1878.

NEW ZEALAND.

EDUCATION.

PAPERS RELATING TO THE ESTABLISHMENT OF SCHOOLS OF MINES.

Presented to both Houses of the General Assembly by Command of His Excellency.

No. 1.

EXTRACT from the JOURNALS of the HOUSE of REPRESENTATIVES.

Thursday, the 28th day of September, 1876.

RESOLVED,—That, having in view the vast undeveloped mineral wealth of the colony, and the necessity of obtaining the fullest possible information concerning the metals and minerals with which the country abounds, the House is of opinion that it is advisable to establish a School of Mines.—(*Mr. Barff.*)

A true extract.
F. E. CAMPBELL,
Clerk, House of Representatives.

CANTERBURY.

No. 2.

The Hon. D. REID to the BOARD of GOVERNORS of CANTERBURY COLLEGE.

GENTLEMEN,— General Crown Lands Office, Wellington, 31st January, 1877.

I have the honor to enclose a copy of a resolution passed by the House of Representatives in favour of the establishment of a School of Mines in the colony. In the short discussion which the motion elicited, a report of which is herewith appended for your information, it was intimated that the Government would take an early opportunity of drawing the attention of the governing bodies of the Otago University and of the Canterbury College to the subject, with a view to induce them to pay special attention to the establishment of mining schools in connection with these institutions.

In accordance with the intimation thus given, I have now the honor to request that you will be good enough to bring the matter before the Council of the Canterbury College, with a view to ascertain whether it will be prepared to establish a School of Mines in connection with the College, where instruction in a popular form might be given in the various branches of science relating to mining, and where persons desirous of having specimens of ores or minerals tested might be enabled to do so on reasonable terms.

The immense importance of this subject to the colony will, I am sure, induce your Council to assist in giving effect to the object in view. I shall be glad to be informed that your Council has resolved to establish a School of Mines in connection with the Canterbury College.

I have, &c.,
D. REID,
Secretary for Crown Lands.

The Board of Governors of the Canterbury College,
Christchurch.

No. 3.

The CHAIRMAN of the BOARD of GOVERNORS to the Hon. the SECRETARY for CROWN LANDS.

SIR,— Canterbury College, Christchurch, 9th February, 1877.

I have the honor to acknowledge receipt of your letter of the 31st ultimo, in which you call attention to the resolution of the House of Representatives respecting the establishment of a School of Mines, and request this Board "to assist in giving effect to the object in view."

In reply, I beg to state that immediately on receipt of your letter I called a meeting of the Board. The Board met yesterday, and adopted the report of the College Committee, which had previously considered the subject. A copy of this report is forwarded herewith.

The Board will shortly forward a carefully-prepared statement showing the appliances at present possessed by the College for giving the instruction required; also an estimate of the annual expenditure for the salary of a lecturer, together with an estimate of the expense to be incurred for a set of models and a metallurgical collection.

In conclusion, I have to state that the Board will gladly assist in every way in the establishment of the proposed school.

I have, &c.,
W. MONTGOMERY,
Chairman.

The Hon. the Secretary for Crown Lands, Wellington.

Enclosure in No. 3.

REPORT of the COLLEGE COMMITTEE.

THE College Committee, having considered a letter from the Colonial Government recommending the establishment of a School of Mines, and having also considered a report furnished to the Chairman by Professors von Haast and Bickerton, is of opinion that the College possesses very sufficient appliances for giving instruction in almost all the departments of study included in the usual curriculum of a School of Mines, and would only require the addition to its staff of a Professor or Lecturer in practical mining, applied mechanics, mechanical drawing and surveying, a set of models, and a metallurgical collection.

The Committee suggest that the relation between a School of Mines and a School of Agriculture is such that it is desirable for the College Committee to confer with the Committee of the School of Agriculture on the subject, and bring up a further report.

The Committee recommend the Board to authorize the Committee to prepare, for transmission to the Government, a full report of the present means of the College applicable to the institution of a School of Mines, such report to be submitted to the Board at its next meeting.

Christchurch, 8th February, 1877.

No. 4.

The CHAIRMAN of the BOARD of GOVERNORS to the Hon. the SECRETARY for CROWN LANDS.

SIR,— Canterbury College, Christchurch, 19th March, 1877.

I have the honor to state that the Board of Governors, having given the question of the establishment of a School of Mines in connection with this College careful consideration, has decided that it is desirable such a school should be established; and that, as the College already possesses very sufficient appliances for giving instruction in almost all the departments of study included in the usual curriculum of a School of Mines, the annual expenditure, in addition to that required to maintain the present staff, would be inconsiderable.

The Board will be prepared to establish the school if a grant of £150 for maintenance be given annually by the Colonial Government, and the sum of £300 be provided to defray the first cost of a set of models and a metallurgical collection.

I have, &c.,
W. MONTGOMERY,
Chairman.

The Hon. the Secretary for Crown Lands, Wellington.

No. 5.

The UNDER SECRETARY for CROWN LANDS to the CHAIRMAN of the BOARD of GOVERNORS.

SIR,— General Crown Lands Office, Wellington, 1st May, 1877.

With further reference to the proposed establishment of a School of Mines in connection with the Canterbury College, and to your letters on the subject, dated the 9th February and the 19th March ultimo, I have the honor, by direction of the Hon. the Secretary for Crown Lands, to request you to be good enough to state how many days in the week, and how many hours of such days, the Board of Governors would be prepared to cause to be devoted to the subjects of the proposed school, and whether a teacher would be occupied exclusively in the duties connected therewith; such particulars to be stated in relation to the subsidy mentioned in your letter, and on the supposition of its being granted.

I have, &c.,
J. GILES.

W. Montgomery, Esq., Chairman, Canterbury College, Christchurch.

No. 6.

The CHAIRMAN of the BOARD of GOVERNORS to the Hon. the SECRETARY for CROWN LANDS.

SIR,— Canterbury College, Christchurch, 14th May, 1877.

In reply to your letter of the 1st instant, I have the honor to state that a great part of the teaching power required for a School of Mines is already provided by the College, and that with the

addition of a teacher of practical mining, land surveying, engineering, and mechanical drawing (whose services would be partly utilized for the purpose of the School of Agriculture now being established), the College would have such a teaching staff that the students of the School of Mines would find suitable classes sufficient in number to occupy all their time, and afford them a complete curriculum.

I may state for your information that at the present time chemistry, electricity, heat, and other branches of physics, metallurgy, assaying, and mineralogy, are taught by Professor Bickerton, himself a scholar of the Royal School of Mines, London; mathematics, pure and applied, by Professor Cook, late fellow of St. John's College, Cambridge; geology, palæontology, and mineralogy, by Dr. Julius von Haast: palæontology also comes within the scope of the lectures of Dr. Powell, lecturer on biology.

It is in consequence of having already nearly sufficient means for affording instruction, such as is required by students in a School of Mines, that this College can undertake to establish the school for the very small amount stated in my letter of March 19th, 1877.

I have, &c.,
W. MONTGOMERY,
Chairman.

The Hon. the Secretary for Crown Lands.

No. 7.

The Hon. the SECRETARY for CROWN LANDS to the CHAIRMAN of the BOARD of GOVERNORS.

