beetroot are over, and sugar-cane will go the way of all discarded products." This prediction depends, however, upon another condition besides that of the abundance of the flowers. If the sugar they contain be wholly or chiefly cane-sugar, that is, "sucrose," then the argument is not without weight. But the nature of the saccharine matter of the Mahwa does not appear to have been ascertained. MM. Riche and Rémont (*Journ. de Pharm. et Chimie*, 1880, p. 215) stated that the air-dried flowers contain 60 per cent. of fermentable sugar, of which about one-seventh is crystallisable. The material available for analysis in Europe consists, of course, of the dried flowers. These may have suffered some change beyond the mere loss of water, but the evidence they afford on chemical examination is not favourable to the view that they are likely to compete with sugar-beet or sugar-cane as a source of cane-sugar. Here is the result of an analysis of a sample of Mahwa flowers (from the Kew Museum) in their air-dried condition :—

	In 100 parts
Cane-sugar	3·2
Invert-sugar	52·6
Other matters soluble in water ...	7·2
Cellulose	2·4
Albuminoids	2·2
Ash	4·8
Water lost at 100° C....	15·0
Undetermined...	12·6

The flowers analysed had a slight smell of fermented saccharine matter and a distinct acid reaction. But it is not at all probable that they could have contained any large proportion of cane-sugar even when quite fresh, and that 15/16ths of that sugar had been inverted during the process of desiccation. We cannot argue from analogy in this case. For while the nectar of many flowers contains no sugar except sucrose, invert-sugar occurs in some blossoms, as well as in many other parts of plants. Even the unripe and growing stems of the sugar-cane and of many grasses contain much invert-sugar. It must, however, on the other hand, be remembered that cut sugar-canes imported into this country contain a large amount of invert-sugar, and that if they be kept a week only after the harvest the invert-sugar naturally present in the juice shows a marked increase and the cane-sugar a corresponding diminution. On the whole, then, so far as the materials at my disposal enable me to judge, I believe that the saccharine matter of fresh Mahwa flowers will be found to consist mainly of dextrose and levulose, and that consequently they will not be available as a material for the economic production of sucrose.

I have to thank Mr. W. T. Thiselton Dyer, C.M.G., Director of the Royal Gardens, Kew, for drawing my attention to this subject, and for a supply of the material on which I have worked. A. H. CHURCH

THE UNIVERSITY EXTENSION MOVEMENT[1]

THIS "movement" is one of the most significant of the present day, and provides a most useful step in that ladder of learning which it is desirable to see reaching from the elementary school up to the University degree.

Under the University Extension system, knowledge of the highest character is offered by its acknowledged possessors to all classes alike, yet with the very popular qualities of cheapness and attractiveness. The contents of this paper fall naturally into two heads : first, the advantages offered and the objects aimed at by those engaged in the work ; and, secondly, hints and instructions as to the methods by which the work may be successfully carried on. Mr. Moulton vigorously urges the former, and has ten years' experience in the latter.

The ideal aimed at is, that a University education should be placed within the reach of any "person" in any grade of society, and that large bodies of students all over the country should be attached to the University as associates, of whom, if few ever became full members, yet any might do so, and all have started on the road. The Universities have set themselves to meet the wants of classes who have been long debarred from such privileges ; and an ample page of knowledge will be spread before the eyes of all whom partial education may lead to seek it yet further.

The desire has long been felt both among middle and lower classes. The old Literary and Philosophical Society on behalf of the one, and the old Mechanics' Institute of the other, were both anxious attempts to do, by voluntary effort and amateur work, what the University now offers to undertake as a special business, by means of an itinerant system of authorised teachers taken from their most highly-trained and successful graduates. Under the eye of the Syndicate, and not making popularity their end, they will have a power at their back and a guarantee of their quality and of its permanency which the old lecturers could never give.

