REPORT
FROM THE
Select Committee of the Legislative Council
ON
GOLD,
TOGETHER WITH THE
PROCEEDINGS OF THE COMMITTEE,
Minutes of Evidence,
AND
APPENDIX.

ORDERED BY THE COUNCIL TO BE PRINTED,
20th March, 1856.

By Authority:
JOHN FERRAS, GOVERNMENT PRINTER, MELBOURNE.
D.—No. 18. a.
THURSDAY, 20th DECEMBER, 1855.

GOLD.—Mr. Humffray moved, pursuant to amended notice, That this Council resolve itself into a Committee of the whole for the purpose of considering the propriety of presenting an Address to His Excellency the Governor, praying that His Excellency will be pleased to place a liberal sum on the Estimates for 1856, for the following purposes:—

1. The employing of gentlemen of the necessary practical scientific attainments to make a mineralogical and topographical survey, more particularly of the lands in and about the Gold Fields of the Colony.

2. To ascertain, by offering premiums or by experiment, the best mode of extracting gold from its matrices, the most efficient machinery for washing gold from the alluvial deposits, and also to make suggestions as to the most profitable way of working the auriferous lands, and to advise generally.

3. That a report of such investigations be published monthly in the public journals, with the object of diffusing information amongst the mining community.

That in order that the above objects may be properly and promptly carried out, a Select Committee be appointed to take evidence and prepare a scheme of operations.

Question—put and passed.

Whereupon the Speaker left the Chair, and the Council resolved itself into a Committee of the whole accordingly.

The Chairman having reported that the Committee considered it expedient that a Select Committee be appointed to consider upon and recommend the best mode of developing the mineral wealth of the Colony, by making a mineralogical and topographical survey, more particularly of the lands in and about the Gold Fields of the Colony, by ascertaining the best mode of extracting gold from its matrices, the most efficient machinery for washing gold from the alluvial deposits, and also to make suggestions as to the most profitable way of working the auriferous lands, and to advise generally—the Council adopted such report.

Mr. Humffray then moved, That a Select Committee of this Council be appointed to carry into effect the above resolutions—such Committee to consist of the Surveyor General, Mr. Wills, Mr. Wheeler, Mr. Pyke, Mr. Benson, Mr. Labor, Mr. O'Shanassy, Mr. Cameron, Dr. Owens, and the Mover.

Question—put and passed.

FRIDAY, 21st DECEMBER, 1855.

ASSAY MASTERS.—Mr. Benson moved, pursuant to notice, That this House resolve itself into a Committee of the whole to take into consideration the propriety of adopting means to obtain efficient and duly authorised persons as Assay Masters or Refiners and Sweepwashers on the various Gold Fields of the Colony, to be under the jurisdiction of the Local Courts.

Question—put and passed.

Whereupon the Speaker left the Chair, and the Council resolved itself into a Committee of the whole accordingly.

The Chairman having reported, That in the opinion of the Committee the consideration of the propriety of adopting means to obtain efficient and duly authorised persons as Assay Masters or Refiners and Sweepwashers on the various Gold Fields of the Colony, to be under the jurisdiction of the Local Courts, be referred to the Select Committee of this Council on the subject of Gold—the Council adopted such report.

FRIDAY, 1st FEBRUARY, 1856.

SAMUEL GORDON, ESQIR.—Mr. Wills moved, pursuant to amended notice, That the Petition from Samuel Gordon, Esquire, presented by him on the 25th of January last, be referred to the Select Committee of this Council now sitting on the subject of Gold.

Question—put and passed.

TUESDAY, 11th MARCH, 1856.

PETITION.—The Surveyor General presented a Memorial from Edward Hill, of Lesney-street, Richmond, miner, praying that the Council would take the case as set forth in the Petition into consideration, and legislate for the future so as to secure to the discoverer of new gold fields the reward of his enterprise.

Petition received, and ordered to be referred to the Select Committee now sitting on the subject of Gold.
REPORT.

The Select Committee of the Legislative Council appointed to consider upon and recommend the best mode of developing the Mineral Wealth of the Colony, have the honor to report to your Honorable Council—

That your Committee having taken the evidence of a number of gentlemen of high scientific attainments, have now the satisfaction of being able to present to your Honorable House a mass of information and suggestions upon the matter of enquiry of the most interesting and valuable character, and are convinced that the practical results derivable from a proper attention to the same would confer a great and lasting benefit upon the Colony. The subject, however, involves enquiry of such magnitude that your Committee could do little more in so short a time than initiate the investigation, and now leave the matter with a strong recommendation to the new Legislature to pursue in a manner worthy of its importance.

That the questions presented for the consideration of your Committee may be divided as follows:—

1. The necessity for instituting a scientific enquiry into the extent and physical features of the auriferous lands of the Colony of Victoria, by making topographical, geological, and mineralogical surveys of the same, and laying down accurate charts, distinguishing thereon the auriferous from the arable and pasture lands.

2. To ascertain from the most reliable sources the present mode of mining, and examine the machinery at present in use on the Victorian Gold Fields, and the proportion between the estimated amount of the labor bestowed and the aggregate yield per man engaged in mining operations.

3. To enquire into the best mode of developing the auriferous and other mineral wealth of the Colony, and how far the Government may practically aid the miner through the agency of scientific instruction in economising labor, time, and money.

4. Whether Government Assay and Bullion Offices in Melbourne, and especially on the principal gold fields, would be profitable to the producing miner and advantageous to the public generally.

5. The necessity for establishing a Mining Board to carry out this important enquiry, the said board to form hereafter a separate department in the Government of the Colony; also the establishing of a Mining and Mechanical School with a museum, laboratory and exhibition rooms attached.

That from the evidence taken before your Committee it appears that it is impossible to over-estimate the public value of the surveys and investigations forming the subject of this enquiry; and although a large outlay of money will be required to carry the matter out properly, the immense benefits however, which would be conferred thereby upon the whole Colony, it is respectfully submitted, forms an ample justification for such productive expenditure, and one which will readily be endorsed by every contributor to the revenue who desires the progress of Victoria.

That America, which has credit for being the most economical Govern-
topographical, geological, and natural history surveys on the most comprehensive scale, and which surveys are superior to those elaborated by any Government of Europe, and results of great practical value have in all places followed from such proceedings.

That your Committee are of opinion that under the peculiar circumstances of this new country (having so large an extent of unsold land) these surveys and investigations should be proceeded with without delay.

That although your Committee find it impossible in their report to enumerate a tithe of the advantages which would arise from these investigations, either to mining, to science, to commerce, or the general prosperity of the Colony, they may mention some of the most important.

That a basis would be laid for a good ordnance map of the country, and the requisite information would be collected for the railway engineer in the construction of those great helps to modern civilization.

That correct data may thereby be ascertained indicating the source and course of the great auriferous deposits of the country, and the bearings of our quartz reefs; such information, if obtainable, will be invaluable to the practical miner.

That when the levels of the country are properly ascertained, reservoirs may be constructed on a large scale, which would provide a constant supply of water to the miner during the summer months, and thus effect much good.

That these surveys would furnish materials for accurate charts, distinguishing the auriferous from the arable and pasture lands, and thus lay the basis of future legislation for the disposal of the public lands of the Colony, and thereby avoid some of the difficulties suggested in the discussion relative to mining upon private property, and preventing the sale of auriferous land by mistake in future.

That such charts would also be a guide to the miner in selecting that portion of our gold fields whereon to try his fortune, and thus prevent much of the inconvenience of his present nomadic life with its demoralizing tendency.

That the geological survey will supply us with a knowledge of the peculiar features and characteristics, and reveal the existence and locality of the vast mineral deposits of this new country; and your Committee regret that the geological surveys have not been carried out in this Colony on a scale commensurate with their value, and trust that the work under this department will receive a sufficiently liberal support, that it may be followed up with vigour.

That a mineralogical survey may, in gold mining, render great service, especially in the deep sinking, aided by mechanical borings; in cross sections the "leads" or "gutters" may by such agency be discovered at a much less cost of labor, time, and money, than the present tedious methods of sinking by which so much labor is thrown away.

That taking these views, supported as they are by undoubted facts, your Committee are strongly impressed with the urgent necessity that every facility should be given to the promoting of these surveys on the most extensive scale, as, independently of their great value in a mining point of view, they will form the best guide for the judicious distribution of immigrants arriving on our shores, whether as miners or agriculturists, and the best sites would be indicated for future towns and villages; also the main railway routes throughout the Colony, and so preventing on the one hand, the delay and disappointment to the immigrant, and save much expense in the preliminary surveys for our railways—in short, much of the future prosperity and permanent settlement of the country will depend upon the time and manner in which these surveys are carried out and completed.

That your Committee would refer your Honorable House to the evidence of the Honorable the Surveyor General for information relative to the progress made up to the present time in this department, by which it appears that much has been done already in obtaining the preliminary triangulations of large tracts of the country.
That your Committee find, from the evidence taken before them, that
the present mode of gold mining in Victoria is most unsatisfactory; and
assuming (by way of illustration) the statistics of Mr. Braché to be correct,
viz., that there are 100,000 miners either engaged in actual mining, or rushing
about from place to place in search of new gold fields, and taking the estimated
yield of gold in the official year ending December, 1855, to have been 12½
millions sterling, it only gives the sum of eight shillings and fourpence per
man per diem. This is less, individually, than day laborers' wages, and it
must also be borne in mind that this amount is far from being equally dis-
tributed, in the digging lottery there being numerous blanks, and whilst many
are making fortunes, a far greater number are struggling hard for the means of
subsistence. How may this state of things be altered? The answer is simple,
viz., that by a better system of mining, not only a far greater aggregate yield,
but a much more equitable distribution of the gold may be obtained by the
working miner, and the chances of individual success much increased.

That your Committee think this part of the enquiry by the Mining
Board of the greatest possible importance. It is well known that a very large
proportion of the gold is now lost through the rude manipulation which prevails
in the present mode of gold washing on the diggings. Professor McCoy asserts
that the "tailings" thrown away by our gold miners would be deemed very
rich on the Ural Mountains.

That your Committee are glad to find that, according to the supple-
mentary evidence of Mr. Braché, there is little fear of our gold fields being
exhausted for many centuries to come; but your Committee think it hardly
necessary to state, that they can only receive Mr. Braché's statement as a
pleasing probability, inasmuch as his deductions are drawn, to a considerable
extent, from assumed data. Mr. Braché has, however, with ability and
considerable industry, investigated the subject extensively, and has arrived
at the following conclusions:—He estimates the auriferous lands of the
Colony to be 20,000 square miles, including 200 square miles of quartz reefs;
that there are 20,650 millions of tons of quartz, which would take
100,000 miners 300 years to work up. Estimating its value as low as £1 per ton, it
would give the enormous yield of 62 millions sterling per annum, allowing
10,000 companies of 10 men each to quarry and crush 24 tons per day. That
he further estimates the alluvial lands at 20,444 millions of cubic yards, and if
worked up by 100,000 miners, at the rate of 90,000,000 of cubic yards per
annum, would take 2250 years as the time required for exhausting our alluvial
gold fields, giving a yield of 24,000,000 sterling per annum; that is, valuing it
at 6s. per cubic yard, it gives the total of 6133 millions sterling as the value of
our auriferous alluvial deposits. Adding to this the estimated value of the
quartz at 20,650 millions sterling, it gives the grand total of the estimated
auriferous wealth of the Colony of Victoria of 26,783 millions sterling!

That it is quite clear that if our yield may be increased from £12,000,000
to even double that sum by an equal or far less amount of labor, and the
united evidence taken before your Committee shows it can be done by more
systematically working our gold fields. If so, it is high time that an improved
system should be put into operation, and the co-operation of the Government
is needed in various ways, such as the appointment of thoroughly qualified
mining engineers to act as instructors and guides to the working miners; the
value of such practical instructions in mining engineering cannot be over-
estimated.

That your Committee would venture respectfully to record their opinion
that it is incumbent upon the Government to foster and encourage, in every
possible way, a thorough reform in our mining system; and would recommend,
that in order that this country should progress in the same ratio as her material
wealth, the energy, enterprise and intelligence of her people warrant, wise and
Mr. Braché.

liberal laws, founded upon a practical knowledge of mining and miners, should at once be introduced, and the utmost care taken in the selection of proper men to administer them; that science, with its grand and powerful agencies, should be brought to bear upon our gold fields, as there is work for the geologist, the mineralogist, the machinist, the mining engineer and metallurgist; and that these levers to our national progress may be advantageously employed to work out the projected scheme, there should be some central supervising power; and your Committee recommend for this purpose the appointment of a Mining Board, with corresponding branches on the principal gold fields, who, will, from time to time, send out a number of gentlemen of the necessary practical scientific attainments, to make a thorough enquiry into the state of the gold fields, to examine the physical characteristics of the same, the modes of mining, the number of miners actually engaged, the productive results, the relative yield of gold to the labor bestowed, the different kinds of machinery employed, noting the efficiency or otherwise of each distinct machine, either in a mechanical, scientific, or economical respect. This, combined with the projected surveys, will be productive of results of great value to the miner and the public generally.

That your Committee think the Mining Board should put itself in communication with the local mining institutions, and consult with them as to the special regulations which may be required for the successful working of the different gold fields, and thus obtain authentic data upon which the Legislature may found improved laws for the gold fields.

That reports of these interesting proceedings and scientific enquiries should be published periodically in the form of a Mining Manual, under some plain title, such as the "Practical Gold Miner's Guide and Scientific Instructor." Authentic reports of new gold fields, especially, would prevent much of the evil arising from false statements, circulated too frequently by the designing, by which many miners are induced to rush about from place to place, and often entail much loss and suffering upon themselves and families.

That your Committee would recommend that prizes should be awarded periodically for any mechanical inventions of merit which would tend to facilitate mining operations.

That your Committee deem it of the greatest importance that a public museum should be established for the reception and exhibition of mineral specimens which may be collected by the surveyors, or which may be presented by the miners, as, without such a museum, having also the necessary apparatus, the result of the most careful field survey alone would be unsatisfactory.

Professor McCoy speaks strongly on this point. The learned Professor says:—

"I believe, however, from my experience, that whenever a government employs scientific men and sends them into the field to observe, they make observations and send them in in considerable apparent detail, but when they come to be investigated afterwards, either by a person of superior attainments, or even by the same person, with more accurate resources, in the closet, it will be found that the field determinations being of a hurried and imperfect kind, are very often erroneous. Now, if it be permitted that a mineralogical surveyor or a geological surveyor goes into the field and observes some particular mineral, and throws the specimens away upon his own individual authority, when he has looked at it, it will be found, as it has been found in the geological surveys of the old countries, that the result of such labors is a large portion of the national money thrown away; that you can never trust implicitly to results so obtained, nor can the word of the most scientific man in the field be worth much, from the hurry and imperfect means of examination used there. He must bring his specimens, whatever those specimens may be, home to his laboratory or museum, and examine them where he has his books and appliances and philosophical instruments to compare and test them accurately, and then write the determination down. For this reason it is absolutely necessary that there should be a museum established in which every special specimen might be deposited, and having been properly tested, be accurately inserted by name on the map; and
there it should remain for reference whenever any question in regard to it or to a similar material should arise. That I look upon as a thing that ought to be done without loss of time. It is of the utmost importance in relation to those investigations, and it is the only way, in my mind, by which you can give confidence to the public that the work will be properly done. I would also add to my description of this museum which I propose, that there should be in connection with it a small laboratory with a set of chemicals, analyzing or testing apparatus, to furnish elementary instructions for ordinary miners to enable them by cheap implements (such as a simple blow-pipe as big as a tobacco pipe, and eight or ten tests, costing as many shillings) to test the nature of all ores which might occur to them in the course of their labors on the gold fields."