SIR,— General Crown Lands Office, Wellington, 18th June, 1877.

I have the honor to acknowledge the receipt of your letter of the 14th ultimo, in reference to the opening of a School of Mines, and in which you furnish a statement of the subjects on which you are prepared to give instruction to students of the School of Mines, should such be established in connection with your College.

In reply, I have to inform you that, with the view of assisting in establishing such a School, the Government will move the General Assembly to vote a sum of £300 for the purpose of procuring suitable models, &c., and an annual subsidy of £150 for five years. The amount of subsidy to be given after that date to be open to be dealt with by the Legislature.

I have, &c.,
D. REID.

W. Montgomery, Esq., Chairman of the Board of Governors,
Canterbury College, Christchurch.

No. 8.

The CHAIRMAN of the BOARD of GOVERNORS to the Hon. the SECRETARY for CROWN LANDS.

SIR,— Canterbury College, Christchurch, 25th June, 1877.

I have the honor to acknowledge the receipt of your letter of the 18th instant, in which you inform me that the Government will move the General Assembly for the aid required to establish and maintain a School of Mines in connection with the College.

I beg to add that the Board of Governors will, when placed in funds, take steps without delay to establish the School.

I have, &c.,
W. MONTGOMERY,
Chairman.

The Hon. the Secretary for Crown Lands.

No. 9.

The Hon. the MINISTER of EDUCATION to the CHAIRMAN of the BOARD of GOVERNORS.

SIR,— Department of Education, Wellington, 18th January, 1878.

In reply to your letter of 3rd instant, requesting that the sum of £450, appropriated for the establishment and maintenance of the School of Mines in connection with the Canterbury College, may be paid, I have the honor to inform you that a voucher for the amount has been passed for payment.

I have, &c.,
J. BALLANCE.

W. Montgomery, Esq.,
Chairman of the Board of Governors, Canterbury College.

OTAGO.

No. 10.

The Hon. the SECRETARY for CROWN LANDS to the CHANCELLOR of the OTAGO UNIVERSITY.

SIR,— General Crown Lands Office, Wellington, 31st January, 1877.

I have the honor to enclose a copy of a resolution passed by the House of Representatives in favour of the establishment of a School of Mines in the colony. In the short discussion which the motion elicited, a report of which is herewith appended for your information, it was intimated that the Government would take an early opportunity of drawing the attention of the governing bodies of the Otago University and of the Canterbury College to the subject, with a view to induce them to pay special attention to the establishment of mining schools in connection with these institutions.

In accordance with the intimation thus given, I have now the honor to request that you will be good enough to bring the matter before the Council of the Otago University, with a view to ascertain whether it will be prepared to establish a School of Mines in connection with the University, where instruction in a popular form might be given in the various branches of science relating to mining, and where persons desirous of having specimens of ores or minerals tested might be enabled to do so on reasonable terms.

The immense importance of this subject to the colony will, I am sure, induce your Council to assist in giving effect to the object in view. I shall be glad to be informed that your Council has resolved to establish a School of Mines in connection with the Otago University.

I have, &c.,
D. REID,
Secretary for Crown Lands.

Sir J. L. C. Richardson,
Chancellor of the Otago University, Dunedin.

No. 11.

The REGISTRAR, OTAGO UNIVERSITY, to the Hon. the SECRETARY for CROWN LANDS.

SIR,— University of Otago, Dunedin, 28th February, 1877.

I have the honor to acknowledge your letter of the 31st ultimo, enclosing a copy of a resolution passed by the House of Representatives in favour of the establishment of a School of Mines in the colony, and requesting that the matter might be brought before the Council with a view to ascertain whether it will be prepared to establish such a school.

In reply, I have the honor to state that the subject was brought under the consideration of the Council at its last meeting, and I am directed to convey to you a copy of the resolution then adopted, namely,—

"That the Colonial Government be informed that the University Council is quite prepared to render more complete and effective the School of Mines, so far as it has already been created in the University, so soon as the £500 a year voted by the Provincial Council of Otago towards such school is available."

In reference to this I have to inform you that the University Council contemplated the establishment of a School of Mines in July, 1875, when it was proposed, in addition to the existing staff, to appoint a Professor of Geology and Mining, and a Lecturer on Surveying, the then Provincial Executive, anxious to forward the views of the Council, offering a subsidy of £500 towards it. The subsidy, however, not having been received, the completion of the school was necessarily deferred, and the only practical step since taken towards it has been the appointment of the Professor of Natural Science, one of whose functions will be to lecture on geology.

I am instructed to add that the University is already able to give instructions in pure mathematics, mechanics, theoretical chemistry, analytical chemistry (with special reference to mineralogy, metallurgy, and assaying, and palæontology, and shortly, as soon as apparatus is provided, in physics.

You will be gratified to learn that, at the University Laboratory, persons desirous of having specimens of ores or minerals tested are enabled to do so on reasonable terms.

I have, &c.,
W. H. MANSFORD,
Registrar.

The Hon. the Secretary for Crown Lands.

No. 12.

The UNDER SECRETARY for CROWN LANDS to the REGISTRAR.

SIR,— General Crown Lands Office, Wellington, 1st May, 1877.

With further reference to the proposed establishment of a School of Mines in connection with the Otago University, and to your letter on the subject dated the 28th February last, I have the honor, by direction of the Hon. the Secretary for Crown Lands, to request you to be good enough to state how many days in the week, and how many hours of such days, the Council would be prepared to cause to be devoted to the objects of the proposed school, and whether a teacher would be occupied exclusively in the duties connected therewith. Such particulars to be stated in relation to the subsidy mentioned in your letter, and on the supposition of its being granted.

I have, &c.,
J. GILES.

W. H. Mansford, Esq.,
Registrar, Otago University, Dunedin.

No. 13.

The VICE-CHANCELLOR to the Hon. the SECRETARY for CROWN LANDS.

SIR,— University of Otago, Dunedin, 19th May, 1877.

In further acknowledgment of your letter of the 31st January, calling the attention of the Council to a resolution adopted by the House of Representatives in favour of the establishment of a School of Mines, and Mr. Giles's letter of the 1st of May, I have to inform you that the subject has since engaged the serious attention of the Council, and by their direction I have now the honor to forward you a report on the subject, drawn up with great care, by a joint committee of the Council and the Professorial Board, and which has been adopted by the Council. Desirous as the Council are to see such a school established, they cannot see their way to proceed with it until they obtain an assurance from the Government of a subsidy to the extent of £500 per annum. I am directed to add

that on receiving a favourable answer the Council will immediately appoint a Director of Mines, with the status and salary of a Professor of the University, as well as the lecturers necessary for the completion of the mining school.

I have, &c.,
D. M. STUART,
Vice-Chancellor.

The Hon. the Secretary for Crown Lands, Wellington.

Enclosure in No. 13.

REPORT of the COMMITTEE of the PROFESSORIAL BOARD.

School of Mines.

THE Committee find that the following classes already in operation are all perfectly suitable for the curriculum of a School of Mines, some of them, indeed, having been instituted with a view to the future establishment of such a school.

I. Elementary mathematics (Euclid, algebra, logarithms, trigonometry, mensuration). Five hours per week.
II. Elementary mechanics and hydrostatics. Five hours per week. Professor Shand.

