heard in reference to his terminology. I agree with Prof. Armstrong that there is some advantage to be gained during early stages of instruction by using names that do not prejudge the chemistry of the problem that is being investigated. But I think history usually supplies a good provisional name, such as inflammable air, calx of lead, spirit of nitre, and personally I should keep to the historical name where possible.

To call carbon dioxide chalk-stuff gas asserts that it comes from chalk, or that, in other words, it is a kind of air fixed somehow in chalk. I confess I cannot see that any greater presupposition is involved in calling it fixed air than in calling it chalk-stuff gas. Historically it was called fixed air, and I value the name because Black's clear perception and proof that a gas could be fixed in a solid and be a weighable material part of it was the means of inspiring Lavoisier with the right view of the part played by air in the calcination of metals, and so led to results of revolutionary importance. ARTHUR SMITHELLS.

Variation in Oat Hybrids.

AMERICAN and English observers have shown that the principles enunciated by Mendel are applicable to hybrid wheats. From observations carried out at St. Andrews, I have been able to demonstrate that the same principles are applicable to hybrid oats.

In 1901 I crossed a few white varieties of oats one with the other, and also black varieties with white ones. The progeny was in all cases characterised by very great vigour and prolificness. The hybrid characters were most easily distinguishable in the crosses between black and white varieties, the unilateral ear and dark grain of the one parent, and the pyramidal ear and light-coloured grain of the other, being so blended in the respective hybrids as to result in a somewhat one-sided ear and rich brown grain. It should be mentioned that by the colour of the grain is meant that of the closely adherent flowering-glume.

The grains of the four hybrids given below, after being classed according to their position in the spikelets, were sown singly in rows of one hundred each. At harvesting the ears of each plant were tied together, and the product of each row made into a separate bundle.

Long continued wet weather had damaged the plants so seriously as to render the working out of certain points impossible, *e.g.* the variation in the ears. From what has been noted in the available examples studied, the form of the ear will no doubt be found to be a constant character in the Mendelian sense. Sufficient material has been secured to show the dissociation of the colour of the grain.

The numbers of plants bearing respectively black, brown, white or yellow grain in the several bundles varied considerably. The totals only are given in the subjoined tables, the brown being classed with the black grain, and the yellow with the white. The distinction between the two classes thus tabulated was in all cases so marked as to offer no difficulty in sorting out, and they are therefore briefly put as black and white.

Goldfinder ♀ × *Black Tartarian* ♂ (*two plants*).

	No. of grains sown	No. of plants saved at harvesting	No. with black grains	No. with white grains	Ratio of black and white
(1)	1000	567	433	134	3·23 : 1
(2)	900	566	415	151	2·75 : 1

Black Tartarian × *White Canadian* (*one plant*).

890	532	379	153	2·48 : 1

Black Tartarian × *Abundance* (*one plant*).

600	274	209	65	3·21 : 1

The Black Tartarian oat is thus shown, in respect of the character in question, to be dominant, whether serving as pollen or seed parent. It is impossible to say whether the destruction done by bad weather affected one type more than another. If all the plants had survived, the proportion of black to white forms shown in the above tables might have been somewhat altered, but for several reasons it may safely be assumed that, at most, the alteration would not have materially affected the conclusion so clearly pointed to, namely, that the dominant and recessive characters in hybrid oats, as in many other self-fertilised plants, assert themselves in the second generation in a ratio closely approximating 3 : 1. JOHN H. WILSON.

Agricultural Department, St. Andrews University.

Visitors from the High North in Central Italy.

THAT *vexata quaestio* the migration of birds presents strange anomalies which confound the best informed theories on the subject. Last winter we had a surprise in the appearance in central Italy of the great white-billed diver, *Colymbus adamsi*, G. R. Gray, two of which were captured, a big ♀ on the Lake Chiusi or Montepulciano on December 2, 1902, and a large-billed ♂ on the 19th of the same month on Lake Trasimeno. Both were adults in autumn plumage, and are now in the central collection of Italian vertebrata in this museum. It is the first time that this sub-polar and eastern species has been noted in Italy.