It will be inferred from this evidence that the enquiry would be incomplete without such aid as the laboratory alone can give, the cost of which would be comparatively small, besides being a reproductive outlay.

That in connection with the said museum, it is very desirable there should be an exhibition room for models and drawings of all gold mining machinery at present in use in Victoria, or which may have been employed on any of the gold fields in any part of the world, so far as such models and drawings may be obtained. The opportunity thus afforded would be eagerly embraced by many who are now doomed to pine away their lives in obscurity, and society deprived of the benefits of their inventive skill for want of such facilities, as a cheap mode of registration under improved Patent Laws would give.

That your Committee are convinced that very much of the mineral wealth in the reach of the ordinary miner is now thrown away or overlooked through the ignorance or carelessness of the miner. It has long been known to science how to extract gold from quartz, but it has yet to be discovered how to apply that knowledge sufficiently economical to make quartz mining remunerative to small companies to any great extent; your Committee have taken some evidence on this branch of mining, but consider it unsatisfactory. It is generally admitted, that but a portion only of the gold is obtained at present by the miners in most instances either from quartz or the alluvial soil, as the very fine gold requires a far more delicate manipulation than the mode which at present obtains. Mechanical and chemical agency may remove much of the evil complained of; the ignorance of the miner of his true interests and his objection to a more general association of labor and the fair and equitable introduction of machinery is fast disappearing, and a new era dawning upon the mining community.

That your Committee believe, notwithstanding that much prejudice prevails, let the Government show that they are anxious to furnish the digger with the aid of scientific instruction, and thus give him the means of securing a better return for his labor, it will gain his confidence and support. Let comprehensive and liberal laws be made, and good men selected to administer them, the Government would find in the miner cheerful obedience and support.

That your Committee would respectfully suggest the desirability of the Mining Board instituting a course of public lectures on mechanical science, practical chemistry, the chemistry of gold, geology, mineralogy, metallurgy, gold mining, &c., &c., &c. The co-operation of scientific men should be invited. These lectures would be interesting to all, and would offer very valuable information to the working miner; the press will no doubt give its powerful aid by circulating full reports of same.

That your Committee being impressed with the great importance of the investigations to be carried out under a Mining Board, would venture to urge that the greatest care should be taken in securing the services of the right man, as a mere theoretical or fashionable enquiry would be worthless for all practical purposes. There must be a personal inspection of the gold fields by gentlemen possessing the required scientific attainments and experience, whose report will have the stamp of accuracy, and which may hereafter be consulted
as an authority and guide upon the subjects investigated, forming a history of our material resources, physical condition, and social progress.

**Assay and Bullion Offices.**

That your Committee think the establishment of Assay and Bullion Offices a matter deserving the fullest consideration of the new Legislature; your Committee are indebted to Mr. Kinnear for some valuable evidence thereon. According to his evidence there can be no doubt that considerable advantages may arise to the producer, as well as the public generally, if ready facilities were afforded for having gold assayed and made into ingots, with the proper weight and fineness stamped thereon, and, especially, if such ingots were made a legal tender. The Committee, however, can do no more at present than recommend the matter of assaying to the consideration of the future Legislature of this Colony.

**General Remarks.**

That your Committee having discussed the more important subjects arising out of this enquiry, think their labor has not been in vain, and entertain high hopes that this enquiry will be the starting point of a great and beneficial change in our national progress, although the enquiry is nominally directed to mining operations and for the benefit of the miners, but the whole community must participate in the prosperity of the mining portion of it.

The prosperity of a new country must depend very much upon the development of its material resources, and in the founding of a young nation, especially, it is wise to take instruction from the experience of older countries—warning from their failures, encouragement from their successes.

The statesmen of Australia have a distinguished and noble task in laying the foundation of the Australian federation. Never had statesmen before such prolific abundance of the material of progress and success at their command: the immense extent of the auriferous wealth of Victoria places her in the most promising position, and one which presents no parallel in the history of British colonies. Her soil contains boundless wealth, and her people indomitable energy. Victoria is indeed deserving of the designation of being the most brilliant gem in the British Crown. It thus becomes the imperative duty of the Government as the trustee of the public property, consisting principally of the waste lands and the golden deposits therein, to facilitate in every possible manner the development of this immense wealth, always bearing in mind the sound political maxim, that a nation's prosperity does not consist so much in the aggregate possession of large wealth, as in the equitable distribution of that wealth.

That inasmuch as the returns arising from gold mining far exceed in commercial value that of all other productions of the Colony, even with the present rude method of mining, and which may be increased threefold, it should receive the assistance and encouragement of the Government, and if that yield may be materially increased through mechanical aid and other scientific appliances, even on social grounds alone, it leaves no doubt on the question as to whether the Government should give its aid in all matters calculated to increase the material productions of the Colony, and thereby promote the prosperity and comfort of the colonists.

That your Committee are fully aware that much prejudice prevails against the introduction of machinery, and the establishment of gold mining on a scale commensurate with the difficulties which isolated mining has suggested but this prejudice is dying out in the same ratio as ignorance is being removed, and better regulations introduced; but it cannot be denied that the individual miner has hitherto had just grounds to be jealous of any infringement upon his individual rights, and this is likely to remain until a more comprehensive and suitable code of laws are framed for the gold fields.
The legitimate and timely aid of capital would not only prevent the ruin of thousands of industrious miners, but would frequently secure an independent fortune to them; but, as the laws now stand, there is neither the requisite protection to the individual miner or the capitalist.

That a country possessing such great material advantages, needing no other conqueror than well directed labor, to be governed by liberal and enlightened laws, guided by intelligence, supported by the energy, industry, and enterprise of Britain's hardy sons, will outstrip in its progress all other portions of the British empire, and become, at a future day, the southern counterpoise to the commercial wealth and political predominance of the north.

J. B. HUMFFRAY,
Chairman.
PROCEDINGS OF THE COMMITTEE.

FRIDAY, 11th JANUARY, 1856.

Members present:—
Mr. Wills, Mr. Wheeler, Mr. Benson, Dr. Owens, Mr. Humffray.
Mr. Humffray was called to the Chair.

Resolved—That in the opinion of this Committee a permanent Gold Mining Board should be established to promote the development of the mineral wealth of the Colony.

TUESDAY, 15th JANUARY, 1856.

Members present:—
Mr. Humffray in the Chair.
Mr. Benson, Mr. Wheeler, Mr. Pyke, Mr. Cameron, Dr. Owens.

Resolved—That in the opinion of this Committee the permanent Gold Mining Board should consist of three members.

Resolved—That in the opinion of this Committee the members of the Board should be permanently appointed, and be paid by a salary out of the public Revenue, and that a paid Secretary to such Board be appointed.

Resolved—That in the opinion of this Committee the functions of such Board should be—
1. To obtain a Chart of the auriferous portions of the Colony of Victoria by topographical and mineralogical surveys.
2. To institute scientific enquiry into the best mode of extracting gold from quartz and alluvial and diluvial soils.
3. To establish Assay Offices, and to engage the services of a number of gentlemen to work out the scheme projected by the Committee.

Adjourned to Friday next at 11 o'clock.

FRIDAY, 18th JANUARY, 1856.

Members present:—
Mr. Humffray in the Chair.
Mr. Wheeler, Mr. Benson, Dr. Owens.
Adjourned to Friday next at 11 o'clock.

FRIDAY, 25th JANUARY, 1856.

Members present:—
Mr. Humffray in the Chair.
Mr. Cameron, Mr. Wheeler, Mr. Benson, Mr. Pyke, Dr. Owens, the Surveyor General, Mr. Wills.

J. Braché, Esq., called in and examined.
Adjourned to Wednesday next at 10 o'clock.

WEDNESDAY, 30th JANUARY, 1856.

Members present:—
Mr. Humffray in the Chair.
Mr. O'Shanassy, Mr. Wheeler, Mr. Wills, Mr. Benson.

Mr. Alfred R. C. Selwyn called in and examined.
Adjourned to Tuesday next at 11 o'clock.
TUESDAY, 5th FEBRUARY, 1856.

Members present:—
Mr. Humphray in the Chair.
Mr. Wheeler, Mr. Benson, Mr. O'Shanassy, Mr. Cameron, Dr. Owens.
Mr. David Wilkinson called in and examined.

Adjourned to Tuesday next at 11 o'clock.

TUESDAY, 12th FEBRUARY, 1856.

Members present:—
Mr. Humphray, Dr. Owens.

No Quorum.

Adjourned to Tuesday next at 11 o'clock.

TUESDAY, 19th FEBRUARY, 1856.

Members present:—
Mr. Humphray in the Chair.

Mr. Benson, Dr. Owens, the Surveyor General, Mr. Cameron.
Mr. Samuel Gordon called in and examined.
Mr. Henry Harris called in and examined.
Mr. Charles Kinnear called in and examined.

Adjourned to Thursday next at 11 o'clock.

THURSDAY, 21st FEBRUARY, 1856.

Members present:—
Mr. Humphray in the Chair.

That it is the opinion of this Committee that, if a system of Mining Awards and Prizes were established it would have the effect of stimulating scientific enquiry and mechanical invention, and thereby aid in the material development of the mineral wealth of the Colony.

Resolved—

That in order to secure proper protection to the discoverers of any scientific agent in mining operations, or the inventors of any new machine or machines, when competing for prizes or awards under the Mining Board, the Committee deem it essential that the present Patent Law in force in the Colony should be completely remodelled, as in its present form it prevents the patenting of new machines and the improvement of old ones.

Resolved—

That it is the opinion of this Committee that the mode of distributing the awards, and the amounts thereof, should be subject to the recommendation of the Mining Board.

Resolved—

That Mr. Braché's supplementary evidence, now laid before the Committee, be received and printed as an Appendix to the Evidence and Report.—(Vide Appendix A.)

Adjourned to Tuesday next at 10 o'clock.

TUESDAY, 26th FEBRUARY, 1856.

Members present:—
Mr. Humphray in the Chair.

Mr. Wheeler, Mr. O'Shanassy, Mr. Benson, Mr. Lalor.

Resolved—

That the Committee recommend:—

1. That prize medals and awards be given for the best machinery applicable to gold mining, for prospecting, working shafts in deep sinking, quartz crushing, amalgamating, washing or puddling machines; and also, for the best chemical or other scientific mode of extracting gold from its matrices or alluvial deposits.

2. That there should be a public repository for all mechanical models for the inspection of the public, and an exhibition every six months at the least, when prizes should be awarded to the successful competitors.

3. That the sum of £6000 be placed upon the Supplementary Estimates for this year, to be disposed of under the direction of the Mining Board, in accordance with regulations to be approved of by the Government, as prize medals and awards to be given at stated periods between this date and the 30th June, 1857.

Adjourned to Thursday next at 10 o'clock.
THURSDAY, 28th FEBRUARY, 1856.

Members present:—
Mr. Humffray in the Chair.
Mr. Wheeler, Mr. Benson.

The Chairman laid before the Committee the following account, received from Mr. Gordon:—

"February 12th and 19th.—Attending the Committee of the Legislative Council on Gold, pursuant to the summons of the Clerk of the Council, at two guineas per day.

£4 4 0

SAMUEL GORDON,
"Land and Parliamentary Agent,
"Rob Roy Hotel, Flinders-lane, Melbourne."

Resolved—
That the question of allowances to witnesses be taken into consideration at the next meeting of the Committee.

Adjourned to Thursday next at 10 o'clock.

THURSDAY, 6th MARCH, 1856.

Members present:—
Mr. Humffray in the Chair.
The Surveyor General, Mr. Benson, Mr. Wills, Mr. Cameron.

Resolved—
That the consideration of Mr. Gordon's letter, and the question of allowances to witnesses be deferred till the next meeting of the Committee.

Resolved—
That the following be the amounts recommended to be awarded as prizes, to be paid out of the Public Revenue, viz.:
1. For the best alluvial Washing Machine, £500.
2. For the best Quartz-crushing Machine, £1500.
3. For the most economical and efficient mode of extracting gold from alluvial soil, quartz, and other earthy substances in which it may be found deposited, £3000.

Resolved—
That such prizes be recommended to be awarded by the 30th June, 1857.

The Chairman laid the following letter before the Committee:—

"Melbourne, 6th March, 1856.

Gentlemen,

At the time that the various motions were brought forward in the Legislative Council, which gave rise to the formation of your Committee, I happened to be in Melbourne on business from Ballarat. The subjects of enquiry in your Committee are of such vital importance to this country, and were so much in accordance with my own wishes, that I could not refrain from anxiously watching your proceedings and offering my personal evidence on the above subjects. The latter, however, I did principally at the request of your Honorable Chairman, with whom I had frequent conversations on mining matters whilst at Ballarat last year. At his request I deferred my departure for Ballarat in order to place myself fully at the disposal of your Committee, and up to this day I have devoted all my time to the consideration of the matters before you, being even now engaged in similar labors, the results of which I shall communicate to you at an early date. I used repeatedly to say that my being occupied with these labors caused me to sacrifice my own private interests; besides which, I incurred some expense in getting my evidence properly copied before its being printed, as I did not like to entrust the correction of my labors to the shorthand writers. I should, however, not have taken the liberty of bringing this matter to your notice, but I am not informed that in special cases compensation is allowed to parties giving evidence on Committee in the Legislative Council. If this be the case, I trust you will favorably consider this my application; if not, whatever my private circumstances may be (which are well known to your Honorable Chairman), I shall not insist upon my claim for compensation, and shall, nevertheless, continue, as long as it is in my power, to contribute to the full investigation of the questions now before you.

"I have, &c.,

"J. BRACHÉ."

Resolved—
That the consideration of this letter be postponed till the next meeting of the Committee.

Adjourned to Tuesday next at 10 o'clock.
TUESDAY, 11th MARCH, 1856.

Members present:--
Mr. Humffray in the Chair.
The Surveyor General, Mr. Benson, Mr. O'Shanassy, Mr. Wheeler.
Professor Melbye called in and examined.
Adjourned to Friday next at 10 o'clock.

FRIDAY, 14th MARCH, 1856.

Members present:--
Mr. Humffray in the Chair.
Mr. Wills, Mr. Benson.
The Committee deliberated.
Adjourned to Monday next at 10 o'clock.

MONDAY, 17th MARCH, 1856.

Members present:--
Mr. Humffray in the Chair.
The Surveyor General, Mr. Benson.

Claims by Mr. Gordon and Mr. Braché for remuneration for attending as witnesses, further considered.