There are also classes for advanced mathematics, analytical mechanics, and mathematical physics, suitable for engineers and others who wish to study the higher mathematics.

III. Lectures on the principles of chemistry. Five hours per week.
IV. Practical chemistry (simple analysis). Junior class. Five hours per week.
V. Practical chemistry (analysis of ores, minerals, &c.). Senior class, 10 a.m. till 4 p.m. daily.
VI. Lectures on mineralogy. Two hours per week. Professor Black.
VII. Lectures on geology. Two hours per week. Professor Hutton.

In addition to the above there are classes for the following modern languages, any of which might be taken, if desired, by students of mining:—English, three hours; Junior German, two hours; Junior French, two hours; Senior German, two hours; Senior French, two hours; Italian, two hours.

To complete the curriculum of a really efficient School of Mines, the Committee think that the following classes are necessary, and in the event of the Government subsidy being obtained, they recommend that all these classes be immediately instituted, although the expense to the University may be considerable:—

I. Principles and practice of mining. Five hours per week.
II. Mining engineering (including plan-drawing and specifications, the use of mining machinery and gold-saving appliances, &c.). Five hours per week.
III. *Mineralogy (the physical characters, classification, and mode of occurrence of ores and minerals), with the aid of the Museum collection. Five hours per week. By Professor of Mining to be appointed.
IV. Surveying, levelling, plotting, and underground surveying, with the description and use of instruments. Two hours per week. By a Lecturer on Surveying to be appointed.
V. The principles, construction, and management of the steam-engine. Two hours per week. By a Lecturer on Mechanical Engineering to be appointed.
VI. Freehand and mechanical drawing. Any number of hours desired. By the Master of the School of Art.
VII. Lectures on metallurgy and assaying. Two hours per week.
VIII. Practice of metallurgy and assaying. In Laboratory; 10 a.m. till 4 p.m. daily. Professor Black.
IX. Geology. An extended course, having special reference to mining. Five hours per week. Professor Hutton.

In order to carry out the plan of the School of Mines proposed above, the Committee recommend that the following arrangements be made:—

1. That a Director of the School of Mines, who would also be the Professor of Mining, be appointed at a salary of £600, care being taken to select a man of first-class attainments and wide practical experience. The Director of the School of Mines should not be permitted to receive fees for private consultations, and his services should be placed gratuitously at the disposal of the Government for three months yearly, for the purpose of visiting mines throughout the colony and offering suggestions on the mode of working them. His travelling expenses, however, would have to be defrayed by the Government, or by the mining companies who desired his advice.

2. That a competent lecturer on surveying be appointed, the lecturer himself to be a practical surveyor.

3. That a competent lecturer on mechanical engineering be appointed, the lecturer himself to be a practical mechanical engineer.

4. That an arrangement be made with the School of Art† so as to render its classes available for the School of Mines.

5. That the charges for analyses and assays in the chemical laboratory be fixed according to a scale to be approved by the Council.

6. As funds will be immediately required for procuring models and instruments for the use of the Professor of Mining, that application be made to the Government for the £500 voted by the late Provincial Government of Otago for this purpose.

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* Professor Black's lecture on this subject should be continued, but might be restricted to the chemical composition and relations of minerals.

† A very successful School of Art, under the direction of Mr. Hutton, is in operation in the Normal School, Dunedin. Besides other accommodation, it possesses four very large rooms for students in different branches of art, and it has been very liberally provided with models and appliances for teaching. It was attended last year by 244 students.

The Committee are aware that it is the intention of the Council to proceed at once with the erection of new buildings for the University; and that a leading feature in the plan of the Council is the institution of completely-equipped laboratories for practical work in the different branches of science. They are also aware of the purpose of the Council to make provision for instruction in physics as soon as the Physical Laboratory shall be erected; so that classes in physics may be expected to be added to the programme given above within a very short time after the opening of the School of Mines. In view, however, of the special requirements of the Mining School, the Committee think that the metallurgical department of the Chemical Laboratory should receive a greater development than was formerly contemplated, and it would be desirable also to provide a workshop in which models of machinery could be constructed by the students.

In conclusion, the Committee would remark, that the "scientific course" in the University was originally planned in the intention that it would serve as a foundation for a future complete school of high-class technical instruction—a school which would ultimately include within its range the several departments of mining, engineering, architecture, and manufactures. The same intention has been carefully kept in view in drawing up the programme submitted above, so that, if this programme be adopted by the Council, the single addition to the teaching staff of a Professor of Engineering will enable it to call into existence a well-appointed engineering school.

Adopted by the Council, 15th May, 1877.

No. 14.

The Hon. the SECRETARY for CROWN LANDS to the VICE-CHANCELLOR.

SIR,— General Crown Lands Office, Wellington, 18th June, 1877.

I have the honor to acknowledge the receipt of your letter of the 19th ultimo, in reference to opening a School of Mines in connection with the Otago University, and forwarding an exhaustive report on the same subject by a joint committee of the Council and the Professorial Board.

In reply, I have to inform you that the Government, being desirous of having a fully-equipped School of Mines established in Otago, is prepared to move the General Assembly to agree to a vote of £500 per annum towards the payment of the salary of a Director of Mines for a limited period of, say, five years. The amount of subsidy to be given after that date to be open to be dealt with by the Legislature.

The suggestions of your Committee as to the qualifications, salary, and duties of the Director appear satisfactory. But, as it is considered that great practical benefit would accrue to the mining interest if the Director could personally inspect the mines and give advice to persons engaged in mining pursuits, I have to suggest that the time during which his services may be so available should be extended to four or five months if required by the Government, on the understanding that his travelling expenses are defrayed as suggested by you.

In the event of this proposal being agreed to by your Council, and the vote passed by the Assembly, the sum voted by the Provincial Council of Otago will also be made available for the objects stated.

The Rev. D. M. Stuart, D.D., Vice-Chancellor of the Otago University, Dunedin.

I have, &c.,
D. REID.

No. 15.

The VICE-CHANCELLOR to the Hon. the SECRETARY for CROWN LANDS.

SIR,— University of Otago, Dunedin, 13th July, 1877.

I have the honor to acknowledge the receipt of your letter of the 18th ultimo, and on behalf of the Council to thank you for the very liberal spirit in which their proposals for the establishment of a School of Mines in this University have been entertained, and to assure you they are much gratified to learn that the Government are prepared to move the General Assembly to agree to a vote of £500 per annum towards the payment of the salary of a Director of Mines for the period of five years, the amount of subsidy to be given after that date to be open to be dealt with by the Legislature.

Your suggestions relative to the extension of time during which the services of the Director may be available for personally inspecting the mines throughout the colony have been considered by the Council and cordially agreed to.

I have, &c.,
D. M. STUART,
Vice-Chancellor.

The Hon. the Secretary for Crown Lands, Wellington.

No. 16.

The Hon. the MINISTER of EDUCATION to the CHANCELLOR.

SIR,— Education Office, Wellington, 29th January, 1878.

Referring to your communications of date as per margin,* relative to the establishment of a School of Mines, I have the honor to inform you that the Government is now prepared to pay towards the salary of a competent professor the sum of £500 a year, subject to the terms and conditions embodied in your letters above referred to, and further that the sum of £500 will be paid towards obtaining the necessary appliances for the equipment of the School.

