard had already converted medicine into an experimental science, and the historical method had wrought a similar transformation in the study of law. Whether the faculties remained isolated or not, they would henceforth have to

adopt scientific methods. Naturally every student could not be turned into a man of science, but every one had a right to know the scientific truths on which his professional education was based, while the small élite of really talented students should have the opportunity of engaging in scientific investigation. In the case of these exceptional students the method of working in common with their masters had hitherto been largely neglected. Yet its importance in working out a discovery to its fullest extent is not only beneficial to all parties, but often of the highest importance to the country at large. Another objection urged by the opponents of reform was that a university by definition implies the concentration of subjects, whereas modern science on the contrary is fissiparous by nature, ever splitting up into new branches and specialities. To this it was easily answered that one of the chief dangers of the day was excessive specialisation, and that the university is therefore the best antidote, as its chief function is to coordinate knowledge and make it a general object of culture. Warned by the excessive specialism that is rampant in German universities, the French have taken for their motto, "Specialisation subordinated to a general culture."

In 1883 Jules Ferry brought the question within the sphere of practical politics by a circular addressed to the faculties; after speaking of the efforts he had made to develop in higher education the sentiment of responsibility and the habit of self-government, he went on to say:—

"We shall have obtained a great result if we are able to constitute one day universities uniting within themselves the most varied kinds of teaching, in order mutually to assist one another, managing their own affairs, convinced of their duties and of their merits, inspiring themselves with ideas suitable to each part of France with such variety as the unity of the country allows, rivals of adjoining universities, associating in these rivalries the interest of their own prosperity with the desire of the big towns to excel their neighbours and to acquire particular merit and distinction."

In conclusion he invited the faculties to give their opinions on his suggestion. These were, in the main, favourable. It was left, however, to his successor, M. René Goblet, to take the first official steps. It was evident to all that the new universities could not be constituted after some ideal plan, but would naturally have to be built up out of the existing faculties. To group the latter in collective wholes, effacing all distinction between them, would have proved too drastic a measure. The best way of building up a university was to begin by strengthening and not by weakening the faculties. This was done by restoring to them the "personalité civile" which had lapsed, and recognising their capability to receive and hold property. At the same time another decree, without giving them the absolute right to frame a budget, allowed them the right to expend all subventions, to which no conditions had been attached by the parties making them, whether departments, communes, or private individuals, on the creation of new courses of instruction, on laboratories and libraries, and on scholarships. To regulate this expenditure a council was created called the "Conseil général des Facultés." This council, established for purely financial reasons, was destined to become the real nucleus in the development of the universities. As M. Liard has well said, "the decree of 28th December, 1885, was truly the provisional charter of the universities before the universities." Linking together the faculties of a single town, the Council not only dealt with the functions for which it was first created; it was soon allowed, under certain conditions, to draw up the programmes of courses and lectures, to exercise certain disciplinary powers, to make financial proposals to the Minister, and to engage in a multiplicity of tasks which fall to the lot of an ordinary university to perform. In 1889 the separate faculties received the right to frame budgets of their own. At the same time those grants were directly paid to them which the Ministry previously had itself expended on buildings and equipment. So far the Government had only proceeded by way of decrees, a method which is not unknown in England, and corresponds roughly to an order in council, but in 1890 the moment seemed to have come for legal enactment, and M. Léon Bourgeois, the then Minister of Public Instruction, brought forward a Bill to settle the whole subject once for all.

Nothing gives a better idea of the enormous sacrifices made by the Republic for the sake of higher education than the preamble of the Bill, which ran as follows:—

"The Republic has understood that university education is in the highest degree necessary; that if primary education is, according to the phrase of one of our predecessors, the canalisation by which knowledge is distributed to the very lowest strata of democracy, university education is the source where it collects and whence it flows. It has understood that a particular dignity and utility are attached to this grade of education, that in it especially are formed and trained the men who are capable of conceiving general ideas, by the power and novelty of which the real influence of nations is measured to-day. Therefore it has liberally given to it the necessary millions which had been persistently refused by former administrations.

"In the last 15 years it has renewed the buildings of the faculties.

"It has supplied almost entirely their equipment, their laboratories, their libraries.

"It has enlarged and increased the scope and range of their teaching.

"It has more than doubled their budget.

"It has improved the position of the 'personnel' and endowed their teaching with the requisite resources.