Resolved--
That this Committee are of opinion that in this case no sum can be awarded in payment of witnesses' expenses, inasmuch as it has not been shewn to the Committee that any actual expense has been incurred by any of the witnesses for travelling expenses, and it not being the practice of the Council to remunerate witnesses for the time occupied by them in attending Select Committees.

Resolved--
1. That in the opinion of this Committee properly qualified persons should be dispatched at once to the Gold Fields of Victoria, whose duty it should be to examine all the gold mining machinery at present employed thereon; also to examine the geological features and ascertain the extent of the auriferous portions of the country, and to make a metallurgical examination of the various minerals and report fully thereon to the Surveyor General, and make such suggestions for publication as they may deem advisable.
2. That it is essential to the realization of the grand scheme now sought to be initiated, that a Mining and Model Museum should be instituted under the supervision of a thoroughly practical man.
3. That the establishment of efficient and economical Assay Offices would confer a great benefit upon the working miner.
4. That it is of primary importance that topographical, geological, and mineralogical surveys should be made of the whole Colony, but first of the gold districts, so that the auriferous portions thereof should be distinctly laid down upon the charts prepared for that purpose, as this would form not only a most valuable guide to the miner but might become the basis of legislation under the New Constitution in the settlement of the land and mining question.

The Honorable Andrew Clarke, R.E., Surveyor General, a member of the Committee, examined.

Resolved--
Adjourned to Wednesday next at 10 o'clock.

WEDNESDAY, 19th MARCH, 1856.

Members present:--
Mr. Humffray.
No Quorum.
Adjourned to to-morrow at 10 o'clock.

THURSDAY, 20th MARCH, 1856.

Members present:--
Mr. Humffray in the Chair.
The Surveyor General, Mr. Benson, Mr. O'Shanassy.

Resolved--
That this Committee taking into account the immense mineral wealth contained in the lands of the Colony, strongly recommend the desirability of establishing the Mining Board as a distinct department of the Government.

Heads of Report laid before the Committee and Mr. Humffray requested to prepare a Report in accordance therewith.

Chairman ordered to report.

D.—No. 18. 62.
MINUTES OF EVIDENCE.

FRIDAY, 25th JANUARY, 1856.

MEMBERS PRESENT:—Mr. Humphry, in the Chair; Mr. Cameron, Mr. Wheeler, Mr. Benson, Mr. Pyke, Dr. Owen, the Surveyor General, Mr. Wills.

Mr. J. Braché called in and examined.

1. By the Chairman.—What are you by profession?—A civil and mining engineer.

2. Have you had much experience with regard to mining in this and other countries?—I have had for several years experience in mining prior to my coming to this colony, and have been engaged in various gold mining speculations for the last three years in this colony. I was well acquainted with the Californian gold fields and the system of mining employed there; and prior to my residence in California I was in Central and South America, seeing the different modes of silver as well as gold-mining of those countries; I also saw the gold mines at Fredericksburg, Virginia, and those of North Carolina, United States, and am acquainted with their mode of working.

3. What is your opinion with regard to the mineralogical and topographical survey of the country?—Such a survey is of the utmost importance and necessity for many reasons; it should by our Government, and more particularly by our mining representatives, be considered the basis of a series of national measures, in order to procure a national saving with regard to our gold miners' social and material condition, tending to abolish the present wasteful system of labor employed in gold mining. If the gold miner had access to a mineralogical and topographical chart with sections of the colony delineating the full extent of our auriferous lands, and if such chart also contained the most accurate notes, illustrating the particular workable portions of each gold field, the worked and unworked portions thereof, the extent of our quartz veins, and remarks as to the probable supply of water that might be attained by means of a series of simple engineering works, such a survey would bestow immense benefits upon our gold miners and the rest of the community, depending upon the yield of our gold fields. Our miners would become more settled occupiers of the gold fields; they would in a great measure abandon their present nomadic life with its demoralizing tendencies.

4. Do you believe, if there were a good scientific chart made out, it would be a guide to the digger as to what portions of the country he should select, and prevent the diggers going in such wild rushes without any accurate guides?—If the miner could obtain a chart of the gold fields he could select any particular portion thereof and make it his steady abode; he would not follow any new rush to any locality without taking counsel from the chart. The often false and frivolous reports of discoveries of new gold fields (frequently but mercantile speculations) would receive a death blow from such a survey being made, and the digger would not spend time, money, and labor in following those rushes, whereby he often becomes but a consumer and ceases to be a producer.

5. What would be the general advantages to the colony derived from such a survey as we speak of?—It would finally settle all disputes arising from mining on private lands; so auriferous lands could after that be sold by mistake. Such a survey would also furnish us with the accurate extent of the mining, pastoral, and agricultural lands of the colony. The knowledge of the extent of crown lands thus occupied by three distinct classes of our population would serve in devising ways and means for raising a revenue, based upon the most just principles of taxation, according to the respective producing capability of the three sections of our crown lands.

6. Do you think such a survey would have a tendency to settle mining operations on a more permanent basis?—It would be the commencement of permanent mining operations in this colony. The reason why there are no such operations now carried on, arises from the various prejudices of our miners. For instance: they believe that our gold fields will sooner or later be worked out, and that the introduction of capital will be detrimental to wages for manual labor; they oppose, therefore, the introduction of machinery, for which, if there were sufficient encouragement, there would be endless employment on our inexhaustible gold fields, and manual labor would be sought after at high rates. Besides, if the extent and richness of our gold fields were known abroad, much foreign capital would find its way into this colony, to be invested in gold mining speculations.

7. Would there be any other general advantages arising from such a survey than the development of the mineral resources of the country with regard to the gold miners?—Such a survey is indispensable for the judicious distribution of our population over the colony, in proportion to its producing capabilities, and will also be most essential in the selection of localities all over the colony for townships, villages, and harbors; the construction of railroads and other public works, such as large reservoirs, and a general drainage or irrigations of our dry diggings, as well as immense tracts of our agricultural lands during summer. The survey would also be highly useful to all branches of civil engineering, architecture, and steam navigation, in pointing out localities where building materials and coal might be procured, for which large sums now annually leave the colony. Indeed, our present railway surveys, carried on throughout the colony with but a very

GOLD COMMITTEE—6.
Mr. J. Beach, who has written a paper on the subject of gold mining in Victoria, has been chiefly engaged in perfecting a machine invented by me, patented, and called the "Prospecting Machine." I was urged to this invention by considering the immense loss of labor and capital through the present mode of mining on alluvial grounds, without a simple and accurate survey thereof being made previous to working them, and which might be obtained quickly, and at a cheap cost. The machine, therefore, is so constructed as to examine the depth, dip, and extent of our alluvial auriferous deposits, and by this means to assist the working of the individual miner, as well as the operations of mining on a large scale; especially, in the construction of proper engineering works. It is also intended to serve as an instrument in the scientific investigation of our gold fields by obtaining accurate geological sections of the same. The machine is further intended to be used as the quickest means for exploring new gold fields, in the search for coal and other minerals, in sinking artesian wells in sterile mining and other districts, and in taking accurate sections of the quality and quantity of excavations along the lines of railways, canals, and other public works. The machine is a highly improved boring apparatus, propelled by hand, horse or steam power, according to its size. It is fully capable to master the drifts in deep sinkings. The machine, like a field piece of artillery, can be easily transported, as it is mounted on a carriage and peculiarly constructed, so as to move over rough and broken ground. It will bore a hole in alluvial auriferous ground six inches in diameter, or more, to the depth of 300 feet, in from twelve to fifteen hours, according to the nature of the ground, and will develop on the surface the thickness of each stratum. A cross section of the reef and gutter is thus obtainable, by which mining operations will be greatly facilitated. The machine, constructed on a smaller scale, and worked by hand, will be a highly useful instrument in the exploration of shallow sinkings in search for new gold fields. I may also mention that I was the first in this colony to start quartz mining, and to introduce machinery for that purpose about two years ago.

10. Do you consider that a topographical survey would assist in discovering gold?—It would most materially assist in the discovery of gold and other minerals; without it the mineralogical survey would be but imperfect. An accurate chart, and sections of the topographical features of the auriferous quartzose and schistose formations of this colony, and of the surrounding or intersecting upheavals of the older rock, and the eruptions and overflowings of the lava mass, with their surrounding strata and alluvial deposits, would lead to such a complete and practical knowledge as to the various agencies and phenomena that caused their existence; whilst the possession of such scientific data as the peculiar formation, bearing, dip, depth, and extent of the quartz veins, the height of quartz hills, with their surrounding strata and alluvial deposits, would lead to such practical conclusions and deductions as would be an infallible guide in future gold mining operations. Indeed, it is my belief, that at a not very distant time gold mining will be reduced to a regular science, in order to accomplish which this contemplated survey would be all-important. Gold mining in the country is now carried on upon the most superficial knowledge, the result of which is a frightful loss of labor and capital, and it becomes almost imperative as a Government measure to obtain a national saving through the timely instruction of our miners in a better mode of gold mining. Such instruction I consider equally important in relation to the material welfare of our miners, as we consider the establishment of churches and schools necessary for the morals of the people. The instruction of our miners should be considered by the Government an indirect financial measure, for it would result in an increasing gold production, furnishing the Government with additional means and ways for raising a revenue. There is no doubt that by the proper steps being taken, gold mining will become a science in the course of time; for coal mining even was in the beginning of this century but a science; it is only since 1807 when the London Geological Society was founded, that through its efforts, and those of scientific and practical men, coal mining has been gradually raised to its present perfection as a science, leading to the discovery of those boundless coal basins by which the manufacturing enterprise of Great Britain is supplied with inexhaustible quantities of that fuel, without which the empire would never have attained its present existence and power. Well might we ask, What would Great Britain be without her coal mines? and again, What would Victoria be without her gold mines? It is estimated that the coal mines of Great Britain will be productive at the same rate as they are now for another 2000 years to come. This furnishes us with a striking example of how much the prosperity of a country depends upon its geological structure and mineral wealth. The future greatness of Victoria will chiefly depend upon the working of her gold fields, which, although we only possess an imperfect knowledge of them, are yet estimated to last for many centuries to come.
In it not, therefore, all-important to acquire in time a knowledge of the mineral wealth of this country, and of the best modes of extracting it? Upon the productiveness of the gold mines the future power of Victoria as a nation depends: all other pursuits in this colony are collateral to gold mining and depending more or less from its success. 11. How do you propose a topographical survey to discover gold?—A topographical survey will only in so far assist us in the discovery of gold as it will make us accurately acquainted with the surface features of our gold fields, and also with those uniform laws of nature through which these features assumed their present aspect. But the topographical survey should never be disconnected from the mineralogical survey in order to accomplish the object at issue; for the latter survey forms the immediate analysis or investigation into the physical structure of our gold fields, and has the paramount necessity in order to carry out efficient mining operations. 12. Supposing we accept your explanation as to a mineralogical survey, in what way or by what indications can you, as a mineralogist, discover the presence of gold?—The real practical mineralogist is not in possession of the knowledge of the use of the best implements to accompany him in his prospecting tours or investigations, but he can also judge from the surface features of any given locality where to apply his labor with the least expense in the search for gold; and he will also use the most efficient machinery prior to working the ground, in order to have a full knowledge thereof and work it most economically. 13. Apart from machinery, in what way can you discover gold without machinery by a mineralogical survey?—There are certain features in the formation of our gold fields, in the appearance of the quartz veins and alluvial auriferous ground, from which the practical mineralogist will conclude infallibly at a superficial glance as to the existence of gold in any locality, without even employing any implements or machinery. Machinery would only be employed in such a survey in order to prospect or explore minutely for the presence of gold. Even now many of our more intelligent miners, most of whom have been in California, have become by observation tolerable practised mineralogists, at least in respect to gold mining. By far the greater portion of our miners are guided by mere instinct, of which Ballarat especially affords the best proofs. During several months I tried to organise a company on that gold field, having for its object to reduce mining to a more regulated system, connected with less speculative risks, and to abolish the obnoxious shepherding system, by surveying the ground prior to the sinking of shafts, by introducing on that gold field the machinery I already described. I was surprised to meet with so much support from the more intelligent miners, but the enterprise failed for the time being, on account of several rushes to other gold fields, which took the mining population from Ballarat. But I was convinced from the general feeling that existed among the miners that similar efforts towards an improved mining system, if properly supported by the Government, could not fail. The greatest portion of our miners, however, seem to have become determined to work by means of physical strength only, ignoring science and trusting to good luck. I have no doubt that after years of serious disappointment arising from misapplied labor, many of our miners will have some idea of a real mining science, but unfortunately this could not happen until an immense amount of labor had been wasted, which, if properly applied, would have saved millions to the colony. Besides, the continued disappointment of our miners has the most discouraging effect, and paralyses the energies of the greater portion of miners; many of them become idlers or give themselves up to a nomadic life, following rush after rush, a life of the most demoralizing tendency, leading to crime, and displaying the worst features in our social development. 14. Without machinery such a survey would be useless?—A survey without the necessary implements being employed would be but very superficial; although it would delineate the physical features of the country, it would not be a mineralogical survey, but only what we call a geological survey. 15. A superficial mineralogical survey or geological survey, in the present state of science, would help you to nothing without machinery?—Even a superficial geological survey of the gold fields, made without machinery, would prove most beneficial; for it would show the extent thereof, and would prevent the sale of auriferous lands. 16. Will you allow me to ask you, as a scientific man, if you possess any means whatever of determining the presence of gold in lands, alluvial or quartz, more accurately and with more certainty than in the ordinary manner?—In alluvial lands the presence of gold could be ascertained by an improved system of boring, by which accurate sections of the ground would be made at a cheap rate, to prove its auriferous quality, prior to working it. As regards quartz, there is a certain degree of mining skill already used in Central and South America, which I have never observed in use here, by which, in a cheap and expeditious manner, the presence of gold in quartz can be determined; but as this subject would be too lengthy to explain just now, I will furnish you some other time with the necessary data. 17. By Mr. Wheeler.—What machinery are you referring to, that you would use in this case? that could be brought to bear upon this mineralogical and topographical survey with advantage?—I refer to the machine I already described, in order to obtain sections of our auriferous lands. 18. The machine has been inspected by most of the honorable members here present. 19. By the Chairman.—Can you state that a certain stratification of the earth from its mere appearance in any given district is auriferous?—There are infallible indications in the appearance of all gold fields by which the practical miner knows at once that gold is present. Had I, prior to the discovery of gold in California or in this colony, traversed this country in various directions, I might, through my intimate acquaintance with the gold regions of South America, of which many have precisely the same aspect as those of Victoria, have had the honor of being the first discoverer in this country.
Mr. J. ... 

25th January, 1890.