* 28th February, 1877; 19th May, 1877; 13th July, 1877.

I may add that the Government hopes there will be no delay in instituting the School, as it is desirous if possible to obtain the services of this professor before his class is in session, in connection with geological inquiries on the West Coast of the Middle Island.

I have, &c.,
J. BALLANCE.

The Chancellor, Otago University, Dunedin.

No. 17.

The CHANCELLOR to the Hon. the MINISTER of EDUCATION.

SIR,— University of Otago, Dunedin, 27th February, 1878.

I have the honor to acknowledge the receipt of your communication of the 29th January last, on the subject of the establishment of a School of Mines.

At the monthly meeting of the Council next after the receipt of your letter—namely, on the 12th instant—the subject was brought under consideration, and the Council being assured of the qualifications of Mr. Ulrich, of Melbourne (with whom I had several interviews in June last), I was requested to communicate with him at once.

I accordingly wrote to him on the 20th instant, making him a definite offer, and I enclose a copy of my letter.

I am to convey the thanks of the Council to the Government for the annual aid of £500 towards the expenses of the School of Mines, without which the Council would not have been in a condition to establish it. And I am to assure the Government, through you, that, after consultation with Mr. Ulrich (assuming that he will accept their offer), the Council will spare no exertions to place the School in a state of efficiency.

I have, &c.,
H. S. CHAPMAN,
Chancellor.

The Hon. J. Ballance.

Enclosure in No. 17.

The CHANCELLOR to Mr. ULRICH.

SIR,— University of Otago, Dunedin, 20th February, 1878.

In the month of June last, I had an interview with you for the purpose of learning whether, in the probable event of the Council of this University being placed in a position to establish a School of Mines, you would be disposed to entertain a definite proposal to accept the Directorship thereof.

Though I was not then in a condition to make a definite proposal, I understood you to be favourably inclined to entertain it when made.

It was only last week that the Council were able to take any steps towards carrying out the object which I mentioned to you, and at their meeting on Tuesday I was requested and empowered to communicate with you definitely on the subject.

On behalf of the Council, therefore, I am authorized to offer you the office of Professor of Mineralogy and Metallurgy, and Director of the School of Mines.

The salary attached to the office is £600 per annum, with the fees paid by the students who may attend your course of lectures. The salary to take effect from the day you report yourself at the University. These, you will understand, constitute all the emoluments of the office. But there is a condition attached to the office by the Government in making a grant to the University in aid of the School of Mines.

I must first explain that, unlike the English Universities and that of Melbourne, our University year is divided into a single term of six months, from the 1st of May to the 1st of November, with a vacation of equal length, from the 1st of November to the 1st of May, comprising, you will observe, all the summer months, the most favourable for the purpose about to be mentioned.

The condition attached by the Government is, that they shall be entitled to secure the services of the Professor and Director whom we may appoint, for any purpose within his proper functions, during any portion of four months of the vacation, without any further remuneration, except the usual travelling allowances. These are the payment of all travelling expenses, such as steamboat, railway, and coach fares, together with one guinea per diem during the time you are absent from Dunedin.

You will also be *virtute officii* a member of the Professorial Board.

There is also one condition imposed upon all professors by the rules of the University—namely, that they are precluded from taking private practice of any kind.

Should you accept this offer, the sum of £60 will be allowed for the expenses of your removal from Melbourne to Dunedin.

I send herewith a copy of the Calendar of this University, published in 1877.

I have, &c.,
H. S. CHAPMAN,
Chancellor.

G. H. F. Ulrich, Esq., Melbourne.

No. 18.

The SECRETARY of EDUCATION to the CHANCELLOR.

SIR,— Education Department, Wellington, 5th March, 1878.

I have the honor, by direction of the Minister of Education, to acknowledge the receipt of your letter of 27th ultimo, concerning the establishment of the School of Mines, and enclosing copy of the offer of the Directorship which has been made to Mr. Ulrich; and have to express Mr. Ballance's satisfaction with the action taken.

A voucher in favour of the University for the two sums voted last session of £500 for the services of the Director, and £500 to make good a vote of the Provincial Council (for appliances), has been passed for payment. These sums the Council will of course see are applied strictly to the purposes intended by the Legislature.

I have, &c.,

The Chancellor, University of Otago, Dunedin. JOHN HISLOP.

No. 19.

The CHANCELLOR to the Hon. the MINISTER of EDUCATION.

SIR,— University of Otago, Dunedin, 21st March, 1878.

I have the honor to acknowledge the receipt of Mr. Hislop's letter of the 5th of this month, written by your direction, acknowledging the receipt of my letter of the 27th February, and approving of the action taken by the Council of the University in relation to the School of Mines.

I am also to thank you and the Government for the sum of £1,000, of which £500 is in aid of the salary of the Director, and £500 for appliances; and I am to assure you that the whole sum will be strictly applied to the purposes intended by the Legislature.

Yesterday I received a letter from Mr. Ulrich (copy of which I enclose) accepting the offer made to him in my letter of the 20th of February, in accordance with the terms of my letter. I had the honour to telegraph to you yesterday announcing Mr. Ulrich's acceptance of the offer made to him.

On his arrival, and after consultation with him, no time will be lost in organizing the School of Mines, which the Council regards of the greatest importance to the country.

I have, &c.,

H. S. CHAPMAN,

The Hon. J. Ballance, M.H.R., Minister of Education. Chancellor.

Enclosure in No. 19.

MR. ULRICH to the CHANCELLOR.

SIR,— Industrial and Technological Museum, Melbourne, 12th March, 1878.

I have the honor to acknowledge the receipt on the 1st instant of your letter of the 20th ultimo, offering me, on behalf the Council of the University of Otago, the position of Professor of Mineralogy and Metallurgy, and Director of the School of Mines at that University.

Appreciating the distinction conferred upon me, and the trust implied by this offer, I herewith have much pleasure in accepting it, feeling confident that I shall fulfil the duties of the office to the satisfaction of the Council.

In accordance with this, I shall at once resign the positions of Lecturer in Mining at the University, and that of Lecturer in Mineralogy and Curator of the mineral section at the Museum, I here occupied for several years, and commence active preparations for early departure.

The Hon. H. S. Chapman, I have, &c.,

Chancellor of the University of Otago. GEORGE H. F. ULRICH.

No. 20.

The SECRETARY of EDUCATION to the CHANCELLOR.

SIR,— Education Department, Wellington, 28th March, 1878.

I have the honor, by direction of the Minister of Education, to acknowledge the receipt of your letter of 21st instant, and to express the satisfaction of the Government at Mr. Ulrich's acceptance of the Directorship of the School of Mines.

I have, &c.,

The Chancellor, University of Otago, Dunedin. JOHN HISLOP.

No. 21.

The CHANCELLOR to the Hon. the MINISTER of EDUCATION.

SIR,— University of Otago, 20th August, 1878.

On Saturday last the Registrar, by the direction of the Council of this University, forwarded to you a copy of a report of the Professorial Board on the organization of the School of Mines, with regulations for the course of study.

The Council at its meeting on Saturday passed certain resolutions having reference to the above-mentioned report, and I was deputed to transmit the same to you; a copy of which is accordingly appended.