This winter we have had a considerable invasion of that beautiful northern bird, the waxwing (*Ampelis garrulus*, L.). During December and January last they appeared in hundreds in our northern provinces, and from Vicenza, Padova, and Verona spread in flocks westward and southward. I received the first specimens on December 18, 1903, from Vicenza, and the last from Barberino di Mugello (Florence) and from Fano (Marche) on January 1 and 15. I also heard from Nice that more than 200 specimens, said to have come from Corsica, had been sold in the market.

HENRY H. GIGLIOLI.

R. Zool. Museum, Florence, February 22.

THE NEW BUILDINGS AT CAMBRIDGE.

THE King, accompanied by the Queen and Princess Victoria, visited Cambridge last Tuesday to open the new Law School and Science Laboratories which have recently been completed on the site the university acquired from Downing College a few years ago.

On reaching Cambridge, the royal party proceeded to the Senate House, where, in the absence of the Chancellor, the Duke of Devonshire, who was prevented from attending by illness, the Vice-Chancellor, Dr. Chase, president of Queens' College, presented an address, which was graciously replied to by his Majesty. In the course of his reply, the King remarked that he earnestly desired the well-being of the university and "the extension and development of all branches of study and research which are essential to the maintenance and the greatness and the welfare of my Empire." There must, he added, be "new endowments for education if my realm is to be kept up to its proper standard of efficiency." The Vice-Chancellor then gave a short description of the buildings, and an account of the Cambridge Association, whose benefactions had enabled the university to build them. He also dwelt upon the pressing need for buildings for the department of agriculture, and for proper provision for housing the ethnological and archæological collections of the university.

When the ceremony was over the King and Queen were entertained at lunch by the university in the large gallery at the Fitzwilliam Museum. The royal lunch party was strictly limited in number, and the university entertained a number of distinguished guests in the halls of Gonville and Caius and of King's College.

After the lunch the royal party inspected the new buildings, which comprise the Medical School, the Sedgwick Memorial Museum, the new Botany School, and the Squire Law Library and Law Lecture Rooms.

FIG. 1.—Botanical Laboratory: Elementary Class-room.

Of these the building for medicine lies on the north side of Downing Street and covers the site of the old Anatomical School so well known to the pupils of the late Sir George Humphry. The plans for this building were designed by Mr. E. S. Prior, of Gonville and Caius College, who has shown considerable ingenuity in satisfying the requirements of the several professors on a very awkwardly shaped site. The basement, which is partly beneath the level of the ground, is given over to store-rooms, workshops, combustion and photographic rooms, and engines and a ventilating installation on the Plenum system. On the ground floor are small laboratories connected with the medical and surgical departments and the chemical laboratories of Dr. Bradbury, the professor of pharmacology. Here also is a large lecture room capable of seating two hundred students, and the pathological museum. On the first floor is the spacious Humphrey Museum, the walls of which are lined with glazed tiles, and the library, which is fitted with movable book-cases which can readily be pulled out into the room. Near by is the private room of the professor of pathology, Dr. Sims Woodhead. On this floor also are rooms for Dr. Clifford Allbutt, the regius professor of medicine, and for Dr. Howard Marsh, the professor of surgery, and a class-room capable of holding fifty or sixty students. On the top floor are the spacious pathological laboratories, lighted from above; also rooms for the demonstrators and lecturers, one of which is specially adapted for hygiene, under the supervision of Dr. G. H. F. Nuttall.

In all the rooms the gas-pipes, water-pipes, and electric wires are carried in covered chases, and can be reached at a moment's notice. The walls and the ceiling are of adamant cement, and all grooves and corners are rounded. There are no angles, mouldings, or projections to catch the dust. It is proposed to supply the electricity used in the building by means of two Diesel oil-engines, and the new Medical Schools will be perhaps more self-contained than any other institution of the sort in Cambridge.