... seen instances where gold contact with again time. Geological researches have already proved this. Gold, when found in its matrix, is found in veins of quartz, which veins are found in what geologists term the metamorphic series of rocks, which comprise granite, under certain conditions, porphyry, serpentine, mica schist, gneiss, and other formations. Until now gold has only been found in this colony in the quartzose, schistose, and granite formations; although, I am told, on good authority, that there are auriferous quartz veins found in granite near Latrobe; and I secretly entertain any doubt that the just now named rocks, which are all met with in this colony, will be found gold-bearing in the course of time. Our gold fields form regular inlets, disconnected and interrupted by the upheavals of the abovenamed older rocks, often surrounded, as in our western gold fields, by the overflowing of basaltic lava. But on this subject I would refer you to the writings of better authorities than myself.

20. By Dr. Owens.—Have you any known constant that will determine and indicate the presence of gold?—Gold, in its native state, is almost universally found under some conditions. Geologists have already proved this. Gold, when found in its matrix, is found in veins of quartz, which veins are found in what geologists term the metamorphic series of rocks, which comprise granite, under certain conditions, porphyry, serpentine, mica schist, gneiss, and other formations. Until now gold has only been found in this colony in the quartzose, schistose, and granite formations; although, I am told, on good authority, that there are auriferous quartz veins found in granite near Latrobe; and I secretly entertain any doubt that the just now named rocks, which are all met with in this colony, will be found gold-bearing in the course of time. Our gold fields form regular inlets, disconnected and interrupted by the upheavals of the abovenamed older rocks, often surrounded, as in our western gold fields, by the overflowing of basaltic lava. But on this subject I would refer you to the writings of better authorities than myself.

21. As this inquiry is a very important one it is necessary to get something like a definite idea on the matter. Can you state, if you are allowed time, that in certain stratified strata one must always exhibit the presence of gold?—I have already answered this question, but I can only again state, that where ever, in this colony, we come in contact with the quartzose and schistose formation we shall find workable gold fields.

22. That is thus: Mica slate contains gold here now; do you mean to state that mica slate is uniformly connected with gold throughout the world?—Decidedly not; only in case mica slate occurs in connection with quartz veins.

23. You find by your observations the same as any miner does, rather than by scientific observations, that in the mica slate of any given district there is gold?—No; with only this difference, that I should go more systematically to work in my search for gold; our miners possess but little knowledge as to how and where to search for gold.

24. By the Chairman.—You would answer the doctor's question more fully if it were put in this shape: Does the science that you now possess enable you to detect by certain indications in the strata the presence of gold?—Undoubtedly; as your practical experience enable you to detect by certain indications in the strata the presence of gold better than the ordinary miner does by the pick and shovel?—It does so in the fullest sense of the economical point of the question.

25. By Dr. Owens.—Will you be kind enough to state how you are enabled to do so?—As I have already said, there are certain technical rules observed in searching and mining for gold in countries where gold mining is of older date than here, and which would be equally applicable in Victoria.

26. By Mr. Benson.—Does your practical experience enable you to detect by certain indications in the strata of the earth the presence of gold?—Most decidedly. This was the case with Mr. Hargreaves' discovery of gold in this country. He concluded from his experience, gathered in California, that there must be gold in New South Wales. And I am confident that any Indian miner from the gold-bearing regions of Central or South America, and brought here, might, on traversing the country, have deprived Mr. Hargreaves of the honor of being the discoverer of gold.

27. Now, by science this practical knowledge would be perfected?—Beyond a doubt, and within a comparatively short time.

28. By the Chairman.—Practical knowledge is the basis of the gold mining science, I presume?—Undoubtedly; in this science, as well as any other.

29. Is there a science in existence relative to gold mining?—There is a certain science in existence, derived from long practical experience in gold mining, which, if introduced here, would prove an incalculable benefit to the gold mining community at large. The Surveyor General—As a miner, he would in all probability be able to give you his own views on the matter, and then let the questions arise out of what he says about it.

30. By the Chairman.—What is your opinion of the present mode of working on alluvial ground?—It is very ineffective. There is an immense loss of capital invested in labor arising from a want of co-operation, an entire absence of skilled labor and machinery. The isolated claim system is the cause of all these evils, preventing large tracts of land from being worked by joint labor and capital associations of our miners, by which they could obtain the necessary supplies of water, by gathering the rainwater in reservoirs, or turning the course of any stream by means of drains for that purpose; whilst on the deep sinkings, where the sinking of shafts is so very expensive, and where the drift water often compels the miners to give up their task, such associations could accomplish the work by sinking one shaft where now ten shafts are sunk; and they could also accomplish by means of machinery to keep down the drift water. Such associations have already been formed in several instances on Ballarat, but with but little success, having been founded on erroneous principles, and not affording sufficient encouragement and protection to capitalists. In this respect we find the Orans the best worked gold field, the works there resembling much the mining works carried on in California. Our miners cry out continually against monopoly, even when they are allowed to form amongst themselves associations, and therefore I can only say here that the ignorance of the mining community as to locating the best means for their social and material welfare is the only monopoly against themselves existing. I am sorry to see so many political charlatans on the various gold fields who keep this outcry against monopoly alive, partly form ignorance of the principles of social economy, partly from party interests. If these charlatans rightly understood their position
they would do all in their power to encourage the joint labor system, and thereby better the material condition of the miner, especially now, when he has politically been placed on an equal footing with any other class of the community. They should at least know that by bettering the material condition of the miner, and by forming settled mining communities, they would sooner gratify their ambitious ends; for the miner would then, far more than he now does, appreciate his political and social condition, as he would have a material lean to rest upon, whilst now, as a nomadic being, he cares in reality but little for his political rights, as we see by the small number of miners' rights issued.

31. Is it your opinion that if there were a system established for the miners to work in associations that it would be a benefit to the mining community?—How could it be otherwise? The following principles would be observed by these associations, viz.: to effect, with the smallest amount of labor and capital the largest amount of produce, and to bestow the greatest good to the greatest number. The poor and helpless miner would always meet with employment through these associations; shepherding would thereby be abolished; the class of consumers and non-producers would disappear on the gold fields; the miner would become more settled, and enjoy the comforts of a home. The mercantile community would rely upon a more settled state of things, and would be less subject to hazardous speculation; crime would be better checked; morality and education would prosper, and our miners would become more intelligent in their labors, undergoing a sort of working routine necessary for managing such associations, for they would elect their own officers and managers. These associations would also give security to the investments of capitalists, being, in fact, a compromise between capital and labor. The present impoverished condition of our miners would subside, for they would at all times earn steady and certain wages or profits. Many other advantages would accrue from the introduction of such associations.

32. Could you suggest any scheme by which individual rights might be protected, and still leave an opening for the introduction of machinery?—To effect this properly the present gold field regulations would have to undergo an entire change. The desired object might be obtained in the following manner:—Branch mining boards on each gold field should be formed, who would appoint competent persons to instruct and guide the miner in his labor, as well as establish and regulate joint capital and labor associations. The principle observed would be to value well-directed manual labor as capital. Any number of miners, not exceeding in number, might form themselves into a mining company, and select their own headman or captain, who would act as their representative on all occasions. This captain, on behalf of the company, would call upon the crown officer, and request the lease of a piece of ground, which lease, for which a certain rental would be paid, would be registered in the joint names of all men in the company. The ground would be selected by the captain of the party, accompanied by the crown officer, who would have to see that said ground would not be comprised in another lease; for that purpose the ground should be gazetted before it is leased. According to circumstances the size of the company's claim might be regulated. Suppose such a company of working men without capital to commence operations, capitalists would then be invited to join them and provide the requisite funds. This might be done in the following manner: it should be agreed upon between the captain of the company and the crown officer as to what amount of capital would be required to work the ground efficiently; this being done, the officers of the crown would cause the ground to be advertised in the Government Gazette, properly describing the extent of the claim, the number of men composing the company, and the capital required for working the claim. Each miner in the company would be a shareholder, his labor being his investment, and the whole capital would be divided into thirds, one-half or one-third, according to the capital required for working the ground, of which would be the property of the working miners, the remaining shares being left open for the selection of capitalists. Should, however, a certain amount of capital be subscribed by the men composing the party, it should be mentioned in the advertisement, which might be this:—

"OPEN FOR THE SELECTION OF CAPITALISTS.

"Lease No. 100, comprising acres, in the district of

"Working party consists of men, under Captain N. Paid up capital £

"Capital required £

"Apply to

"Crown officer, Ballarat."

In this manner, I believe, the rights of individual miners would be fully protected, and inducements held out to capitalists. The crown officer would draw up the necessary compacts between the labor party and the capital party (if we may distinguish them thus), and would act as arbitrator in all cases of dispute. If he should fail to settle a dispute that might arise, it should be referred to the present local courts. After the labor and capital party had entered into a compact, the working of the mine should be done under proper discipline and management, which might be accomplished in the following manner:—Capitalists would agree with the captain of the workmen as to the election of a fit and proper manager of the mine, who would lay down a working routine, and put the right men into the right place, keeping all under strict discipline. That such can be done I experienced myself on Forest Creek, having employed at one time as many as thirty-two men composed of all nations. I observed the latter policy in order to rule over them by division; if I had selected either all Irish or German conspiracies or strikes would have been the consequence. I experienced never a harsh word with my men; I kept them sober and made them ambitious, one emulating to exalt the other in his work. I had employed a
Chilian miner, a Peruvian miner, one Spaniard, two Frenchmen, one Austrian, four Italians, and the rest Irish, English, and Scotch. He should also defray all expenses, and be responsible for all transactions of the association. That similarly constituted companies can be formed and organised, I have learned from my own experience in a quartz mining establishment of my own. I employed twenty-two men, and for three months I kept them in the best order. I should have been successful had not the outbreak at Ballarat, and the snarely it caused on other gold fields, disturbed very undertakings from without, protection from Government not being then sustainable. On close examination there will be found nothing impracticable in this scheme. The captain and the workmen themselves will watch that every one of their party does his duty. This I remarked especially in my own party. In this manner the poor but industrious digger will always be protected against want, for he will have access to the advantages of capital. The party would supply themselves with provisions wholesale, and only so much of the yield of the mine would be distributed weekly as would be necessary for defraying current expenses; the rest of the yield the mine would be left to monthly, quarterly, or final settlements. Should the company find their claim unprofitable, they should have the right to have another claim granted them on lease, under the same name, on surrendering the old ground. The advantages accruing to the miner from such associations would be, that he would be taught to do his work according to the best known mining principles. One shaft only would be necessary where now perhaps ten are sunk. The miner would be safe against penury and want. He would become a steady occupier of the gold fields, and have a steadier income than at present. Morality would be in the ascendant and crime checked. Disorderly characters would be excluded from the advantages enjoyed by the better portion of the miners. The miner could enjoy the comfort of a home. The interests of the capitalists would be compromised with those of the miner, who can only rely upon the labor of his hands, which would be appreciated as capital. Capital thus invested would have no privileges beyond its natural influence. The miner's labor could always compete with the influence of capital. In case of illness the digger would meet with proper support. Should in the end the claim be found not paying, then, in dissolving, the laborer will have lost his time and labor, and the capitalist part of his money; in many cases, however, he would retain the greatest portion thereof in the shape of machinery and works erected by the company, provided an agreement to that effect had been entered into at the outset. This should be done in order to encourage capitalists to join such associations, for they would otherwise besides their time lose also their capital, and so be the worse of the losers, which should be avoided, for if the capitalist retained his capital he likely would remain with the company in selecting another piece of ground for work. Any party could sell out his share, the laborer as well as the capitalist; but the principle should always be, that there are as many men representing so many shares against so much capital representing so many shares. I cannot enter more fully into the details of this scheme, but it would take up too much time. I am well acquainted with the continental mining systems and those of other countries, and feel confident that out of portions of each of these a most equitable mining law for Victoria might be forged. I need scarcely say that the above discussed associations would be well adapted for this country. Through them the deep sinkings on Ballarat could be worked at one-tenth their present expense, and I am confident that if such associations were formed throughout the colony, the products of our gold fields would soon amount, to double or treble the present production, jointly divided amongst the laborer and capitalist.

33. By Mr. Benson.—Labor would be requisite to derive that benefit?—Of course, and labor would then reach its highest value, whereas now labor is often spent without any result; for if labor does not produce, it is only a waste of time.

34. By the Chairman.—Do you believe that there is efficient machinery now in existence to carry out this scheme?—Inaugurate a new law on the gold fields, which gives all and every security to the investment of capital, and efficient machinery will soon be abundant. I have closely watched the progress of our gold fields. When is 1854 I started in quartz mining, with an outlay of capital of £2000, there were immediately other parties following my example; but up to the beginning of 1855 I believe there was not more than £20,000 worth of machinery employed on all the gold fields. In 1855 the increase has been such that in January, 1856, I find the number of large quartz crushing machines throughout the colony amount to more than 150, worth on an average about £3000 each, besides a great number of small establishments of the kind, which, with the steam engines employed in pumping water in deep sinking, and the machinery employed in washing gold, might be estimated at the value of £1,300,000. In spite of the increase in the number of miners, which may be estimated at 100,000, and in the machinery employed on the gold fields, we scarcely perceive an increase in the production of gold at the close of 1855.

35. How do you account for that?—I account for it through the inefficiency of machinery and the ignorance in mining matters, as well as the present mining regulations in force on the gold fields, throwing destructive impediments in the way of capitalists.

36. By the Surveyor General.—Is it increase of population or increase of miners that you mean?—I mean increase of miners.

37. Apart from the population?—Yes.

38. By Dr. Owen.—What is the population of miners of all classes?—At the lowest estimate I should set it down at 100,000.

39. By the Surveyor General.—Actually engaged in mining day after day?—A great portion of this number may not be actually engaged in mining, but may be following those wild rushes so prevalent in the colony. But I believe that 100,000 people actually depend from the yield of their pick and shovel for their living.

40. By the Chairman.—Have you averaged the wages that those may earn?—I find from the export duty on gold paid this year, that about 10 millions sterling have been produced; but
I will set it down at 12½ millions, taking into consideration the amount that may have been smuggled or otherwise disposed of. Dividing then 12½ millions amongst 100,000 miners, the result does not amount to quite 7s. per diem, or setting down 300 work days for the year, 7s. 3d. per day per man is the result, which is less than what the laborer on the roads receives as wages. This with poverty and want prevalent on our gold fields; for nearly the whole of this yield per head is required to provide the necessaries of life, leaving no capital in the hands of the miner, whereby to better his condition by the introduction of machinery.

41. By the Attorney General.—Are you aware that there is any smuggling going on?—Smuggling must be a very profitable trade, as the Sydney market price has been as high as 24 3s. 6d. per ounce for gold, which can be bought in Victoria at £10 10s. 6d. per ounce, leaving a considerable profit. I cannot persuade myself, therefore, that no smuggling should be carried on in seeing so much temptation held out.

42. Is it mere supposition, or have you any reason to believe it?—I have every reason to believe that smuggling is carried on from good authority. A gentleman residing at Port Albert informed me that a regular smuggling traffic is carried on through Gippsland, and that a great deal of the Owens gold, from the Backland River, Lake Omeo, the Motta Mitta, the Nicholson River, Snowy River, and other parts, is smuggled into New South Wales by regular traffickers. He even informed me of the route these smugglers generally take. They cross the Alps near Lake Omeo, descend to the Tambo River, pass by Bratten and ascend the Snowy River, cross the boundary, and pass through the Maneroo Plains. N.S.W., thence to Sydney, entering at diggers from the New South Wales mines. Therefore the New South Wales exports of gold will not be a satisfactory argument that no smuggling is going on.