In support of the Council's application, I am to mention that the two functions which the Government has lately intrusted to the University have entailed an expenditure much beyond the aids placed at the Council's disposal.

The maintenance of the public Museum in a state of efficiency—and I may state that it is now in very perfect order, and is as attractive to the public as it is useful to students—entails an expenditure of at least £600 per annum over and above the present annual value of the endowment granted to the University for the support of the Museum.

The efficient working of the School of Mines will ultimately entail at least as great a charge on the University funds. A careful perusal of the report of the Professorial Board will make this very apparent.

Looking forward to the future, the Council views with great favour that portion of the report which speaks of a school of engineering. When the School of Mines is in full working order, it will be seen that a very small addition to the teaching staff of the University will enable the Council to impart a complete course of engineering knowledge—both theoretical and practical—except, of course, the skill of the workshop, which must be learned in the workshop, and can be learned nowhere else.

Several well-educated youths in this city are now engaged in the large engineering establishments, and these, we believe, would flock to the University if we could afford them the scientific instruction appropriate to their profession.

I have, &c.,
H. S. CHAPMAN,
Chancellor.

The Hon. the Minister of Education, Wellington.

Enclosure 1 in No. 21.

RESOLUTIONS of the UNIVERSITY of OTAGO.

School of Mines.

1. That the Council of the University of Otago approves of the regulations and plan of instruction for the School of Mines, as proposed by the Professorial Board.
2. That, inasmuch as the said plan of instruction requires several additions to the present teaching staff of the University—that is to say, one assistant mathematical lecturer, at a salary of £250 per annum; one lecturer on mining surveying, and one lecturer on applied mechanics, say at £100 per annum each—the Council do forthwith apply to the Government for an additional annual grant of £450, in order that the said School of Mines be placed in a state of efficiency and usefulness.
3. That the Council respectfully represent to the Government the importance of, and even the necessity for, a school of engineering; and this the University could effect by the addition to their teaching staff of a professorship of engineering.
4. That these resolutions be forwarded to the Hon. the Minister of Education, with a copy of the report of the Professorial Board on the School of Mines.

Enclosure 2 in No. 21.

Professor BLACK to the CHANCELLOR.

SIR,— Dunedin, 14th August, 1878.

I have the honor, on behalf of the Professorial Board, to submit, for the consideration of the Council, the following plan of the Otago School of Mines, which the Board has, after careful consideration, unanimously resolved to recommend for adoption by the Council. The plan is prefaced by an explanatory introduction by Professor Ulrich, the Director of the Mining School; and it is followed by a few observations on the part of the Board, to which it desires to invite the attention of the Council.

I have, &c.,
JAMES G. BLACK,
Chairman of the Professorial Board.

The Chancellor of the University of Otago.

Sub-Enclosure 1 to Enclosure 2 in No. 21.

PLAN OF THE OTAGO SCHOOL OF MINES.

INTRODUCTION by Professor ULRICH.

THE aim of mining is to extract useful minerals from the crust of the earth, and to treat and prepare them in such a manner that they can be profitably disposed of as articles of commerce. Mining science, in its widest sense, comprises, therefore, the knowledge of how useful minerals occur in nature, and of the principles and rules, founded upon science and experience, according to which they are prospected for, extracted from the ground, and conveyed out of the mines, as well as how certain hindrances and dangers always attending these kinds of work are successfully to be overcome. It further embraces the knowledge of how mines are surveyed, how the minerals won are mechanically separated from the waste—*i.e.*, dressed and concentrated—and finally how certain of them, by the aid of chemical processes, are prepared as articles of commerce.

To master all these different branches of technical science—taking into consideration the practical training each requires, independently of theoretical study—would evidently occupy a considerable period of a student's life. It has therefore been deemed advisable at European Schools of Mines—and the arrangement has since been adopted by those in America—to divide the field of mining science into a number of divisions, one or more of which the student may choose according to his predilection and capacity. Two main divisions of these are mining proper and metallurgy; more subordinate ones are mine-surveying and assaying; whilst the knowledge required for geological surveying falls naturally within the scope of the lecture courses, provision being made in these for lectures in palæontology and natural history. There is also in most German Mining Schools—on account of the mines being managed by Government—another main division, namely, "mining administration," for which no practical training is exacted, but which requires specially a study of the mining law, and, to a certain extent also that of the common law, of the country.

It is not possible, in lectures on any of the technical subjects above enumerated, so accurately to describe all features, machines, appliances, instruments, and operations, that they can at once be thoroughly understood, and, as regards the latter, be practically executed, by the student. The extent of the field, especially in mining and metallurgy, permits but a general description of the technical details, and the student, in order to gain a more accurate knowledge, must study for himself works and publications treating of the subject. Lectures are intended to prepare him properly for this study, and more especially to afford him a knowledge of the rules and reasons according to which operations

in the various technical branches are carried on. This knowledge presupposes, however, an acquaintance—more or less intimate, according to the nature of the technical branch—with certain other sciences upon which those rules and reasons are based, and in the plan of instruction of an efficient school of mines these sciences are generally all represented. They are—mathematics, physics, mechanics, geology, mineralogy, palæontology, natural history, chemistry, together with instruction in drawing.

As regards the extent to which these sciences are generally entered into, the guiding principle is that the knowledge to be acquired by the student is intended for direct application, not for general scientific accomplishment. On this account, therefore, the entering into any imperfectly-established hypotheses, and into researches aiming at an enlargement of the field of any of the sciences, is precluded; and, whilst those parts of the latter that have no connection, or only a remote one, with the technical branches are left unheeded, or more or less superficially treated, other parts that have a direct bearing upon them receive special attention. Thus, in chemistry, the whole vast field of organic chemistry, and in applied mathematics nautical science, are left quite untouched, whilst astronomy and several parts of physics, viz., acoustics, dioptrics, meteorology, &c., receive only partial notice.

At the Royal School of Mines of Clausthal, Hartz, Germany, and most other German institutions of the same standing, lectures are, for instance, delivered on the following subjects:—

Mathematics.—Algebra and analysis to the polynomial theorem, approximate solution of higher equations, geometry, plane and spherical trigonometry, stereometry, analytical geometry.
Mineralogy.—General, and a special course in determinative mineralogy.
Geology.—Geognosy, dynamical geology, stratigraphy.
Petrography includes determination of rocks by means of the microscope.
Mining Geology.—Geology and search of mineral deposits.
Natural History and Palæontology.
Inorganic Chemistry.—General, and a special course in stœchiometry.
Technical Chemistry, with special course on salt manufacture.
Analytical Chemistry.—Qualitative and quantitative, with laboratory practice.
Assaying.
Scientific Use of the Blowpipe.—Determinative mineralogy and assaying.
Metallurgy.—General, and a special course on the metallurgy of iron.
Mining, in all its branches.
Applied Mechanics, with special courses on the construction of machines, and on the steam-engine.
Theoretical Mechanics.
Mine-surveying.—Two courses—I. Theory; II. Practice.
Physics.—Special attention is given to statics, hydrostatics, hydrodynamics, thermodynamics, hydraulics; more general to optics, electricity, magnetism, acoustics, &c.
Architecture.
Mining and Civil Law.
Keeping Accounts of mines and smelting works.
German Language, as regards style of business letters and reports.
Free-hand-drawing, Plan-drawing, Machine-drawing.—Geometrical projection, perspective and isometric drawing.