The great difference, accordingly, from the single desultory lectures given at the old institutions is the thoroughness of the instruction aimed at under this new system rising by stages to the full studies of the University. No subject is undertaken in a set of less than twelve lectures ; notes are expected to be taken, the books recommended by the lecturer are expected to be read, and a class is held before or after the next lecture to incite and help the students. An examination takes place at the end of the course requiring a higher standard than the ordinary college examination, and not a lower one on account of the student's difficulties, for such students are allowed eventually to take a University degree, and it is correctly felt that it would be exceedingly mischievous in any way to lower the standard now required for that. This may seem a high one for candidates often consisting of a large proportion of working men, but nevertheless, in many cases where comparison could be made with young men resident at college, the former have proved to have the advantage over the latter. This again is not incredible ; persons attending these lectures are drawn from all classes alike, yet all are volunteers, who have felt their want and chosen their subject—the best soil for any seed of knowledge to fall upon. It is not the upper classes only who are found to appreciate higher education, but it has proved to be a cause which can rouse passionate effort among working men placed in the most unfavourable conditions.

The Universities thoroughly sympathise with the demand in these days for knowledge in the lines of science and of modern history. There is perfect freedom from holding up classics and ancient languages, and abstruse mathematics as the *summum bonum*. The principal supporters of the movement are clearly divided into favourers of science, and favourers of literature and art, and an effort is made to thoroughly meet either demand. Indeed, nothing is more striking in reading this publication than the elasticity with which the University sets itself to fit its syllabus of subjects, and its arrangements for teaching them, to the various wants of the different bodies who wish to avail themselves thereof—whether colleges, philosophical societies and institutes, free libraries, subscription libraries, or special societies or companies for the purpose. Instances are given of the lectures being carried on by all these various bodies, and to all who would make use of this means of increasing knowledge, practical advice is here given upon matters down to those of the smallest range, and we may quote the following experiences :—

Ladies more than gentlemen are glad of the educa-

[1] "The University Extension Movement." By R. G. Moulton, M.A. With an Introduction by Prof. Stuart, M.P. (London : Bemrose and Sons, 1886.)

tion here offered, and ladies accordingly should always form part of the committee; young people also who have lately left school and can attract their companions to continue whatever study they have liked or felt the value of; pupil teachers—often, hereafter we hope, as at Hull now, the School Board paying the fee—attending as a matter of business; and artisans who feel their deficiencies. The trades unions of the latter already, some of them, spend 1000*l.* a year in education, and if men can also be attracted here to increased knowledge, lay in a solid foundation of some science at a course of lectures, and get their intelligence awakened to what is going on in the world around them, public-houses will to them be no great temptation, and much of their work will be carried on more intelligently.

Where, as is generally the case, from three to five towns at no great distance apart can agree upon a course of lectures to be given, and audiences can be drawn to both afternoon and evening deliveries, it is found that the charge made to one of the courses need not exceed three shillings for the set of twelve lectures. Nevertheless the financial difficulty is described as the greatest both to lecturers with the rich University at their back, and to hearers, who certainly may lose working-hours and perhaps feel the attendant small expenses of books, &c. It is one of the most curious characteristics of this movement that the lectures are assiduously attended by all classes of society alike, and yet the seekers after knowledge themselves do not value it at its cost price, even when offered on so liberal and economical terms. However, higher education always did require the help of the patron of letters and of the founder of the college, and he who assists these classes may rest satisfied that he is carrying on their work in a modest way.

Prof. Stuart in his Introduction hopes, and cannot doubt, that the University or some other competent body may realise the vast influence and noble position here to be attained. The compressed population of England possesses great economical advantages over the scattered townships of America. It cannot be believed that financial difficulties will be suffered to stand in the way of this movement, and we may look forward to seeing our Universities literally worthy of their name through offering all knowledge to all sorts and conditions of men.