43. By the Chairman.—What are the average wages of the diggers?—The actual wages would amount to about 5s. per man per day, if we take the amount raised by the export duty as a guide for production. But I have gone even into more accurate estimates on various portions of the gold fields. I find that at Magpie Gully and Frencheorn's Lead (perhaps the richest gold field yet ever discovered in the colony), where within two months, from the middle of September, 1855, over £350,000 were raised from the ground, the average wages of all employed in mining or shepherding, taking the lucky with the unlucky, were only 7s. 4d. per day per man. From all I can learn the Owens are the best paying in the average, but also the best worked gold field in the colony. On Ballarat proper, raising a man's day's labor at 10s., and considering the outlay of capital for slushing, tools, machinery, &c., we find that the production of gold does not amount to one-half this outlay, there are generally three to four shovels to one paying hole. This is well proved by the fact that a Ballarat we perceive amongst the miners at the same time the greatest opulence and the greatest misery.

44. By Dr. Owens.—Then you do not think that mining is a remunerative occupation on the gold fields?—Gold mining in its present state is all but profitable; every other occupation is preferable to it, and its present state requires the utmost attention to avert serious consequences for the future.

45. All the efforts to produce machinery at present have been failures in consequence of their imperfection?—Not always. Mining operations have failed through scores of other evils; for instance, badly constructed machinery, ignorance of management of the works of a mine and machinery, the little reliance that can be placed on hired labor, the want of capital, and the want of protection given to parties collecting it. In many cases, failures took place also on account of insufficient machinery. The main reason is that nearly all have been isolated individual efforts, instead of co-operative joint capital and labor associations. Besides, in quartz mining, immense sums have been squandered in sinking deep shafts, when it is a well known fact that gold decreases in quantity in the quartz as we descend; and for many other reasons those failures took place.

46. Do you think there is any higher inventive or practical skill in the colony at present to enable us to produce better machinery?—There is a sufficient amount of inventive skill in the colony which, if properly supported and protected, could be induced to construct better machinery, but as the gold fields regulations now are there is but little inducement.

47. To wash alluvial soil or to crush quartz?—Both branches of mining require more efficient machinery on a larger scale, to be constructed by parties that have proper knowledge of gold mining, but not such knowledge merely as might have been gathered in this colony. Besides, there is a great amount of humbug carried on by ignorant machinists, who have by their bad machinery created a prejudice against its introduction. Already this evil is very much on the increase and requires the speediest reform. There should be a board appointed who would at all times report as to the merits of any machine, and no machine should be allowed to be introduced unless its practicality had undergone examination. This measure, though extraordinary, might prevent much mischief for the future, and would be a protection to a productive mining enterprise.

48. By the Chairman.—Do you not think that there has been a considerable amount of prejudice against the introduction of machinery?—The prejudice against the introduction of machinery has been very great at one time, but the present condition of our miners inclines them daily to be more favorably towards its introduction, and before long the bad policy of having opposed it will be recognised by the mining community. This prejudice, however, has been kept alive by agitators chiefly, who, if acquainted with social economy, would at once see their error of supposing that capital will curtail the rights and income of the miner, who can never be worse off than he is at present. The introduction of skilled labor and machinery will increase the production of gold, wages would rise, and labor would be in constant demand. It is an absolute necessity to oppose the introduction of capital on the gold fields; it must find its way there sooner or later.
I have been able to realise what they should each 'Victoria will' worked ground an extended claim of three times the size of an ordinary claim could be given under the miner's license ?—It was a certain number

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having an interest in the undertaking.

What wages were you allowing?—One pound per man per day, and at the same time the men were to have an interest in the undertaking. This I gave as an additional stimulus to the men.

Did you furnish them with rations at the same time?—I did; but they were to be deducted from their wages.

Was this claim a lease or was it merely a certain number of claims under the miner's license?—It was a certain number of claims under the miner's license. I had the promise of a lease. I was to have a lease, or I would never have established my machinery.

Who promised you these?—The Crown. I first addressed His Excellency the late Governor, requesting a lease for mining purposes. He referred me to the Chief Commissioner, Mr. Wright, who gave me a letter of instructions to the Resident Commissioner at Castlemaine, Mr. Bull. By him I was referred to Mr. Crepyngny, the commissioner of the district where I had established my machinery, and he selected and staked out the ground for me in my name only, and not in the names of the other miners.

Did he promise you a lease of that claim?—I was promised a lease of the whole claim at that time, and protection for the dam that I was erecting and the water that would be collected by its means.

On the strength of that promise you erected your machinery there?—I did.

Did you ever get that lease?—I never did. When the Ballarat riots broke out the police force was taken from the Mount Alexander District and transferred to Ballarat. My own men were persuaded to leave me by evil-disposed persons opposed to my undertaking. I lost my control over those still remaining in my employ, partly through their finding that no lease would be granted, and they thought they had just as much right to the ground as myself. One night three shots were fired into my hut, no doubt intended for me; and coming from the direction of a locality inhabited by bad characters, which I had restricted from committing depredations on my rights and property, I was, however, rather comforted, and when I called next day the camp I was informed that there was no police to spare, it having gone to Ballarat. I then had to protect myself, and in keeping two men regularly off work I made them guard the establishment every night armed to their teeth. Besides, many horsestealers and some ticket-of-leave men were living in the neighborhood. I took the liberty afterwards in naming the place as a map I made of the
losing my control over the men, and the ground not being secured by lease, the locality, command, and sufficient capital, without being as rich as is generally imagined. These companies, however, having a large space of ground at individual labor had worked away the superficial portion or cream of the gold fields, the rest has taken from me, and the Government not affording me protection, I incurred loss after loss, and it has been proved there ever since the discovery of the mineral wealths in those countries, that after individual labor had worked away the superficial portion or cream of the gold fields, the rest has remained abandoned for ages, and eventually passed into the hands of large capitalists, without any disputes arising with the individual who originally owned it. Besides, it has been found invariably that only large establishments can exist, it sometimes being the case that even such establishments work for years under heavy expenses without realising any profits, but in the end they have generally paid well. This arises from the fact that not every portion of the quartz vein is as rich as is generally imagined. These companies, however, having a large space of ground at command, and sufficient capital, without being discouraged, continue their work, being certain that they will be paid in the end by striking a heavy deposit of gold. The same will happen to quartz mining in this colony. It will be found remunerative only to large companies with extensive means and a large claim at command.

62. By the Chairman.—Can you inform us of any scheme by which the introduction of machinery might be encouraged in preference to the present one, which presents so many evils; knowing the evils, what would remove them?—I believe, as far as machinery has been established at present, it is not sufficiently extensive to prove successful in quartz mining. In Mexico, as in South America, I have seen that all the establishments there are founded with a great deal of capital, seldom less than from ten to twenty thousand pounds. And it has been proved there ever since the discovery of the mineral wealths in those countries, that after individual labor had worked away the superficial portion or cream of the gold fields, the rest has remained abandoned for ages, and eventually passed into the hands of large capitalists, without any disputes arising with the individual who originally owned it. Besides, it has been found invariably that only large establishments can exist, it sometimes being the case that even such establishments work for years under heavy expenses without realising any profits; but in the end they have generally paid well. This arises from the fact that not every portion of the quartz vein is as rich as is generally imagined. These companies, however, having a large space of ground at command, and sufficient capital, without being discouraged, continue their work, being certain that they will be paid in the end by striking a heavy deposit of gold. The same will happen to quartz mining in this colony. It will be found remunerative only to large companies with extensive means and a large claim at command.

63. By Dr. Owens.—What do you think is the great difficulty in the machinery for quartz crushing; in what particular department; point out the difficulty?—It is less a mechanical question than a chemical one, insomuch as the crushing can be performed in such a way as to reduce the quartz to an impalpable powder.

64. Then the difficulty is in extracting the gold from the quartz after it is crushed?—Exactly so.

65. You consider that quartz crushing has not been brought to so high a perfection as it may be desired?—Not by a great deal; there are many defects.

66. In what would you consider is still the deficiency in quartz crushing; is it in the expense?—Most of the failures arise from the insufficiency of means in supplying the most powerful machinery; frequently from over-estimating the value of quartz veins; and also the small extent of claim now obtainable under a lease. The extent of such claim, and the gold bearing quartz therein, may not be sufficient to guarantee the outlay for machinery which is frequently seen in the quartz mines of South America, where a company may work wherever they like in the quartz over a large space of ground without restriction; but if these companies have not met with success, they are mostly successful in the end. It is very erroneous to lease so many yards of a quartz reef. This system will be abandoned before long; for the individual miner will work the quartz veins but superficially, and abandon his claim when the work begins to be difficult. Quartz veins can ultimately be worked only by large companies, with considerable capital at command.

67. By the Chairman.—Supposing you found a good quartz reef, what would be the best mode of crushing that quartz? I think that is the doctor's question?—More or less the principles of all the machines used in crushing quartz in this colony, if they are able to crush a sufficient quantity, would answer. But here lies the difficulty: to crush quartz in large quantities it requires power and most expensive machinery; besides, the small establishments cannot afford to pay a metallurgist to do the amalgamating, and consequently they lose their gold through ignorant management. An economical amalgamating process requires always some metallurgical knowledge, and is by far not so easy a task as is generally believed. Machinery therefore frequently fails in the hands of apprentices, which most of our quartz miners are, which might, under efficient management, have answered.

68. Have you seen better means employed?—I have.

69. Where?—In silver mines.

70. Where in what place?—In South America.

71. Have you been there; have you seen it, or merely heard so?—I have seen it.

72. By Dr. Owens.—Do you mean merely in the amalgamating of silver?—It is not amalgamated there; that has been abolished. The solution and precipitation principle is employed, which was first introduced into Bolivia in 1844.

73. Do you believe that precipitation could be introduced in extracting gold from quartz?—I believe this will ultimately be done, unless quicksilver becomes much cheaper.

74. At what rate could gold be brought into the market by that means?—Much cheaper than quicksilver would do it.

75. By Mr. Wills.—Is the process you have seen applied expensive?—It requires a large establishment.

76. By Dr. Owens.—Do you not consider that the outlay for a large establishment is itself an evil, if it can be avoided, insomuch as it necessarily throws quartz mining into the hands of large capitalists?—I am of a contrary opinion, from what I have witnessed in Bolivia. From authentic records, I find that since the erection of such establishments wages have risen every year. There is a larger demand for labor, because the capitalists have been doing well, and can afford to pay high wages. In 1833 and '34 the wages in the silver mines were from 2s. 6d. to 4s. 6d. per day; they are now 12s. per day, and this in a country where for 1s. per day the laborer can obtain all the necessaries of life.

GOLD COMMITTEE—D.
77. You say that you could manage by other means to obtain gold from quartz cheaper than we do now by the ordinary process?—I believe it can be done.

78. Suppose a ton of quartz is properly crushed, and yields two, three, or ten ounces to the ton, are you aware what the cost would be per ounce to extract it by the amalgamating process?—In this colony it can scarcely be said what the cost per ounce would be.

79. Is it possible?—I find quartz mining to be almost an entire failure—at least in nine cases out of ten—not to say, however, that the whole of the quartz-crushing machines of the largest size are included in this failure. They have often been erected at no less a cost than £3000 each.

80. Amalgamating machines?—Quartz-crushing machines connected with amalgamators.

81. By the Chairman.—That is not the point now; we speak of crushing quartz.

82. By Dr. Owens.—I am not speaking now of any process for separating from the amalgam or anything of that kind; but the mere cost of extracting the gold from the quartz by silver amalgamation. You could not tell us perhaps what would be the cost of that per ounce?—I have not considered that point. I believe no data could be arrived at at present. The market price of quicksilver being fluctuating, the cost of amalgamation depends on the price and purity of the metal as well as on the chemical state of the quartz. No precise data have been arrived at in this colony as to the cost per ounce, and if such data had been brought forward they were not established on facts.

83. By the Chairman.—Could you not give us any definite answer (arising out of the doctor’s enquiries as to the simple cost of extracting the gold from a given ton of quartz according to the present mode?) Have you any data to go upon that will enable you to say what is the cost of extracting the gold from a ton of quartz?—I believe, if it were worked efficiently, it might be done at £1 per ton, or even less on the average.

84. By Dr. Owens.—That is £1 per ton for amalgamating only?—For amalgamating and crushing with efficient machinery and competent skill.

85. On a large scale.—Only on a large scale.

86. You think it can be done for less?—Yes, this is the maximum. I have just heard that several parties are about to crush quartz with very imperfect machinery; their estimate is that it will cost them about thirty shillings per ton.

87. Could you furnish us with any scheme, which we could recommend, which would cost only £1 for crushing and amalgamating?—I can scarcely do so without writing it down.

88. By the Chairman.—Would you have any objection to furnish us with a scheme? Could you do it under proper protection?—I could do so.

89. You said less?—It could be done for less in proportion to the size of the establishment.

90. By Dr. Owens.—You say you have a scheme for producing machinery by which you could do it for £1 per ton?—Yes, I have.

91. Do you crush by stone or by iron?—I would crush by stone.

92. If you crush by stone there is certain wear and tear?—We have got here a most abundant supply of the hardest granite almost anywhere.

93. It cannot be obtained without quarrying, and the cutting of stones for that purpose is very expensive?—It would be less expensive than castings, for making the mould alone would cost more than the quarrying of rollers out of the granite beds.

94. What do you calculate castings cost?—One shilling and one penny per pound.

95. And I suppose you would require half a ton or a ton weights?—At the very least ton weights.

96. Thirteen pence a pound for iron is a good deal; for how much less could you get stone?—I have not fully estimated that, not having had any made. I am aware it would cost much less, and I will furnish you with the necessary data at some future day when I am further advanced with my scheme.

97. I have been in South America myself, but what is done in that country would not assist us at all; but still, if you can make improvements on these matters, all well and good; for £1 would be consumed through the mere friction of the wheel and machinery alone; apart from any manual labor it would cost more than £1 per ton?—I am not speaking of raising the quartz from the mine when I speak of £1 per ton.

98. You said the whole process?—Then I was mistaken; it does not include the raising of the quartz from the mine; this would cost more.

99. By the Chairman.—You do not include, then, the expense of raising it out of the mine?—I do not.

100. You say the crushing, the amalgamation, and all the rest of it would not amount to more than £1 per ton?—Yes, I do.

101. By Dr. Owens.—By one single operation of your machinery the money would be gone; you do not show to the contrary?—I would erect machines that could crush fifty tons a day; provided there was every protection and encouragement given me, and sufficient means at command.

102. Give us an idea of this machine; then we can follow you up by recommendations deserving of your abilities in any way. It is not enough to tell us: Supposing we have a machine: That, practically, is not before us.—I will furnish you with the particulars at a future day.