These lectures are connected with a six months' practical course in the mines, ore-dressing establishments, and smelting works of the Upper Hartz, which every student has to go through in order to be admitted to final examination. The Council of the school grants certificates of Mining Engineer, Metallurgical Engineer, Mining and Metallurgical Engineer, Mining Surveyor, and Assayer, for which students have to pass in the following subjects:—

Mining Engineer.—Mathematics, mineralogy, geology, petrography, mining geology, mining, inorganic chemistry, assaying, use of the blowpipe, mine-surveying, mechanics, physics, drawing, and keeping accounts.
Metallurgical Engineer.—Mathematics, mineralogy, geology, inorganic chemistry, technical chemistry, analytical chemistry, assaying, use of the blowpipe, metallurgy, mechanics, physics, ore-dressing (last subject of lectures in mining), drawing, and keeping accounts.
Mining and Metallurgical Engineer.—In all the subjects so far mentioned.
Mining Surveyor.—Mathematics, mine-surveying, geology, mining geology, inorganic chemistry, physics, mineralogy, and drawing.
Assayer.—Mathematics, mineralogy, inorganic chemistry, technical chemistry, analytical chemistry, use of the blowpipe, assaying, metallurgy, physics.

The course of study of any of the engineering branches is three years.

At the Royal School of Mines, London, the lecture courses embrace the following subjects:—

Inorganic Chemistry.—Theoretical, technical, qualitative and quantitative analysis, with practice in laboratory.
Mineralogy.
Physics, with practice in laboratory.
Applied Mechanics.
Mining, inclusive of *Mining Geology.*
Geology.—Petrography, geognosy, dynamical geology, stratigraphical geology.
Metallurgy, with practice in laboratory.
Assaying, with practice in laboratory.
Natural History, with practice in laboratory.
Palæontological Demonstrations.
Mechanical Drawing.

There are three divisions, viz., Mining, Metallurgical, and Geological, and the lecture courses are

distributed over three years, but are so arranged that all divisions come together in the first and second years, and are only separate in the third, thus:—

First Year.—All Divisions: Inorganic Chemistry, with practice in laboratory. Mechanical Drawing.

Second Year.—All Divisions: Physics, with practice in laboratory. Applied Mechanics. Mineralogy. Mechanical Drawing.

Third Year.—Mining Division: Mining. Assaying. Geology.—*Metallurgical Division:* Metallurgy, with practice in laboratory.—*Geological Division:* Natural History, with practice in laboratory. Geology. Palæontological Demonstrations.

The following is an abstract of the regulations and charges of the Royal School of Mines:—

The public are admitted to the lectures on payment of £4 for each course of forty or more lectures, and £3 for a course of thirty and under forty lectures.

Certificates of attendance are granted to all who attend the lectures; but students desirous of obtaining certificates of proficiency are required to pass the examinations.

Persons who follow the prescribed course of study and pass the examinations of the third year in the first class, receive an official certificate with the title of "Associate of the Royal School of Mines."

The fees for students desirous of becoming associates are £30, in one sum on entrance, or two annual payments of £20 each.

Students presenting themselves for examination must pay a fee of £1 for each subject.

The chemical and metallurgical laboratories are open to all students, whether attending the lectures or not. The special fees for the chemical laboratory are £12 for a course of three months, £9 for two months, and £5 for one month. For the metallurgical laboratory the special fees are £15 for three months, £12 for two months, and £7 for one month. The ability of the student to make trustworthy assays is, in every case, thoroughly tested, and no certificate of competency is given to a student who has not furnished satisfactory proof that he is able to obtain accurate results. For the biological laboratory the special fee is £6, and for the physical laboratory it is £12.

Free admission to all lectures and examinations is offered to any person who obtains a Queen's Gold Medal at the annual examinations of the Science and Art Department.

Sub-Enclosure 2 to Enclosure 2 in No. 21.

REGULATIONS AND PLAN OF INSTRUCTION.

THE session is the same as in the arts course, commencing on the first day of May, and lasting for six months continuously. The mode of instruction is by systematic courses of lectures in the prescribed branches of study in connection with written and oral examinations, by practical work in the laboratories, and also, according to circumstances and opportunities, by inspection of mines and field excursions.

The classes are open to all persons over fifteen years of age. There is no entrance examination, but students enrolling themselves are expected to possess a fair knowledge of English and arithmetic, as well as some acquaintance with elementary mathematics, since otherwise they will derive little benefit from the lectures, and can scarcely hope to pass the examinations which are held at the termination of each year's course.

The fees are the same as those charged in the arts course—namely, three guineas for each course of lectures occupying not less than three hours per week during the whole session; one guinea and a half for any course occupying two hours per week; and one guinea for a course of one hour per week. In addition to the class fees, students will be required to pay a college fee of one guinea per session. All fees must be paid, in advance, to the Registrar.

There are five divisions in the Mining School—namely, the Mining, the Metallurgical, the Geological, the Mine-surveying, and the Assaying Divisions. In the first three divisions the course of study extends through three years, and students who pass the examinations in any of these divisions will obtain the distinction or title of "Associate of the School of Mines, Otago." In the last two divisions the course of study is for two years, and students who pass successfully through these courses will be entitled to receive certificates of "Mining Surveyor," and "Metallurgical Chemist and Assayer" respectively.

Students may qualify themselves for certificates in two or more of the above-named divisions, by attending the lectures and passing the examinations in the special subjects prescribed for the respective divisions. For example, a student following the course laid down for the Associateship in the Mining Division may obtain also a certificate in the Metallurgical Division by attending the classes of metallurgy and analytical chemistry (including laboratory practice) which are specially prescribed for the latter division. It will not, however, in all cases, be possible to complete such combined courses within three years.

Examinations in the different branches of study will be held in the month of November of each year, and students who shall have attended any course of lectures in the Mining School, and shall have passed the examination in that course, will receive certificates to that effect. If a student fail to pass the November examination in any subject, an opportunity will be given to him to pass in the same subject in May of the following year; and, if he again fail to pass, he will be required to attend the lectures in that subject a second time. Students who shall have passed the class examinations in all the branches of study prescribed for any division will be entitled, without further examination at the termination of their course, to the certificate of that division.

It shall be competent for the Professorial Board to grant exemption from attendance at any course of lectures in the Mining School to such students as shall produce satisfactory evidence that they have received sufficient instruction in the subject of which these lectures treat; but such student shall, notwithstanding, be required to pass the November examination in that subject.

The certificates of all the divisions of the school shall be signed by the Chancellor or Vice-Chancellor of the University, and by the Chairman of the Professorial Board, and shall be sealed with the seal of the University.