"It has created two categories of student, formerly unknown in France, students in science and in letters.

"It has introduced more science into those courses in which the preoccupations of professional studies predominated, and it has imposed a professional task on those orders of faculties which were without it.

"It has restored to the faculties the 'personalité civile,' a right which a suspicious *régime* had denied they possessed.

"It has rendered relationship possible between them by giving them a common function to fulfil.

"It has given full liberty to science and theory.

"It has favoured the coming together of students as well as that of teachers.

"In conclusion it has seen the number of its students rise from 9000 to more than 16,000, foreigners returning to its schools, and frequenting them in greater numbers than in any other country in Europe."

The Bill itself proposed to create universities in the fullest sense of the word out of the existing groups of faculties in the seven largest towns. Unfortunately local influences proved too strong; the other ten towns possessing two or more faculties demanded equality of treatment. The former adversaries of the project joined forces with them, and in the end the Government was obliged to withdraw the Bill.

Beaten on the question of establishing local universities of the fully equipped type, the reformers took once more the line of least resistance, and in 1893 an Act was passed investing with the "personalité civile" the groups of faculties formed by the union of several faculties, and represented by the Conseil Général. This was followed in 1896 by an Act introduced by M. Poincaré, which converted these groups of faculties into

universities. The idea of full and complete universities, which had been the underlying conception of the Bill of 1890, was abandoned, and wherever an academy existed, even if it had but two faculties, its place was taken by a university. As M. Liard well says, "it was a choice between having too many universities or of having none." To provide funds, the tuition fees, which had hitherto gone to the Treasury, were handed over to the new bodies. The examination fees, however, were still retained by the Treasury. The law contained but four clauses. The first decided that the groups of faculties should take the name of universities. The second decided that the Conseil Général should receive the title of university council. The third enlarged the disciplinary powers of the new council. The fourth dealt with the financial arrangement mentioned above, the new funds provided being "earmarked" for certain definite purposes, such as expenditure on laboratories, &c. Certain other financial rearrangements were made, with the result that the extra cost to the State came to about 15,000*l.* a year. The existing "personnel" was paid, as before, by the State, and the regular grant, variable year by year, for buildings and equipment was likewise continued. By the law of 1899 the universities were allowed to establish "degrees of a purely scientific kind." This was largely done to encourage the attendance of foreigners, while the proviso that they conferred no rights or privileges safeguarded the State from incurring any responsibilities *vis à vis* their recipients.

The preamble of the Bill of 1890, quoted above, gives an adequate summary of the progress made from 1870 up to the university year 1888-1889. More detailed information of the progress since that date is to be found in the "Statistique de l'Enseignement Supérieur," which brings up the record to the university year 1897-98 (the last year available). The following are some of the principal items of interest. Though the French universities have not, with very rare exceptions, found any benefactors on the scale of the Rockefellers and Carnegies, the list of benefactions published in full shows that the power of the new universities revived in 1875 to receive donations and legacies has not remained unappreciated. The University of Paris has received such lump sums as 210,000*l.*, Montpellier such as 60,000*l.*, while several have received donations of 4,000*l.* or less. In 1889 the annual grant from the State amounted to about 456,284*l.* In 1898 it was more than 523,640*l.*, showing an increase of 67,000*l.* odd over the grant of ten years before, which itself was more than double the grant under the Empire. Though the universities received the above sums in hard cash, the actual cost to the State was less, as one must deduct from it the fees for degrees, which, as has been already stated, go into the coffers of the State. These amounted to 5,135,162 francs in 1898, or, roughly, 205,406*l.* The net expenditure, therefore, of the State was about 318,000*l.*

The departments and municipalities make contributions to nearly all the universities, their contributions being "earmarked," as a rule, for specific purposes. They practically support all the medical schools, whether situate at the seat of the university itself or within its area of control, the only exceptions being Paris and Bordeaux, which also receive a State subvention. The contributions of the departments and municipalities to the budgets of the university and faculties amount to about 68,000 francs and 132,000 francs respectively; their contributions to the medical schools unsupported by the Government, and to the so-called preparatory classes in letters and science amount to about 135,500 francs and 882,000 francs respectively. The total income of the universities, including these medical schools, but excluding the Collège de France, the Museum, and the various special schools, amounts to about 14,142,000 francs for the universities, and 1,582,858 for the medical and preparatory schools, in all a grand total of about 15,725,000 francs. Towards this total the State contributes 13,096,664 francs, the departments about 203,000 francs, and the municipalities about 1,014,000 francs; the rest is made up of students' fees, legacies, and contributions by societies and private persons. As, however, the towns receive from university sources the sum of 421,837 francs, their net contribution is only about 593,000 francs, or roughly about 23,720*l.*