103. By the Chairman.—You say the present mode of extracting quartz is defective; show us how to remedy it. What is your mode of remedying the evils that exist in the working of quartz veins in this colony?—As soon as my labors in compiling a pamphlet on Quartz Crushing, which I am writing, are completed, I will furnish you with all data required. The subject would be too lengthy to enter into now.
104. By Dr. Owens.—Do you think that if there were premiums allowed for the best means of working quartz, that we might arrive at some satisfactory conclusion?—I believe if premiums were offered they would be of great benefit. I do not say so because I mean to be one of the competitors; for I would not compete unless there were sufficient protection for inventions, by a new patent law in this colony, and unless the granting of premiums would be done by the most competent judges. Still I believe there would be but few competitors, as the expense connected with the necessary experiments is very great.

105. Suppose you were secured by a patent right in any machine you might invent, or in any process you might establish?—I should have to be protected by a patent; but letters patent granted under the present patent law in this colony are not sufficient protection.

106. Suppose you were protected?—If protected, in the fullest sense of the word, I should make an effort; though past experience in reference to letters patent has given me infinite annoyance, connected with the mode of obtaining letters patent, at present, and has fully convinced me of the utter impracticability of our colonial patent law.

107. Would you compete for the premium?—I might, if I could find parties to join me in the expenses of the experiment.

108. By the Chairman.—If the present patent law were altered, would you then recommend that a reward be given?—I believe it would be the best means of obtaining the best mode of crushing and amalgamating quartz. But I doubt, at the same time, whether any competent persons would be able to undergo the expense. It would also require the most competent board of judges to decide which would be the most meritorious method of crushing quartz.

109. That would have the effect which we are now struggling to get. Would that suffice for all the wants of the gold fields?—No; I do not believe that this will be sufficient. There are equally great defects in other branches of our present gold mining system, which I have already mentioned, and which ought to be speedily enquired into by a competent commission.

110. By Dr. Owens.—It is not exactly a scientific question. It is a very important point connected with the patent law, in my opinion. Suppose you patent a machine of any sort for mining purposes, and you take it to the gold fields, and it can be imitated by miners easily, and within their means, and they choose to build one for themselves, do you think you could enforce the patent law?—I might enforce it by a lengthy suit in law or equity; there is no other speedy remedy according to our present patent law.

111. I will suppose you have the power. Do you think that the miners, having made up their minds to make the machine for themselves, considering the temper of the miners, and that they have a great objection to special privileges, do you think they would sufficiently consider your patent, and that you could protect yourself against infringement?—There would be very little difficulty, because if the patent law were sufficiently strengthened, the machine could not be made anywhere else than in the proper place; there would be a better control over its manufacture.

112. Not if the machine could be made on the gold fields?—There would be no difficulty to get the miners to support me in my privilege as an inventor.

113. If the patent where so simple that the miners themselves could make the machine, an amalgamating machine for instance, do you think that you could hold it against the miners by the patent law?—No, I do not believe it possible, and in such a case the Government should compen­state the inventor for giving his invention up to the public.

114. In the fact, the patent law would be no protection to a simple and effectual invention?—I do not think there will ever be so simple an invention.

115. By the Chairman.—Mr. Braché, what is your opinion with regard to the value to the colony of an enquiry such as has been proposed by Mr. Wheeler?—I believe it would be of very great advantage, if there were an immediate enquiry made by a commission into the present modes of gold mining and into the material condition of our miners. Such commission should also be authorised to report as to the best measures for remedying the present existing evils. It would also be of great use to the diggers, if, by authority of this commission, publications about the best modes of gold mining were issued from time to time.

116. Would you allow yourself to be guided by the recommendations of a commission?—Yes, I believe a competent commission could decide as to the merits or demerits of anything connected with gold mining. Neither could I propose any other way by which it could be done better and more expeditiously, because I do not see who but such a commission should award the proposed premiums, as they would watch the whole matter carefully.

117. Do you think it would require an examination of competent persons to ascertain whether the inventions are worth any reward or not?—It would require most competent judges; it could be done by the proposed commission of enquiry; for the decision as to the merits of such an invention could not be properly given except on the gold fields; and sufficient protection should in the meantime be granted to the inventor whilst he would be carrying on his experiments publicly. The commission could examine the machines on the gold fields, and would then be best able to report as to their merits or demerits.

118. What is your opinion with regard to the necessity of the establishment of a permanent mining board of five, to institute all these enquiries?—A permanent mining board is very much wanted, and if such a board had existed long ago, much mischief, and many ill-usages now in force on the gold fields, would have been averted.

119. What would be the functions of this board if established?—The permanent mining board should watch at all times over all mining affairs, and should devise the best ways and means to develop our mineral resources; it should centralise under its jurisdiction all and every transaction which would tend to improve the social and material condition of our mining population, and
should for that purpose suggest and enforce such reforms in the working of our gold fields as might be deemed best to the mining community at large.

120. By Dr. Owens.—You are taking now the political subject?—It should be less of a political than of a social nature. The mining board should be considered only as an economical measure.

121. By the Chairman.—Would you describe in general terms this commission which you wish to have established?—The commission of enquiry should be appointed and instituted by the chief mining board. It should enquire and report as to the different modes of mining now in use in extracting gold from quartz and alluvial soils, and improvements that might be made. It should report as to the real social and material condition of our miners; it should suggest remedies where required, and report as to how branch mining boards on the different goldfields might best be instituted, suggesting improvements upon the present goldfield regulations. It should also decide as to the merits of premiums being awarded to the best mode of quartz mining; report upon and enquire into the defects of the present patent law, and frame a compensation and cost of laws to regulate the transfer of a person's mining board of the colony. For this purpose the commission should have the assistance of a chairman well acquainted with mining matters, a secretary, a metallurgist, a mining engineer and assistant, being a draughtsman, well acquainted with the local goldfields. The selection of this latter will be most important, as he will have to perform the most important part of the enquiry. The secretary should be a person possessing some scientific attainments and having a good knowledge of several modern languages; as he would have to act as interpreter in the examination of foreigners, of whom there are many engaged in mining in this colony, and have erected extensive machinery. The secretary and engineer should be acquainted with the Spanish language, as the most important works on gold and silver mining are written in that tongue, and have not been translated, no other nation requiring such knowledge previous to the discovery of gold in California and here, with the exception of Russia. The commission would also have to translate works and mining laws published in foreign languages, which it would be the secretary's duty to translate. As the secretary's time would be sufficiently occupied, a reporter would also have to be engaged to compile the minute evidence.

122. Would you vest in this commission the power of examining persons on the different goldfields as to the present mode of mining, &c.?—Yes; they should possess that power.

123. By Mr. Clerk.—Can you give us any recommendations as to whom the mining board should consist of?—The mining board should consist of a chief mining board, whose seat should be at the head-quarters of the Government. The power vested in this board should be the following:—To appoint, if found necessary, branch mining boards on each goldfield; to examine all new inventions in relation to mining, &c., and to report to the secretaries as to the merits or demerits thereof, and recommend as to the granting or refusing of letters patent for an invention; to examine into any project or proposition as to whether it would be advisable for the miner to perform the most important part of the enquiry. The secretary and engineer should be acquainted with the Spanish language, as the most important works on gold and silver mining are written in that tongue, and have not been translated, no other nation requiring such knowledge previous to the discovery of gold in California and here, with the exception of Russia. The commission would also have to translate works and mining laws published in foreign languages, which it would be the secretary's duty to translate. As the secretary's time would be sufficiently occupied, a reporter would also have to be engaged to compile the minute evidence.

124. By the Chairman.—How can you suggest their establishment without a large cost incurring to the colony, with regard to the goldfields regulations and management?—I believe, considering the establishments now existing, that the members of the local courts on the various goldfields have not the necessary mining acquirements to draw up good mining regulations. They
could easily make the by-laws and regulations required, if they would act in harmony with the acting mining engineer, thus supplying the wants of the community. The expense of these mining boards would not be large, as indirectly the beneficial results arising from such boards would be proved by an increased gold production, and there would, consequently, be an increase arising in the duty on gold; whilst, directly, the boards would charge fixed fees for their advice and all work they would be called upon to perform.

125. Then you believe that if such a board were established, it would have a beneficial effect of instructing the miner in a general manner?—There should be engineers, or mining instructors, sent to each gold field, from whom each miner could get the necessary instructions as to where to place his machinery best, and as to the working of that particular section of the gold field. If this were done, in a short time, mining instructors could call public meetings to instruct the miners on various topics connected with mining; and one of the first steps would be to form joint capital and labor companies, as I have already explained. Thus, these institutions might shortly be proved by the general prosperity of our gold fields to have been highly useful.

126. By Mr. Wills.—Do you think, if a large premium were offered for the most economical and effectual mode of extracting gold from quartz and other matrices, that it would have the effect of inducing scientific men in foreign countries, such as France and Great Britain, to compete for it?—I believe it would; and, therefore, they would have the advantage over us.

127. What is your opinion as to the effect of such competition?—I think that scientific men in foreign countries might fully determine the difficulties in which extracting gold from quartz merely is at present involved. But this knowledge is not new. The great difficulty rests in other causes; to ascertain whether the treatment of quartz could be performed equally economical here as in other countries, where labor and material are cheap. Foreign scientific men would be required to possess a full knowledge of the physical structure of our gold fields before they could give advice as to the best mode of mining in quartz. Besides, quartz mining is connected with so many difficulties, that it requires an accurate local knowledge to overcome them; and I believe the commission could best decide that difficulty by inspecting the gold fields.

128. By Mr. Wills.—Supposing, for instance, a thousand tons of quartz were sent home to England for competition as to the best modes of crushing that quartz?—I think some good might arise out of it.

129. Suppose the quartz were put into your hands?—I believe we have sufficient scientific knowledge here for carrying on the experiments, however at a rate not equally as low as in England or any other country.

130. By Dr. Owens.—What advantages over ourselves do France and Great Britain possess, as well in crushing and amalgamating as in working up the quartz, setting aside wages, for mechanical operations?—They possess no other but economical advantages, for they have access to large machinery, and also to large laboratories; and possess every means to make the most minute chemical analysis of quartz.

131. I do not think you understand the question. What scientific or mechanical advantages have they in Europe for working up quartz, which gives them an advantage over ourselves?—They have no scientific advantages beyond what we could find in the colony; but they have all the necessary apparatuses for extracting gold, and all the necessary materials and laboratory appliances that could only be obtained on a small scale, I believe, at the Assay Office here.

132. Then, apart from the fact that in Europe there exist more comprehensive and complete mining and experimenting stations, they have no better knowledge, no more scientific knowledge, applicable to these matters, than we have ourselves?—Many scientific men come to this colony with the settled purpose of devoting their whole attention to gold mining; they are only prevented from doing so by their not possessing the necessary means and instruments.

133. By Mr. Wills.—Such premiums should be confined to this colony?—The greatest competition should be invited; although I do not believe more information would be sent in from foreign countries than could be obtained in the colony. It would, however, draw the attention of foreign countries to our immense mineral wealth, which might prove very beneficial by attracting foreign capital and skill to our shores.

134. By the Chairman.—You would not wish it to be confined to the colony.—No. It would be highly interesting to watch the results derived from the first authorities in Europe in relation to quartz treatment; and for that purpose portions of quartz from the various gold fields selected, crushed and in its raw state, should be presented by the colony to the first mining and polytechnical schools in England, France, and Germany, but the further decision as to how, and under what regulations, should be left to be decided by the commission of enquiry.

135. By Dr. Owens.—Do you think that if four rewards of £1000 each were offered for the best means or appliances, and then another reward of £5000 to be competed for by the world at large within two years, would that be a good system at all?—You would require to give sufficient time for the trial, in order that it might be accomplished abroad, which is a great objection; for I believe a commission of enquiry could effect the desired end within a shorter space of time, and no time should be lost, for already there is a panic spreading, through so many failures in quartz mining, which ere long might end in entire cessation, as it was at one time the case in California; only of late quartz mining there, being carried on with more skill and on a large scale, has revived and is generally successful.

136. Do you think there are inventions sufficiently advanced, and sufficiently important, to justify us in recommending a reward of £1000 for them now?—I believe not; there are none perfect enough. I know nearly all the different machines that have been employed, and there are none at present worth it.

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137. You do not think there is a perfect amalgamator?—There is not a complete one at present. I have not heard of any successful amalgamation as yet; that is, of a really economical process of amalgamation.

138. By the Chairman.—If any reward were given, it would be on condition that the plan should be made known?—Of course.

139. By Dr. Owens.—Supposing, for instance, you are the inventor of a machine; I will allow that machine cost you £1000, and you came here; and because you invented that machine, and we considered it the best, we gave you the thousand pounds, would you be content to give up that machine if your name were to appear as the inventor of it, and if you were to have the profit arising from its manufacture for the future, for £1000?—That would be insufficient.

140. It pays you back your cost?—The paying back of all cost would not be a sufficient stimulus. The trial would last a long time. The trial that was made for the better extraction of silver from its matrices, in which the best of scientific men were employed, among others Mr. V. de Rada, in Bolivia, cost about £5000. He had it patented, and with a patent, and having sufficient capital at command, he made something of it; but that would not be the case here.

141. By the Chairman.—Would you describe the defects in the present patent law, and the obstruction which you say it offers to the introduction of proper machinery into this country?—The present patent law in this colony is as bad as that of Great Britain, because it does not give sufficient security to the patentee.

142. Would you think that a cheaper mode, a more registration for instance, would have a beneficial effect?—I think it would, for at present I make the least alteration in any machine or other invention, it has to be advertised for two months in the Government Gazette, and I have to write out a new specification, giving me the same trouble and expense that a new patent would have. Any new invention would be thrown open to the public. I am not aware of any proper parties who should be chosen for such a purpose; I do not think there is at present any proper provision made by the Government on this all-important subject, which would require the most competent patent commissioners.

143. That is not what I mean. Who are the parties now to examine a patent?—I am not aware of any.

144. Who examined your patent?—I do not know. The Lieutenant Governor appoints fit and proper persons to examine into the merits and defects. The whole is left open for public competition, and, as I believe, without having been examined, merely gazetted for two months, after which period the said letters patent are granted, leaving the patentee, however, open to all competition; for if any one comes hereafter, and proves that he knew the invention before some where in Great Britain, he can bring me into a lengthy suit at law, and even then the difficulty will often be in the want of proper judges in this colony on patents to decide in the matter. All such cases should be left with the commissioner of patents, and the power of the siuris factas of the Governor, entirely.

145. By Dr. Owens.—Under any regulations whatever do you see how to avoid that difficulty, that if you fix a day for your invention, and a person comes forward with proof that he know of it yesterday, can you see any means of avoiding or correcting that difficulty, because he really has a prior claim?—If there were patent officers appointed at any time, the inventor could place his invention under their care when he invented it, whilst he is making experiments publicly; besides, these officers would be the best arbiters to decide whether any other person had a prior claim. But it should be generally understood that the one first applying for protection should have a prior claim, and disputes should be settled, on the recommendation of the patent officers, by the siuris factas of the Lieutenant Governor.