W. ODELL

THE NEW NATURAL HISTORY MUSEUM IN VIENNA

THE two magnificent palaces in the Ringstrasse, opposite the old Kaiserburg, designed, the one for the conservation and exhibition of the art history, the other of the natural history, collections of the Imperial Court, are rapidly approaching completion. Completely alike as they are in their decorations and their style of architecture generally, their interior arrangement does of course in each case conform with the special requirements of the collections each is intended to receive. The lateral front, 69·38 metres long, faces the Ringstrasse; the main fronts, at right angles to the Ringstrasse, run, with a length of 169 metres, parallel to each other, separated by a square which is laid out in garden plots, and is to be crowned in the centre by the monument of Maria Theresia. The design and execution of the two buildings emanate from one of the most eminent architects of Vienna, Karl Baron Hasenauer, who is at present directing likewise the erection of the Court Theatre, and the reconstruction of the Hofburg.

The building occupying the more western site, and destined to receive the Natural History Museum, is somewhat further advanced as a whole than its eastern compeer. A few particulars regarding this Institute will be acceptable to the readers of NATURE.

The collections hitherto kept apart, and now about to be united into one grand and indivisible whole in the new building, are under the supreme direction of the Royal and Imperial Chief Staff of Stewards of the Court (*Obersthofmeisteramt*), the present head of which, Prince Constantine Hohenlohe, takes a most lively interest in this branch of his administration. They embrace:—

(1) The Mineralogical Court Collection, hitherto distributed in four rooms of the Hofburg and some smaller underground compartments there. These comprise the mineralogical, geological, and palæontological treasures.

(2) The Zoological Court Museum, popularly known as the "Naturalien Cabinet," hitherto exhibited in a quarter of the Hofburg, in Josephsplatz, adjoining the Court library.

(3) The Botanical Court Museum, which, along with the herbarium of the University, found its accommodation in a structure situated in the Botanical Gardens, and belonging to the University.

(4) The Prehistoric, Anthropological, and Ethnographical collections, hitherto not exhibited, but kept packed in various depots.

The new building destined for the accommodation of these collections possesses four stories. The lowest, elevated but a few feet above the level of the street, and distinguished as the "*Tiefparterre*," is arranged as a storehouse, with assorting rooms for the different divisions of the Museum, and here, too, the chemical laboratory for the mineralogical department is to be fitted up. The next two stories, distinguished as the "*Hochparterre*" and "First Floor," are designed for the exhibition of the various objects that will be arranged for general view. Each of them consists of a suite of nineteen halls, ranging from 200 to 260 square metres in area, disposed all round the exterior face of the building, which stands on free and open ground, in such order that, entering from the staircase, visitors will be enabled to pass through them in a continuous series, re-issuing into the staircase at a place opposite to that by which they entered. Inside this exterior suite of rooms, and looking down into the two large courts, are ranged a series of smaller compartments in a line parallel to that of the large halls, destined in part likewise for purposes of exhibition, but mainly for the libraries of the different departments and the laboratories of the various divisions.

The plan for the distribution of the different collections in the halls, and for the general arrangement of the whole, was drawn up by my predecessor, Intendant Hofrath von Hochstetter, who, unhappily, was called away in the midst of his ardent activities in the summer of 1884; and, except in the case of a few quite subordinate alterations, this plan has been completely maintained.

The former Mineralogical Court Collection is divided into two assortments: a mineralogical-petrographical and a geological palæontological. The first, which is under the care of the custodian, Dr. A. Brezina, assistant to Dr. Friedrich Berwerth, has the Halls I. to V. inclusive in the *Hochparterre* (see figure) assigned to it. In the central repositories of the Halls I. to III. will be shown the finest specimens of our long-celebrated collection of minerals, arranged in the main according to the system of Groth. The wall-cases, having higher frames, will exhibit in part the larger specimens, and in part local series of minerals. In the window recesses in Hall III. will be disposed a collection of polished precious stones.

Hall IV. will display in its wall-repositories a collection representing the paragenetic relations of minerals, as also smelting processes.

The central cases of Hall V. are intended to accommodate the meteorites. These will constitute the most brilliant point in the whole division. According to the last inventory of Dr. Brezina ("Year-Book of the Royal and Imperial Geological Institute," 1885, p. 151), this collec-