Owing to lack of funds the syndicate entrusted with the erection of the medical schools has only been able to carry out two-thirds of the complete plan. In time it is hoped that the building will be connected with the eastern corner of the Physiological Laboratory, and that more rooms, which are earnestly needed, will be provided for the departments of physiological chemistry and pathology, and that a space will be set apart for a proper development and teaching of hygiene.

The Botanical School forms the southern side of the court, which the university is rapidly enclosing, on the site it bought from Downing College seven years ago. Externally the building is simple and without ornamentation, but its proportions are good and architecturally

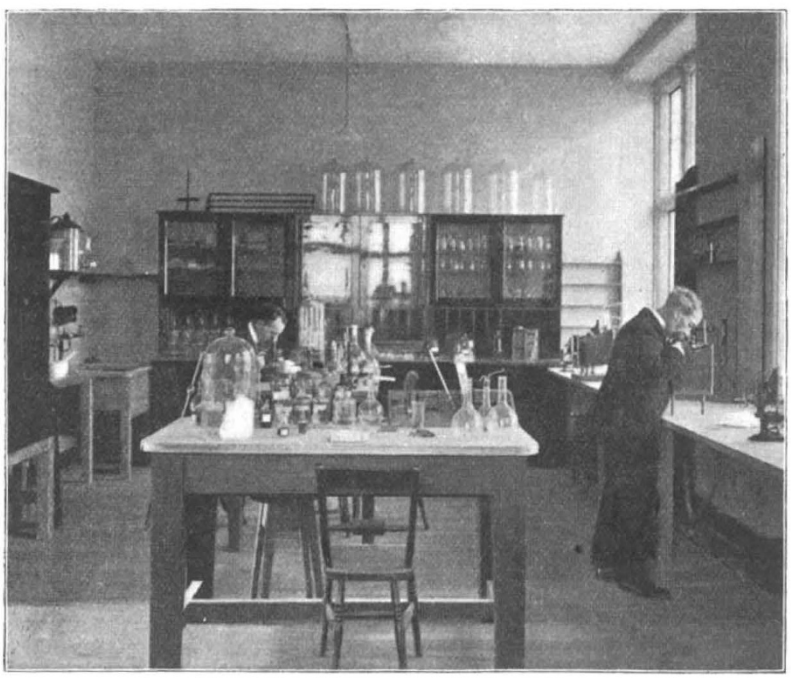

FIG. 2.—Botanical Laboratory: Professor's Room.

the effect produced is pleasing. The architect is Mr. W. C. Marshall, of Messrs. Marshall and Vickers.

The building is entered by two doors, from either of which access is gained to the large central lecture

room designed to accommodate some two hundred students. West of the lecture room is the herbarium, containing a very extensive collection of dried plants which have been accumulated since the chair of botany was founded in 1704, and a special library of systematic monographs. Corresponding with this, but on the eastern end, is a museum in which is exhibited a really remarkable collection of plants in spirit, besides many specimens of economic interest.

On the first floor of the building is a library, which contains more than four thousand volumes and in which nearly forty current scientific botanical periodicals can be seen. Above the herbarium is the morphological laboratory and the chemical laboratory with a photographic dark room.

The professor's rooms and rooms for sterilisers and incubators are over the museum, and other rooms on this floor are occupied by the lecturers in botany, Mr. Seward and Mr. Blackman.

On the second floor the western half of the space is occupied by a large laboratory capable of seating one hundred and fifty students. There are also rooms provided for the demonstrators and small lecture rooms for advanced students. The eastern end of this floor is occupied by a laboratory for plant physiology, connected with which is the dark room and the greenhouse. Mr. Francis Darwin, university reader in botany, has his rooms near by.

The large flat roof is well adapted for certain kinds of experimental work, and there are three greenhouses so arranged as to provide for the plants therein different external conditions throughout the year.

The great care exercised by Prof. Marshall Ward and the architect has resulted in the completion of what is probably the most complete botanical teaching institute in the Empire.

It is gratifying to know that the King's visit to Cambridge is being marked by the foundation of a scholarship of 100*l*. a year for encouragement of research in botany. The generous benefactor, who is already well known to Cambridge as the founder of a studentship at Caius College, is Mr. Frank Smart, of Tunbridge Wells.