The following are the courses of study prescribed for the respective divisions:—

I. Associateship.—Mining Division.

First Year's Lectures.	Hours.
Mathematics	5
Mining Geology	3
Physical Geology	1
Theoretical Chemistry and Chemical Technology	5
Drawing	2
Total hours per week	16

Second Year's Lectures.	Hours.
Mathematics and Theoretical Mechanics	5
Mining	3
Physics	3
Mine and Land Surveying	3
Mineralogy	4
Drawing	2
Total hours per week	20

Third Year's Lectures.	Hours.
Mining	3
Petrography	2
Assaying	3
Use of the Blowpipe, and Determinative Mineralogy	2
Applied Mechanics	3
Drawing	2
Total hours per week for first 3 months	15
Laboratory Practice for 3 months	5
Total hours per week for second 3 months	20

II. Associateship.—Metallurgical Division.

First Year's Lectures.	Hours.
Mathematics	5
Physical Geology	1
Theoretical Chemistry and Chemical Technology	5
Drawing	4
Total hours per week	15

Second Year's Lectures.	Hours.
Mathematics and Theoretical Mechanics	5
Metallurgy	3
Physics	3
Analytical Chemistry and Laboratory Practice	10
Mineralogy	4
Total hours per week	25

Third Year's Lectures.	Hours.
Metallurgy	3
Assaying	3
Use of the Blowpipe, and Determinative Mineralogy	2
Applied Mechanics	3
Mechanical Preparation of Ores, last part of mining lectures (for about two months)	3
Drawing	2
Laboratory Practice	10
Total hours per week	23 to 26

III. Associateship.—Geological Division.

First Year's Lectures.	Hours.
Mathematics	5
Mining Geology	3
Physical Geology	1
Theoretical Chemistry and Chemical Technology	5
Drawing	2
Total hours per week	16

Second Year's Lectures.	Hours.
Mathematics and Theoretical Mathematics	5
Physics	3
Mine and Land Surveying	3
Mineralogy	4
Natural History	5
Total hours per week	20

Third Year's Lectures.	Hours.
Petrography	2
Use of the Blowpipe, and Determinative Mineralogy	2
Analytical Chemistry	5
Palæontology	3
Drawing	4
Geological Field Practice	...
Total hours per week	16

IV. Certificate of Mining Surveyor.

First Year's Lectures.	Hours.
Mathematics	5
Mining Geology	3
Physical Geology	1
Theoretical Chemistry and Chemical Technology	5
Drawing	4
Total hours per week	18

Second Year's Lectures.	Hours.
Mathematics and Theoretical Mechanics	5
Mine and Land Surveying	3
Physics	3
Mineralogy	4
Drawing	4
Surveying Practice	...
Total hours per week	19

V. Certificate of Metallurgical Chemist and Assayer.

First Year's Lectures.	Hours.
Mathematics	5
Physical Geology	1
Theoretical Chemistry and Chemical Technology	5
Analytical Chemistry	5
Metallurgy	3
Drawing	2
Total hours per week	21

Second Year's Lectures.	Hours.
Assaying	3
Metallurgy	3
Mineralogy	4
Use of the Blowpipe, and Determinative Mineralogy	2
Physics	3
Analytical Chemistry and Laboratory Practice	10
Total hours per week	25

Sub-Enclosure 3 to Enclosure 2 in No. 21.

SYNOPSIS OF THE CLASSES IN THE SCHOOL OF MINES.

Mathematics.—Professor Shand.

First Year.—Euclid: Six books, with geometrical exercises. Algebra: To the binomial theorem. Trigonometry: To the solution of plane triangles, including the use of logarithms. Text-books: Todhunter's Euclid, Colenso's Algebra, and Colenso's Trigonometry.

Second Year.—Algebra and trigonometry: An extended course. Elementary mechanics and hydrostatics. Text-books: Todhunter's Algebra, Todhunter's Trigonometry, Goodwin's Statics, Goodwin's Dynamics, and Besant's Hydrostatics.

PHYSICAL GEOLOGY.—Professor Hutton.

The composition and formation of rocks; the structure of rock masses; metamorphism; form and internal condition of the earth; movements of the surface; earthquakes; volcanoes; denudation; physiography; results of palæontology; chronological classification of rocks; former changes of climate.

PALÆONTOLOGY.—Professor Hutton.

Processes of fossilization; zoological, and botanical characters of the more important extinct animals and plants; historical palæontology; principles of the distribution of animals.

NATURAL HISTORY.—Professor Hutton.

The morphology of the classes and orders of the animal kingdom; the principles of taxonomy. This course includes practical work in comparative anatomy and histology.

THEORETICAL AND TECHNOLOGICAL CHEMISTRY.—Professor Black.

(*a.*) The general principles of chemical notation, combination, and nomenclature.
(*b.*) The classification of the elements, and the principles of the leading chemical theories.
(*c.*) The description of the more important elements, and organic and inorganic compounds.
(*d.*) The general chemistry of animal and vegetable organisms.
(*e.*) Chemical physics, including the chemical relations of light, heat, and electricity.
Text-book: Fownes' Manual.

QUALITATIVE ANALYSIS.—Professor Black.

This course is conducted in the Chemical Laboratory. Practical instruction is given to the students in classes. It is devoted to the qualitative analysis of simple, compound, and complex salts, soils, water, metallic ores, and other minerals.
Text-book: Fresenius' Qualitative Analysis.

QUANTITATIVE ANALYSIS.—Professor Black.

This course is conducted in the Chemical Laboratory. Practical instruction is given to the student in the methods of determining the percentage compositions of soils, rocks, water, the ash of plants, salts; also of metallic ores, limestones, coal, and other minerals.
Text-book: Fresenius' Quantitative Analysis.

METALLURGY.—Professor Black.

The lectures will treat of—
(*a.*) Fuel, furnaces, crucibles, retorts, fluxes.
Coal—the different varieties.
Charcoal—its manufacture in kilns, heaps, ovens.
Coke—its manufacture in mounds, ovens, &c.
The description of the different kinds of furnaces: The blast furnace—hot blast, cold blast; reverberatory furnace, oxidizing and reducing furnaces, puddling furnace, refinery, calcining furnace, liquation furnace, assay furnace, Siemen's gas furnace; materials for furnaces and crucibles—*e.g.*, fire-stone, fire-clay, fire-bricks; the different kinds of crucibles and retorts; determination of the heating power of different kinds of fuel.
(*b.*) Extraction of metals from their ores.
(*c.*) Physical and chemical properties of the metals.
(*d.*) Industrial applications of the metals.

ASSAYING.—Professor Black.

Instruction will be given to students in the Assay Laboratory or Furnace-room. It will be devoted to the most approved and useful methods of assaying—both by the dry and wet processes—metallic ores, such as gold, silver, platinum, bismuth, the compounds of copper, lead, tin, antimony, zinc, iron, nickel, cobalt, mercury, &c.; also the dry and wet assay of bullion.

MINING GEOLOGY.—Professor Ulrich.

1. Modes of occurrence of useful minerals; description of the various kinds of deposits of useful minerals; lodes or mineral veins; bedded deposits, seams or layers; irregular massive deposits; stacks and stack-works; impregnations, &c; theory of faults or heaves, and rules for searching for the faulted or lost portion of a deposit; review of certain theories and hypotheses regarding the mode of formation of mineral veins and other kinds of mineral deposits.
2. Prospecting for useful mineral deposits; shoading, trenching, costeaning; boring as practised with rods or rope, different apparatus and different cutting and clearing implements; the diamond drill.

MINING.—Professor Ulrich.