146. By the Chairman.—Allow me to correct a mistake you have fallen into. He is merely referring to an application for an improvement on a patent, is it not so?—Yes; instead of allowing the inventor to deposit or register any additional drawing of any improvement made in the same invention, the patentee, according to the patent law, has to submit the whole again for advertisement in the Gazette. The inventor, also, as soon as he makes an improvement on any invention, has to surrender the former letters patent granted to him, and has to pay about £30 additional for the grant of new letters patent, which causes almost as much trouble as in the beginning; £10 is paid for correcting some inadvertency in the specification alone. The law now is that I have to surrender my first letters patent, and then again advertise my improvement for two months in the Gazette, and then get new letters patent granted, which takes generally from three to four months or more. The United States patent law is by far preferable; it says with regard to improvements: "Whenever the original patentee shall be desirous of adding the description and specification of any new improvement of the original invention or discovery which shall have been invented or discovered by him subsequent to the date of his patent, he may, like proceedings being had in all respects as in the case of original applications, and on payment of fifteen dollars as hereinafter mentioned, have the same annexed to the original description and specification of the original letters patent; and the commissioner shall certify on the margin the time of his improvement and recorded, and the same shall hereafter have the same effect in law to all intents and purposes as though it had been embraced in the original description and specification."

147. You think, as the law stands now, it is a general obstruction to the development of mechanical science?—It is an impediment which I have most seriously felt as an inventor,
and which has caused me many an anxious moment, for the fruits of my labors for several years were at stake.

149. By Dr. Owens.—What would you suggest as a patent law for this colony?—I believe that our patent law should be distinct from the patent law of Great Britain.

150. How would you begin this? We will simplify it, and suppose you to be an inventor and wanting to patent a machine, would you be content to undergo the present routine? Would that give you all the security you require? You are an inventor, I presume, of something, and want a patent, and want this article secured to you; what do you consider would be a practical plan that you would recommend? It would always be necessary that any new invention should be advertised in the Government Gazette, to find out whether there are any other parties who had made a similar invention. This, however, should be done only after the inventor has fully and substantially proof to the patent officers of their prior claim.

151. How long would you advertise?—For one month, and no longer.

152. Having advertised it in the Gazette for one month, what should be the next step?—The invention should within this one month be examined by fit and proper persons to learn its merits, and whether there is not an invention of a similar nature already existing. These officers should be acquainted with all the machines of the same kind known previously. They should then recommend to the Lieutenant Governor that letters patent be granted. No other parties, not having within the time of advertisement come forward and disputed the validity of the invention, should be allowed to make use of the invention until they have given the most substantial proof to the patent officers of their prior claim.

153. Should letters patent be granted immediately?—They should be granted immediately after the period of the advertisement has elapsed, no other parties having objected to their being granted.

154. By the Chairman.—What is your opinion with regard to models of machinery being exhibited, or the drawings of any machine? Would that assist in the development of mechanical science?—If inventions were exhibited, or the drawings of any machine, the competitor for any invention, or any party that wished an invention to be patented, could go to such exhibition or museum and see whether it is already existing, saving trouble to himself and the patent officer.

155. By Dr. Sutro.—Do you think it would be an advantage, if you were allowed to go to the Patent Office for a period of six months with your invention, and for that period were granted protection against any invasion of your rights?—Such a Registration Act would be a great benefit to the inventor, for it is often very difficult and takes in this colony a long time to make experiments, during which time the invention would be subject to infringement, which the Registration Act could prevent. On registering the inventor should fully explain to the patent officer the object, process, and progress of his invention, so that other parties might be prevented hereafter from registering the same. At the same time there should be implicit privacy observed by the patent officer as to the inventions protected under the Registration Act, whilst now I can get almost any amount of information at the Colonial Patent Office, which might often materially injure the interests of those who have their inventions only registered.

156. For six months, then, you would proceed to experiment on a patent?—And if the invention was not then complete the period of registration should on application be extended.

157. And during that six months you would find out whether the machine were really valuable?—Not always. I have been experimenting for more than a year, and have only succeeded in perfecting my invention of a prospecting machine. If I had gone to the Patent Office here for each improvement, according to the present Act, I should have already obtained half-a-dozen patents in succession for one and the same invention, at a large expense and loss of time. I did not go to the office to secure a new patent, fearing the expense and delay, whilst in the meantime my improvements, being unprotected, could be infringed upon by other persons. If there were a Registration Act in force this would cease, for each improvement I devise can be registered in succession.

158. Assuming that, would it not be a convenience to give it up to a mere registration office?—A rigid Registration Act would be a great advantage, saving time and expense to the patentee as well as to the patent officer.

159. By making a registration clause in connection with the Letters Patent Act, do you think that would encourage inventors?—The adding of a Registration Act to the Patent Act would prove very beneficial. Our Patent Act should be altered most materially; and here I would recommend the United States Patent Act, which is simple but stringent. The patent commissioners in that country transact their business with the utmost dispatch. The cost of obtaining a patent there is but £10, which would also be quite sufficient here, instead of £100, which is the expense at present. Many patentees are poor, and cannot afford to pay enormous fees. Whilst the revenue derived from such fees is but small, it might, at the same time, prevent some valuable inventions from being introduced. The amount of patents taken out in this colony for 1855, and the fees secured thereby, would have more than paid for establishing the office of a patent commissioner. As the law stands at present, a patent can be granted in this colony and in Great Britain, both valid in this colony; the latter having only to be registered here in order to be valid, whilst any letters patent obtained here are only valid for this colony; and any person patenting my invention in Great Britain would have valid letters patent for the whole of the colonies. This is one of the greatest evils, and makes colonial patents all but valueless.

The granting of letters patent is a prerogative of the Crown. They are granted under the
Great Seal of Great Britain; and by the representatives of Her Majesty governing the various
colonies letters patent are granted in the colonies. Letters patent granted under the Seal of
Great Britain can infringe upon colonial patents. This should be well considered. I believe it
would be best, as far as concerns this colony, to abolish the decrepit patent law in force in Great
Britain, which subjects, at any time, the patentee to endless quibbles at law, and upon which our
own patent law is based. New inventions are only just now commencing to show themselves in
this colony; they require the utmost protection by law, which should exclude as much as pos-
sible anything that might give rise to law suits. If patent commissioners were appointed, they
should be vested with the necessary power of protecting patentees; only in extreme cases the
law should decide as to the validity of the patent. It would be best to introduce the United
States patent law into this colony, which is so simple, and has worked well, giving the greatest
possible security, which has been the cause of so many inventions being made in that country.

Our present patent law, founded on the patent law of Great Britain, is but a farce; and I find it is
considered as such by most patentees, who will not apply for a second patent, after having proved
one find it valueless. I have an invention of my own in reserve, which, I believe, would prove of
great benefit to gold mining; but I shall not bring it forward until our patent law is altered, and
an Act of Registration instituted; for whilst I would be experimenting, other parties
might pirate the most essential parts of the invention, and until mine would be perfected, they
might have preceded me; besides, the expense attending colonial letters patent is too great.
All inventions will develop the resources of the colony, thus increasing the revenue; therefore
the patentee should be rewarded rather than heavily taxed, often beyond his means. Against
this it might be urged, that if letters patent were connected with little expense only, hundreds
might apply for letters patent, often for the most valueless articles. I say, So much the better;
it will tend to develop the resources of the colony, and the increasing number of patents would
compensate the deficiency of revenue which would arise in abolishing the present fees. But in
all cases let the patent commissioners decide as to the merits of any invention brought under
their notice, and either grant or refuse letters patent. The United States Patent Act is best
suited for the requirements of a young colony. I am acquainted with the patent regulations
there, and can also furnish you with any amount of information thereon. Besides, there should
be some competent sworn patent lawyers attached to the Patent Office, acquainted with drawing up
specifications and other forms required, which if this were found objectionable, let
provisions having business to transact at the Patent Office, which is done in the
United States. At this very moment my patent is being infringed upon; and, on advice, I am
told that I can only recover justice in a court of equity. If there were a patent commissioner, as
in the United States, I could soon have redress. I cannot go to law; for my opponent has the
means of meeting me in a lengthy suit, whilst I could
by our banks, who have almost monopolised
the gold traffic throughout the colony, with
the exception of some merchants who also remit gold to England. As far as regards the profits of the
latter, some of the money remains in the colony (though in the hands of a few only); but as
regards the banks, the greater part of the shareholders are foreigners, who share in the profits.
To retain for a time the export duty on gold has been found to be an expedient financial measure
by a large majority in the Legislative Council, as there was no substitute found whereby to raise a
revenue in its stead. I believe the evil could be best overcome in the following manner, which
would raise the desired revenue, and also give the highest market price to the miner for his
gold. Suppose a branch of the Royal Mint were established here, in connection with the
Assay Office and branch Assay Offices on the various gold fields, the digger would bring his
gold to such an Assay Office, and would be paid according to the standard price of gold in Great
Britain, namely 2s. 6d. per ounce to be deducted as an assay fee instead of export duty; a Govern-

160. By Mr. Benson.—Do you not consider it desirable that officers should be appointed on
each gold field, for the purpose of asaying the gold and making it marketable?—Yes, I believe
it would be of immense importance, because at present the miner does not get the full value for his
gold, as it goes into the hands of dealers. It is their interest to keep down the price of gold as much as possible.

161. Under existing circumstances, of course, speculators in gold are parties who would take
advantage of the state of the metal, it not being so pure as it ought to be for a marketable com-
modity—The speculators have the benefit of the doubt as to the purity of the gold offered for
sale in a raw state, the only way in which their profit arises; besides, our banks give us only paper
for the raw gold.

162. And it would be beneficial to the interests of the miner, as well as of the community at large, that that article should be perfected as much as possible on the mines?—It would prove
highly beneficial, not only to the miners, but also to the rest of the community. It should be
considered as a national saving. It would be an institution founded on a most important principle
of political economy, viz., to obtain the highest market price for our export produce on the spot
where it is raised. Gold leaves the colony now at £3 17s. 6d. per ounce (export duty being
included), whilst it fetches from £4 2s. to £4 4s. in England; or even as near as Sydney 
the average profit per ounce
derived from Victorian gold in England, after deducting shipping expenses and charges, may be
set down at 8s. per ounce, or an annual profit of nearly £500,000 on 5,000,000 ounces of gold
exported, being about five per cent. clear profit on gold exported to England. This profit is chiefly
realised by our banks, who have almost monopolised the gold trade throughout the colony, with
the exception of some merchants who also remit gold to England. As far as regards the profits of the
latter, some of the money remains in the colony (though in the hands of a few only); but as
regards the banks, the greater part of the shareholders are foreigners, who share in the profits.
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gold to such an Assay Office, and would be paid according to the standard price of gold in Great
Britain, namely 2s. 6d. per ounce to be deducted as an assay fee instead of export duty; a Govern-

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ment Bank might also be established on the principle of the Bank of England, exchaunging its notes for standard bullion, taking raw gold at £3 11s. 9d. per ounce, and delivering it coined or in notes at £4 6s. 6d. per ounce, charging as before 2s. 6d. for assaying and 3d. per ounce for coining the gold. The digger could receive for his raw gold either coined gold of the Colonial Mint, or notes of the Government Bank, or, if preferred, a draft for any amount upon the Colonial Bank.

It thought advisable the Government Bank might enter into an arrangement with the Banks of England (in order to further money transactions between the two countries) for issuing drafts which the Bank of England would honor, and vice versa. The Government Bank might also issue gold coins of the value of 5s., 10s., one ounce, five ounces, &c., as would be found convenient.

The difficulty would be in the beginning, as the Government would require to raise a loan for the establishment of a mint, and in order to have the necessary funds at command to purchase gold offered for sale, but even this loss might be saved if the Government Bank were established first, and on the security of the crown lands issued bank notes, redeemable within a certain period, until the necessary establishments were erected, at the option of the holder of the note, either in coin or in land. In this manner the Government would have the advantage of the use of such money without any interest for the establishment of a mint and assay offices, and might even make use of it in the creation of public works throughout the colony, for by this being done the value of the crown lands would be enhanced and the security rendered more secure.

The grand benefit arising from such a combined measure would be this, that within a short time the notes could be collected, the Government having sufficient coin in hand shortly after the outset to redeem their notes; we should only have gold coin of convenient sizes in circulation instead of notes of various banks, which drain as of our raw gold at a loss as well as of our cooins. The mercantile community would benefit immensely thereby, as in sending their remittances to the bank could be paid interest on money deposited at a fixed rate, which would allow the Government to turn the money to great advantage by developing the resources of the country. Such interest on bank deposits might be taken, at the holder’s option, in coin or in crown lands (under certain advantages). The digger would get the highest price for his gold in the country; he could deposit his money with the assayer on any gold held, or deposit, and could redeem it again in any part of the colony, or even have a draft on the Bank. The escort and customary fees would cease, and the expense of carrying them on; and last of all, the Government would not only derive the same revenue, but would get every particle of gold entrusted to its care. The smuggling of gold would cease, offering no inducement, and I believe the establishment and maintenance of the mint, banks, and assay offices would not cost more than the staff of officers now required for collecting the export duty on gold. Besides, the above assay tax, other large taxes are not command, for furthering the progress of the country. The measure which I here propose would, I feel confident, be welcomed by the colonists at large; for it would benefit every class, except shareholders in banks. The latter would subsist, or would be restricted to other transactions, without, I believe, being pitied by anybody. For their enormous profits have amounted to some £5,000,000 during the last four years, which have been drained from this fine milk cow, Victoria, to be distributed over the most part amongst foreign shareholders. The principle laid down by me is, to do the greatest good to the greatest number, and it is high time that we commence doing so.

History will point us out for having for five years neglected one of the first principles of political and social economy, which teaches us to do all in our power to obtain the highest price for our export produce, and to drive to have a full control of our money market at our doors. It might be said that it would be dangerous to place such an institution of the colony under the hands of the Government alone; but for that purpose a responsible board should be elected by the two Houses of Parliament under the New Constitution, to act as managers and directors of the above institutions. Under such regulations, and with such security, a large number of notes might, without danger, be constantly kept in circulation, which would provide the Government with large means for various purposes. We have now vast quantities of notes of private banks in circulation without an equal amount of coined metal in the banks, and without any direct security. Why should not the Government, therefore, issue a large paper currency on the security of the crown lands to the holder? I am only afraid that such a measure would meet with the most violent opposition from our banks, and I do not know how we would come into contact with their charters. At the same time, as our New Constitution makes us more independent of the Home Government, we need not fear much opposition from that quarter, whose interest it has been to encourage the influx of millions of pounds stirring into the mother country at our expense, making therefore also use of the milch cow.

163. What do you consider the best means for crushing quartz?—I believe that mills on a large scale would always prove the best.

164. And as regards calcining, what is your opinion?—Calcining is the best mode, as long as we have sufficient timber to effect it.

165. At what stage would you have the quartz calcined, or would you have it partly calcined?—Immediately after it comes out of the mines I would have it set up in large blocks.

166. Do you think that by crushing quartz to a certain diameter or size, that it will be more easily and efficiently calcined than by being burned in large heaps?—Do you mean what calcining would be the most efficient?