FIG. 3.—Sedgwick Museum: West End.

In the year 1727 Dr. John Woodward bequeathed by his will to the University of Cambridge his collection of English fossils with the two cabinets con-

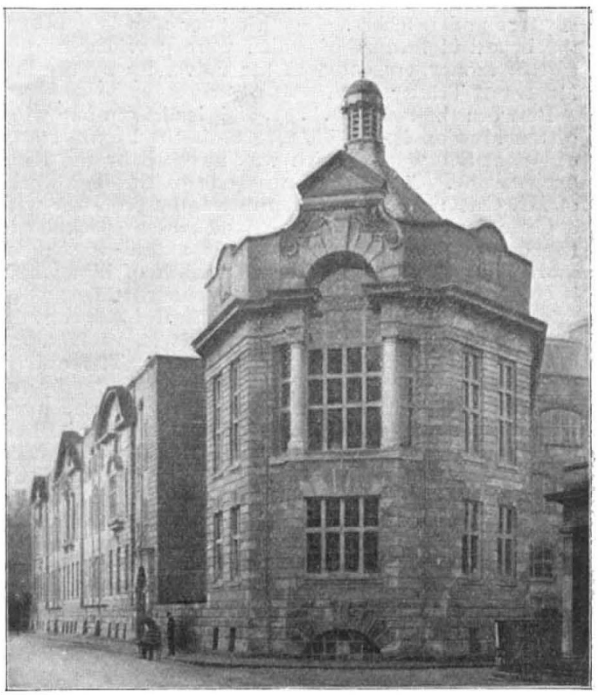

FIG. 4.—Humphrey Memorial Museum.

taining them and their catalogues. From this small beginning the geological collections of the university have grown.

The magnificent pile of buildings which has recently been erected is partly a memorial to Adam Sedgwick, one of Cambridge's greatest professors, who died at the beginning of 1873 at the advanced age of eighty-eight. In the spring of that year a meeting was held at the Senate House at which it was decided to collect money to build a new geological museum in his memory. So large a sum was collected, and so long a time elapsed before the museum was begun that the trustees, a year or two ago, were able to hand over a sum of money which amounted, with the interest received during the interval, to more than 26,000*l*. The remainder of the cost of the building has been defrayed by the university.

The Sedgwick Memorial Museum was designed by Mr. T. G. Jackson, R.A. Its ground plan is of an "L" shape, one side running along Downing Street, where it adjoins the new Law Library, the other side, at a somewhat obtuse angle, forming the western boundary of Downing Place.

On the ground floor are numerous workshops, a very fine lecture room, and a museum of economic geology. On the first floor the Sedgwick Museum occupies almost the entire extent of the Museum, one corner of which is partitioned off, and

here Woodward's ancient cabinets are piously preserved. Adjacent to them are the rooms of the Woodwardian professor, Prof. Hughes, and a board room.

On the second floor are numerous students' class rooms and private rooms for the various demonstrators and teachers. On this floor also is a library the beautiful fittings of which were provided from a gift of money presented to the university by the late Master of Trinity Hall.

Between the two arcades, which lead from one wing of the Museum to the other, stands the bronze statue of Adam Sedgwick which was unveiled by the King on Tuesday. This statue was one of the last works of Mr. Onslow Ford, and represents the professor with a geological hammer in one hand and a specimen in the other. Considering that this statue was made more than thirty years after the death of him whom it commemorates it is wonderfully successful.

The Law School forms the central block on the north side of the new courtyard. It is, in fact, the centre of Mr. T. G. Jackson's façade. The university has been able to erect this noble building by the generous bequest of Miss Rebecca Flower Squire, who has also endowed certain scholarships to be held by law students in the university. To the 15,000*l.* which the trustees allotted for the purposes of the Law Library the university has been able to add sufficient to complete the Law School by the addition of professors' rooms, lecture rooms, and examination rooms. The main library is a lofty room 85 feet by 30 feet in area, lighted by spacious windows on the north and south, and with book-cases projecting towards the centre of the room between each window. Above these are ample space for storing duplicates and books which are seldom used. Each end of the room is provided with a handsome gallery.