Since 1888-89 the number of students has risen in a remarkable fashion, though no doubt this increase is due in part to the law which grants two years' exemption from military service to those who have passed certain examinations. In 1888-89, the number of students was about 16,000, in 1898 the total had risen to 28,782, of whom 871 were women, and no less than 1784 of foreign nationality. All the faculties show an increase in the number of students during the same period, but those in science (a school which did not exist before the Republic) show the greatest increase. Their numbers have risen in the last ten years from 1187 to 3424.

The Baccalauréat shows the same remarkable increase. Certain changes in the examination do not permit of a comparison being drawn with any year earlier than 1892–93. In that year there were 25,612 candidates for the different sections of the examination, of whom 11,518 passed. In 1897-98 there were 36,922 candidates, of whom 16,688 passed. The other establishments of university rank, the Collège de France, the Museum of Natural History, the École Normale Supérieure, the École pratique des hautes Études, &c., all received an increased grant in 1898 in comparison with the last decennial account. The Collège de France, which is entirely devoted to research work, contains no less than forty-two chairs, and receives from the State nearly 21,000*l.* a year. The Museum of Natural History, equally devoted to research, has a budget of more than 38,000*l.* The school of Oriental languages, which has no counterpart in England, though we have a far greater need of one, receives more than 6000*l.* a year. The École des Chartes receives more than 3000*l.* The École pratique des hautes Études receives more than 12,500*l.*, as well as more than 1500*l.* a year from the City of Paris. The majority of these institutions have enormously developed, if they have not been actually created, under the Republican *régime*.

One word must be said in conclusion for the free universities founded in 1875, when the university monopoly in higher education was abolished. At first permitted to grant degrees similar in name to those of the official world, they have since lost the right. In spite of this they have none the less continued to increase. In 1888-89 their students numbered 726, in 1897-8 they had increased to 1407. It is difficult to say what will be their fate under the present campaign to re-establish the monopoly of the State in education. The higher schools of art and technology being under more or less separate authorities do not figure here in the list of higher education.[1] The present *régime* has been equally liberal and equally successful in dealing with these important branches of national education. Whatever may be the final verdict of history on the Republic, its bitterest critics will never be able to contest the fact that only Prussia after Jena can compare in any way

[1] The schools of art are under a separate department in the Ministry of Public Instruction and Art. The higher schools of commerce and technology are under the Ministry of Commerce.

with the thoroughness and success with which it has reformed and revivified every branch of higher education. CLOUDESLEY BRERETON.

Principal works consulted :—" Ministère de l'Instruction Publique et des Beaux Arts; (1) Statistique de l'Enseignement Supérieur; (2) Introduction à la Statistique de l'Enseignement Supérieur, par M. L. Liard, Directeur de l'Enseignement Supérieur. (Paris: Imprimerie Nationale, MDCCCC.) (3) " Législation et Jurisprudence de l'Instruction Publique. Extrait du Répertoire du Droit administratif." Première partie, Historique et Organisation générale; Deuxième partie, Enseignement Supérieur; Sixième partie, Écoles ne relevant du Ministère de l'Instruction Publique. (Paris: P. Dupont, 1903.)

THE RESUSCITATION OF THE APPARENTLY DROWNED.

IN 1862 a committee, which included several eminent medical men and physiologists—amongst the latter Dr., now Sir, John Burdon Sanderson—was appointed by the Royal Medical and Chirurgical Society to investigate the phenomena attendant upon drowning, and the methods which had been recommended for the recovery of apparently drowned persons. That committee made a number of experiments in man upon the dead subject, and upon animals during life, and the results they obtained were duly published in the *Transactions* of the society. But it appeared important to renew the inquiry with modern methods, and a second committee for the investigation of this important subject was accordingly appointed a few years ago, with Prof. Schäfer as chairman. This second committee attempted, in the first instance, to pursue the inquiry as to the best means of carrying on artificial respiration, in the same manner as the 1862 committee, *i.e.* upon the cadaver, but met with grave difficulties from the outset in the enormous resistance which the condition of *rigor mortis* sets up to effecting changes of volume of the chest, a difficulty which had been also met by the earlier committee, and very imperfectly surmounted. The new committee accordingly decided to discard the cadaver, and to endeavour to determine in the living human subject how great an amount of air could be moved into and out of the lungs by movements imparted to the thorax by the agency of external force. This force was applied either by intermittent traction upon the arms, or by intermittent pressure upon the thorax, the subject being either in the supine or prone position, and remaining perfectly passive during the short period of the experiment. The amount of air taken in and given out was measured in a graduated vessel, or by means of an ordinary gasometer.