1. Breaking down rocks and useful minerals; tools employed in hard and soft ground, in metal and coal-mines; various methods of blasting; tools and explosions employed; boring and cutting machines; fire setting.
2. Opening of mineral deposits; shafts and adits.
3. Exploitation or the working away of mineral deposits.
4. Modes of securing excavations by timbering, masonry, and tubbing; construction of underground dams.
5. Transportation of mineral and rock along the underground roads, and hoisting or winding them up the shafts; machinery, appliances, safety-cages or parachutes, &c.

6. Modes of gaining access to underground workings.
7. Lighting underground workings; description of the most approved safety-lamps.
8. Draining of mines of water; adits, pumps, pumping engines, water-pressure engines.
9. Ventilation of mines, its principles and modes of achievement; natural ventilation, artificial ventilation; various approved ventilators; distribution of air through the workings.
10. The mechanical preparation or dressing of ores; machines and appliances.

MINERALOGY.—Professor Ulrich.

1. Crystallography; systems of crystallization; laws determining modification of crystals; compound crystals; pseudomorphous crystals; description and use of goniometers.
2. Physical properties of minerals, discussed as far as essential to recognition and practical distinction of the various mineral species.
3. Chemical composition of minerals.
4. Classification and description of the more important species and varieties of minerals; their modes of occurrence, association, and geographical distribution, with special consideration of those that are of economic value, as ores, in jewellery and in the coarser arts, or of interest in a geological or physical point of view.

These lectures will be illustrated by specimens intended for close inspection.

Text-book: E. S. Dana's Text-book of Mineralogy.

SCIENTIFIC USE OF THE BLOWPIPE AND DETERMINATIVE MINERALOGY.—Professor Ulrich.

Instruction in the use of the blowpipe; reactions of elements; oxides and acids; determination of artificial inorganic compounds, to be succeeded by that of important metallic and earthy minerals, with aid of their crystalline form and physical properties. Experienced students, on providing themselves with the necessary apparatus, will also receive instruction in executing assays for gold, silver, lead, copper, nickel, cobalt, &c., by means of the blowpipe.

Text-books: Guide to the Determination of Minerals by means of the Blowpipe, by Dr. Fudis, translated from the German by T. W. Danby, M.A.; Manual of Determinative Mineralogy, by Professor Brush; Plattner's Manual of Qualitative and Quantitative Analysis with the Blowpipe, translated by Professor H. B. Cornwall.

PETROGRAPHY.—Professor Ulrich.

Description of the characters of the rocks composing the earth's crust. Discussion of the different systems of classification proposed for the igneous, aqueous, and metamorphic rocks. Various methods for determination of the chemical and mineralogical constitution and minute structure of rocks, with special consideration and illustration of the use of the microscope in the examination of thin sections. Preparation and mounting of thin sections.

These lectures will be illustrated by specimens intended for close inspection.

Sub-Enclosure 4 to Enclosure 2 in No. 21.

REMARKS BY THE PROFESSORIAL BOARD.

IT will be seen by an inspection of the foregoing synopsis that all the courses of lectures can be undertaken by the existing staff of the University, with the exception of the following: Physics, mine-surveying, and applied mechanics. As these, however, are all essential subjects, instruction in them will require to be provided by the Council before the School of Mines can be regarded as complete. As regards physics, the Board is aware that rooms have been designed for a Physical Laboratory in the building now in course of erection, and it does not doubt that it is the intention of the Council to furnish the Laboratory with the requisite instruments immediately on its completion, and to provide the necessary teaching-power. The urgent need for doing this becomes the more evident when it is considered that, not merely is a class of physics an indispensable element of a School of Mines, but also that the want of it has been noted as a conspicuous defect in the Arts curriculum. It is proposed that the course of instruction in mine-surveying shall occupy three hours a week, and shall be attended by students of mining during their second year, so that it will be necessary for the Council to make arrangements for the delivery of lectures on this subject before the commencement of the session of 1880. It may be deserving of consideration by the Council whether the lecturer to be appointed should not also be required to give lectures on general surveying, which would be useful, and which might be expected to be attractive, to persons preparing themselves for the surveying and engineering professions. As the lectures on applied mechanics—by which term is meant the construction and working of common machines, and more particularly the steam-engine—are set down for the third year of the course, it will not be necessary to appoint a lecturer on this subject until the opening of the session of 1881. It is assumed that provision will be made for instruction in drawing by an arrangement with the Dunedin School of Art, the ordinary classes of which are quite as suitable for the purpose in view as would be special classes instituted by the University. Should it be considered desirable, there will be no difficulty at any time in providing short courses of lectures on the mining laws in force in the colony, and on the hygiene of technical pursuits.

At the proposed scale of charges the cost of instruction to the students will be extremely moderate—unprecedentedly so, the Board believes, in the case of schools which offer a complete preparation for remunerative professions. Thus, the cost of the whole three years' course of instruction in the first three divisions, qualifying for the Associateship of the School of Mines, will not be more than from thirty-seven to forty-two guineas; while the cost of the two years' instruction in the two last divisions, qualifying for the certificates of Mining Surveyor and Assayer, will amount only to twenty-four and thirty-one and a half guineas respectively. There can be no reason, therefore, on the

ground of expense, why the School should not be largely taken advantage of by practical miners and by other persons who propose to devote themselves to mining or metallurgical pursuits. The Board, however, does not venture to entertain sanguine anticipations that the colony will reap, to the fullest extent, the advantages derivable from the establishment of the School so long as it is considered not incompatible with the public interest that persons possessing no recognizable qualifications should practise in the colony those professions and occupations for the exercise of which it is the aim of a School of Mines to afford the requisite instruction and training.

When, in May of last year, the Board submitted an outline plan of the School of Mines, it directed the attention of the Council to the consideration, which it conceived to be of the highest importance, that, if the proposed School of Mines were established, the University would then be able, by the single addition to its staff of a Professor of Engineering, to call into existence a fully-equipped Engineering School. In now submitting a detailed plan of the School of Mines, which has since been founded in connection with the University, the Board does not think any apology needed for again pointing out that the course of study therein contained, in conjunction with the classes of higher mathematics and mathematical physics and of modern languages already instituted in the Arts curriculum, comprises all the subjects required to constitute a School of Engineering, with the exception of those technical branches which it would be the duty of the Professor of Engineering to teach. It should also be noticed that, as both applied mechanics and surveying would fall within the province of the Chair of Engineering, if such an appointment were resolved upon, the necessity for providing lecturers on these subjects for the School of Mines would thereby be superseded. If the Council are unable, with the resources now at their command, to give effect to this proposal, the Board would suggest that it is a matter well deserving of being brought by the Council under the notice of the Government. The Board believes that many persons in the colony are now preparing themselves for the engineering profession, without enjoying an opportunity of receiving the technical and scientific instruction which it would be for the public advantage, not less than for their own, that they should possess. The considerations which have been adduced seem also to make it evident that the means now being expended by the Government and by the University on the School of Mines will be only partially utilized, until, by the institution of a Chair of Engineering, the Council are able to combine with the School of Mines an equally well-appointed Engineering School.

By Authority: GEORGE DIDSBURY, Government Printer, Wellington.—1878.

Price 9d.]