For some time, owing to the wants of the university library, the professor of civil law has been driven out of the old Law School and has been a wanderer through the literary lecture rooms. Miss Squire's bequest has enabled the university to find him a home, and for the first time in the history of the Cambridge Law School, more than five or six hundred years, the students of law will assemble in a handsome and roomy building especially adapted for their very needs and in close contiguity to the ample library.

The illustrations which accompany this article are taken from photographs made by Mr. Palmer Clarke, of Cambridge.

EDUCATION AND PROGRESS IN JAPAN.

IN his address at Southport last September, the president of the British Association, taking as his subject "The Influence of Brain-power on History," traced convincingly and conclusively the intimate relation that exists between the provision made by a nation for the higher education of its people and the position taken by that nation in the ceaseless competition between the great countries of the world. After a searching comparison between the facilities for university education in this country on one hand and in the United States and in Germany on the other, Sir Norman Lockyer said:—"But even more wonderful than these examples is the 'intellectual effort' made by Japan, not after a war, but to prepare for one. The question is, Shall we wait for a disaster and then imitate Prussia and France; or shall we follow Japan and thoroughly prepare by 'intellectual effort' for the industrial struggle which lies before us?" It would indeed be difficult to find a more striking example of the profound and comparatively immediate effect on national prospects which an earnest and thorough attempt to establish a complete system of education can effect. The events of the past few weeks serve to bring into high relief what was before clear enough to students of educational progress, that Japan has succeeded in a little more than thirty years in bringing about a revolution without bloodshed, in changing an eastern people—among whom originality was considered a form of disloyalty—into a powerful nation equipped with western education and possessed of all the resources of modern civilisation.

In the following attempt to trace the leading events of these thirty years of Japanese progress in education, reference has been made to numerous authorities, but most of the facts included are from a statement of the development and present position of State education in Japan prepared by Mr. Robert E. Lewis, of Shanghai, and published in the reports of the United States Commissioner of Education.

The beginning of modern Japanese history dates from 1868. For three and a half centuries before this date, to quote Mr. Lewis, "Confucius was the headmaster of Japan, with Buddhist priests as his understudies." But with the coming of the new learning and with the arrival of English-speaking people from America in 1853 and from England—in the persons of Lord Elgin and his suite—in 1858, in which year the British-Japanese treaty was signed, a change commenced which was destined, as subsequent events have shown, to be a rapid one.

A provisional board of education was established in Kioto in 1868, and three years later the Mombu-sho, or department of education, was established with a Minister of State to preside over it. The first educational code was issued in 1872, and in promulgating it the Emperor said:—"All knowledge, from that necessary to prepare officers, farmers, mechanics, artisans, physicians, &c., for their respective vocations, is acquired by learning. It is intended that henceforth education shall be so diffused that there may not be a village with an ignorant family or a family with an ignorant member." In 1898, that is, in twenty-six years, out of 7,925,966 children of school age in the country, 4,062,418 were being educated in schools modelled on western plans. Moreover, if only the boys are taken into account, there were in that year 82·42 per cent. of the Japanese boys of school age receiving what may be described as education in the European sense.

In 1872 what was known as "the world's embassy," consisting of forty-nine representative Japanese, including Prince Iwakura and Marquis Ito, was at work, and much of its attention was devoted to observations of education in Europe and America. The plan of sending Japanese students to foreign countries for the purpose of studying modern thought and methods has been much employed by the educational authorities of Japan, though in recent years the custom has been largely discontinued, as highly educated Japanese have become available for university and similar posts. For instance, in 1873 there were 250 students studying in foreign countries at the expense of the Japanese Government, while in 1895 only eleven Japanese students were similarly officially sent abroad. The same tendency to dispense with foreign assistance at the first opportunity is noticeable also when the personnel of the staffs of the institutions in connection with the Japanese department of education is examined. Though in the years following the promulgation of the first education code by the Japanese Government the number of European and American professors and instructors was relatively