The results showed that by all methods which have been suggested for the performance of artificial respiration, viz. the Silvester traction method, the Marshall Hall rolling method *plus* compression of thorax, the Howard method of compression of thorax in the supine position, and also a similar method of pressure upon the thorax with the subject in the prone or semi-prone position, an amount of air can be drawn into and driven out of the thorax which is at least as great as the amount of air exchanged in the ordinary tidal respirations of the individual. This being so, it is evident that, in selecting a method of artficial respiration for restoring the drowned, one should be guided less by the actual amount of air which any given method is capable of exchanging than by other considerations, such as the facility offered for the escape of water and mucus from the air passages, and the preventing of the tongue from falling back and blocking the fauces, both of which objects are better attained by the lateral and prone than by the supine position. It was further clear that it is more easy to effect artificial respiration by exerting intermittent pressure upon the thorax than by arm traction, and although the committee do not give instructions for the restoration of the apparently drowned in their report, it is obvious that their conclusions point to the adoption of the prone or semi-prone position of the subject, and to rhythmically intermitted pressure upon the thorax, as the methods which are likely, in the circumstances of drowning, to yield the best results.

The experiments upon animals (which were performed almost entirely upon anæsthetised dogs) are, it is believed, the first in which all the phenomena connected with the circulation and respiration have been graphically recorded during the process of drowning and subsequent resuscitation by artificial respiration. The chief points which they illustrate are the very large amount of water which can be taken into the lungs and become entirely absorbed into the system within a few minutes, without producing any but quite temporary symptoms, the great amount of vagal stimulation which is produced during drowning, and which is, in some instances, sufficient to arrest the heart's action almost entirely, and the extreme variability in the power of resistance to drowning in different individuals of the same species, so that, while a submersion of two minutes is fatal to some individuals, one of seven or eight minutes, or even more, can be borne by others with a fair chance of recovery as the result of the application of artificial respiration. The experiments all point to the supreme importance of commencing artificial respiration at the earliest possible moment, and are, therefore, condemnatory of all instructions for the recovery of the apparently drowned which direct that, before proceeding to apply artificial respiration, the patient should be divested of clothing, hartshorn should be applied to the nostrils, and various other remedies attempted—all of which merely serve to waste time, every second of which is invaluable for combatting the actual condition which is threatening life, viz. the lack of oxygenation of the blood. Incidentally it was found in the course of these experiments that, without sufficient aëration of the blood, even the most powerful cardiac and vascular stimulant—such, for example, as the extract of suprarenal capsule—is entirely unable to assist recovery.

The experiments upon the cadaver were chiefly performed by Mr. Pickering Pick, Mr. Henry Power, and Dr. J. S. Bolton, in London; those upon the living subject by Prof. Schäfer and Dr. P. T. Herring in the physiological laboratory of the University of Edinburgh. The report of the committee was read by Prof. Schäfer at a largely attended meeting, held on May 26 last, at the rooms of the society in Hanover Square.

NOTES.

WE regret to learn that on Saturday, July 25, M. Prosper Henry, of the Paris Observatory, was found lying dead in the La Valoise Valley near Pomogen at an altitude of 1600 metres, in the French Alps. His death appears to have been due to congestion caused by extreme cold. M. Henry was buried at Nancy, his birthplace, on August 1. A number of astronomers was present at the sad ceremony, among them being M. Callandreau, of the Paris Academy of Sciences; MM. Borchart and Fraissinet, of the Paris Observatory; and M. Trépied, director of the Algiers Observatory. M. Prosper Henry and his brother, M. Paul Henry, were attached to the Paris Observatory in 1865, and their work is well known in the astronomical world. Between 1872 and 1882 they discovered fourteen asteroids,