167. If it were partly crushed and placed in smaller pieces, instead of in large pieces as it comes out of the quartz reef?—Decidedly. The smaller the pieces of quartz are, the more perfectly can we calcine it. It is a question of economy.

168. My object is to know, whether that is the best way of extracting the gold; whether

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it would be better burned in one way than in the other?—If it could be calcined in small pieces, it would be much better.

169. Do you consider, in the calcining of quartz, it to be an advantage to burn it in coke ovens or in a furnace?—These artificial ovens are the best, if they could be obtained at a reasonable expense. But at present, as long as we have sufficient timber covering our ground all over the country, the best way would be to pile it up in regular stacks, and burn the quartz and wood together.

170. It would be only partially calcined?—I believe it could be calcined thoroughly even in this manner, if the miner were fully aware how to do it, piling it up in a manner something like charcoal burning.

171. Do you consider it would be better burned by means of charcoal?—It would be obtained much sooner, free from ashes.

172. If it could be reduced into such portions and particles that the charcoal would operate on them better, it would be sure to extract the gold, as well as calcine the quartz?—This could be prevented by careful treatment.

173. By the Chairman.—With regard to machinery, do you believe there is any in existence that would aid in a mineralogical survey?—I believe there is.

174. I suppose you have faith in your own invention?—Yes; if this mineralogical survey were made, it would be found of great value in the survey department. In that case it would tend greatly to encourage mining on a large scale.

175. By Dr. Owen.—Supposing that by your topographical and mineralogical survey you do determine that certain lands are auriferous, how can you determine whether they will pay the miner for working them?—That can be determined fully and accurately by regular surface and bottom charts and sections of the ground, which would be obtained by means of the machine.

176. You can determine that a tract of land of some ten miles square is auriferous?—I can, and would furnish you with accurate sections and charts of such ground, with mining directions attached.

177. And you can determine, then, whether it will pay the gold digger?—I can do so by means of the proper instruments. The expense of doing this would depend upon the nature and features of the ground on which a horse machine would be employed, and would be fully repaid by the information gained prior to mining the ground. I could bore a hole of 20 feet deep on Forest Creek, Bendigo, the Eves, &c., in alluvial ground, within one hour, and could thus furnish a section of a piece of ground with borings 95 feet apart and 20 feet deep, twelve in one day, which would furnish me with a section 300 feet in length, illustrating each stratum downwards to the bottom, with the undulations of the latter. I would thus find the deepest ground or gutter. The cost of these borings, amounting in all to £400 foot, would be from £15 to £20 per day.

178. By the Chairman.—I will just rectify your mistake. Your last question was, whether by a mineralogical survey he could tell whether a tract of country would be remunerative, and in connection with it, what expense this could be done?—The expense would also depend upon the size of the machine, and whether it would be worked by hand, horse, or steam power.

179. By Mr. Bean.—One of the great difficulties miners have to contend with is the want of water?—Yes; and for this very purpose a topographical survey should be made, so that the miner could select such spots, through the results of the survey being known to him, where water could be secured in large quantities. The supply of water might be accomplished by forming water courses, who would get a lease from Government, their rates being limited by law, and this means might also serve to inaugurate the co-operative system.

180. Would it not be better, instead of constructing dams for collecting water, to survey direct lines from the streams in the upper country?—The characteristics of the topographical features of the colony are such, that in most cases the streams of the land could not be made available, and in summer, even if we were to dam them up, we could not draw the water off at their source, whilst the water collected further down the streams in pools and holes, could not be raised, except by steam power, to make it available. The expense of doing so makes it impracticable in the present state of mining.

181. Do you think it necessary to go through a very extensive survey to ascertain whether or not such dams must be made, and whether they would be of any use to the immediate neighbourhood; and must they always be filled with water to a given amount, and could you bring the water over the ranges?—The position of the gold fields throughout the colony is generally of such an altitude above the beds of rivers, and so far removed from the larger streams of the country, that this mode of irrigating our gold fields, though very desirable, would be impracticable; and besides, the expense attending it, if it were done, would be such as to counterbalance the benefits that could be derived from it, at least at this early period of our history. The only most efficient and cheapest way by which our gold fields might be watered would be the erection of reservoirs. These could be easily constructed everywhere throughout the gold fields, the topographical features of the ground offering endless narrow ravines and gullies that can be dammed up at little expense by means of timber, stone, and clay, and thus millions of gallons of rain-water could be made available on the dry diggings. Water companies should be formed for that purpose by our miners on the joint labor principle. A steam saw might be set up at the reservoir for cutting the timber of the country round, to be used for the construction of box drains, which would be the cheapest mode of conducting the water. Besides, the timber thus obtained might be used for mining purposes, in the erection of puddling machines, &c., and could also be obtained sufficiently cheap, to enable the miner to erect a hut, as he would most likely become a settled resident of the district. From my own practical experience, I entertain no doubt but that sufficient water can be collected in reservoirs. Two years ago, whilst on Forest Creek, I commenced erecting
a day that would have collected the drainage of several gullies (not auriferous), and in spite of the immense evaporation during the summer months, I should have had at least one million of gallons of water in the middle of summer. Leving said the benefit that would arise to the miners from such reservoirs, there would be other benefits derived from them. I have no doubt that in the course of time thousands of such reservoirs would be spread all over the country. The effects thereof will be found in a meteorological change of our climate; for the extensive and numerous sheets of water would attract clouds and rain in summer, and would therefore not only bestow great benefits upon the agricultural classes of the colony. The very extraordinary and wet summer we have this year may, I believe, be partly attributed to the extensive geological changes the country has undergone and is now undergoing, much soil being broken up for tillage, and vegetation increasing. Especially the extensive mining operations of the country might have contributed to this effect, numerous holes filled with rain last and the preceding winters being left open. Thus we see that by applying the right means in the right place, we would not only change our social and material condition, but might also, by applying artificial means, change the very aspect of the heavens in our favor. It is a grand and endless field for contemplation, the vastness of our resources, and the inexhaustible means that the genius of man has at command to turn them to account; but, at the same time, it is a pitable reflection to look upon this vast body of men, styling themselves the most independent of any, planned on a soil beneath which inexhaustible treasures are buried, devoid of energy and skill, starving on the very ground which, if properly explored, would make each of them truly independent in a material point of view. Whenever they cry out against monopoly, they ought to be told again and again, "that their ignorance as a class, in not devising means for their social and material welfare, is the greatest monopoly existing against them;" and if they ever hold meetings for the purpose of altering their condition, let the words I just pronounced be passed as the first resolution, and carried unanimously; for before we can remedy an evil we must see it, and then a change for the better is not far distant.

182. By the Chairman.—Can it be ascertained whether the water can be brought over the ranges after the topographical survey has been made?—Yes, it can.

183. By Mr. Benson.—The water here is not so abundant as there?—California has an abundance of streams; but in summer the smaller ones mostly dry up, and the fall of rain in this colony is as abundant as in California. But as an engineer, having seen both countries, I should say that the topographical features of this colony offer less difficulties to the construction of mining aqueducts and reservoirs than those of California, the greater part of which is of a steep, precipitous character, and makes such works very expensive.

186. By Dr. Owens.—Were you ever upon the American River?—Yes.

187. You know that falls have been constructed there?—I do.

188. Did you know the country near Hang Town, at Water Creek, and all through that part?—I do not know that country, but I was there.

189. The water works there were made by a number of hard-working men?—But they were men belonging to a mining community that knew their interests better than ours do theirs.

190. By the Chairman.—John Bull, then, is not so expert as Jonathan?—I must confess I found it so on my arrival in this colony, and the assertion is only too true, as far as concerns our gold mining population.

191. The collection of water is a point that has been much agitated on one occasion with a view to meet that difficulty, has it not?—I believe it has, but the efforts were not made properly; besides, the miners opposed all companies, under whatever shape, even those that were to supply them with water at a cheap rate, and so obstructed their own benefactors. They did the same by opposing the introduction of capital, which, like a steady reservoir of a monied interest, would have supplied their pockets with good wages, as the water collected in reservoirs would supply their puddling tubs with that element without which they cannot obtain the gold. But capital is now pouring upon the gold fields like a small stream, and although even now their opposition retards the course of that stream it cannot hinder it, and as that stream increases it will eventually break in upon them with the power of a mountain torrent, and they will by degrees learn their error and feel its benignant effects.

120. Do you think that the social condition of the miners would carry this measure to a great extent?—I believe if the miners were properly managed by competent and independent leaders, who have their interests at heart, and would not yield to the vulgar prejudices of the mass, they would soon alter the aspect of society on the gold fields. Besides, I believe there is a large portion of very intelligent miners on the gold fields, who would with pleasure come forward to suppress all such efforts and carried on by the very passion which prevents the better class of the miners to join. I am grieved to notice the ignorance which thus prevents the development of our resources. What is Victoria, and what might it not be! The leaders of the miners have a glorious opportunity, in seeking to reform our wasteful and ob-
Mr. J. Brach, Esq., 26th January, 1856.

Mr. J. Brach, continued.

noxious gold mining system, of erecting themselves a lasting monument in the heart of every
miner; their independence of character, though it might be misunderstood at first, would redound
to their credit at last.

WEDNESDAY, 30th JANUARY, 1856.

Members present:—Mr. Humffray, in the Chair; Mr. Wheeler, Mr. Benson, Mr. Will, Mr. O'Shanassy.

Alfred R. C. Selwyn, Esq., called in and examined.

193. By the Chairman.—Are you the Government Geologist?—I am.

194. Have you paid attention generally to the auriferous characteristics of the colony?

Yes.

195. Do you think the present mode of mining is the one best adapted to develop the
mineral resources of the country?—No; I think a better one might be discovered; necessarily
where individual miners only are employed they cannot work with the same advantage as an
associated body.

196. Do you think if machinery were introduced, that would have a tendency to benefit
the miners?—I think so certainly.

197. If an enquiry was instituted as to the present mode of mining, with a view to any
improvement which might be effected, do you think such an enquiry would result in any benefit
to the diggers?—Not unless they were willing to admit companies on the diggings; through com­
panies, I think, a general benefit might result.

198. By Mr. Wheeler.—Provided you could induce men to work in larger numbers than
they do now, do you not think that some better mode of mining could be introduced, and machinery
be introduced to work alluvial mines in a much better way than they are at present
worked by individual labor?—I certainly think so; especially where there is much water, and
pumping is required, because one engine would drain an enormous extent of land, whereas now
every five or six men have an engine, and from not working in combination, they do not drain the
area that one engine properly worked would drain.

199. By the Chairman.—Do you think any benefit would be derived from a mineralological
and topographical survey of the country?—I think so most decidedly. I do not think you could
actually pronounce where gold might be found, or tell the diggers that if they sunk in a certain
place they would find gold; but you might indicate places where gold might very probably be
found, but as to the amount it must always be a lottery.

200. Do you think such a thing would be any guide in deep sinking to indicate the course
the leads would take?—I should think not further than indicating the districts where gold
might probably be found.

201. In making a mineralogical survey, would not the borings indicate the direction of the
leads?—If borings were made they would, but that would be an enormously expensive process.

202. Have you ever seen the boring apparatus invented by Mr. Brach?—I have not.

203. Do you think any benefit would be derived by the diggers from the establishment of
 assay offices on the diggings?—It think so very greatly. For the want of an assay office when
specimens are found the diggers cannot ascertain the value of them.

204. Do you think any advantage would be derived to the digging community from the
establishment of a permanent gold mining board to superintend the development of the gold
fields?—I think so if the board were properly constituted and carried out.

205. Do you think a topographical survey would be of use in reference to water by
ascertaining the levels of the country?—It might have an effect in that way, but that I am not so
competent to speak about. There is plenty of water to be got, I think, near most of the gold
fields if they go to the right places. There is always an enormous quantity of water to be got
under any of the lava plains, and the water constitutes the great difficulty in mining under the
ironstone or lava plains.

206. Are there any general remarks which you would wish to offer to the committee?—
My object since I have been here has always been to make a geological survey of the country,
which I thought would be most beneficial to the diggers if properly carried out, but I have had so
very small an amount of assistance that I have been able to do very little. I wished to make a
connected survey, and for that purpose I commenced at the Heads, and I have carried it now up
to the Great Dividing Range, Mount Disappointment, and Mount Despair, and the result of
part of my survey was the discovery of the Caledonia Diggings, which I reported to the Colonial
Secretary nearly two years ago. If there were a better topographical map than there is now in
existence, in the course of a geological survey all the quartz reefs would be laid down, their
bearings and direction given and accurately marked on the maps, and wherever gold was found
it would be indicated on the map, and a reference to that would be at once told the miners where
to go; it would not tell the amount of gold there, but it would tell them gold did exist in one locality
and not in another.

207. Do you think that would have a tendency to do away, to a great extent, with the
nomadic habits of the diggers?—I think so, because it would show them that they would have
quite as good a chance in one place as in another, if they would stick to work.

208. By Mr. Benson.—Have you had any practical experience as a digger or quartz
miner?—No, except what I have seen going on on the diggings.
209. Have you any opinion as to the best method of crushing quartz?—I have always stated that I believe the old and very common stamp heads are the best things you can make use of for crushing quartz.

210. By Mr. Wheeler.—Have you seen any of the Chilian mills, or of the pendulum machines?—I have not. I have seen a good many of the mills and stampers at work in Cornwall, and what applies there will equally apply to the crushing of quartz. There it is universally found that there is nothing so good as a set of stamp heads of a certain weight working upon the floor, and water running under them, the stuff being carried of into amalgamating basins.

211. By Mr. Benson.—What do you consider the best method of burning or calcining quartz?—I should think merely roasting it in a kiln would be the best way. Experiments of every description on quartz both from California and here, have already been made in England, by the very best metallurgists and chemists in London.

212. By Mr. Wheeler.—If those experiments were carried out here by a mining commission, and the results of those experiments published as a manual, at a very small price, and distributed amongst the diggers, do you not think great benefits would result?—We cannot say what new discovery might take place; but as far as the chemistry of gold is concerned, it is perfectly understood, and it is perfectly easy to separate the gold completely from the quartz, but the process is so expensive that it will not pay. The operation has been conducted in London by some of the first chemists and metallurgists in England, Dr. Percy, Dr. Lyon Playfair, and others, and it has been done with perfect success, but only on a small scale; and when tried on a large scale it has been found not to pay, unless the per centage of gold was very great indeed. It might pay with some of the richest quartz veins here. Next to that, the best mode is the stamping and crushing; and if more attention were paid to the mechanical means used for washing gold, it might be done much more economically than at present.

213. By Mr. Benson.—Would a more perfect calcination be of advantage?—I think it would. It would facilitate the crushing; in a great measure; but I have not had an opportunity latterly of seeing what they are doing on the gold fields. I think one of the great faults is that they put too large pieces of quartz into the furnaces, and they only get calcined on the surface, and remain perfectly unaltered in the centre.

214. By the Chairman.—Have you any further observations to make to the committee?—No, I think not on that subject. As I have stated before, I think a connected geological survey of the whole country would perhaps be one of the best aids to the miner if thoroughly carried out. The great difficulty in the way of doing that at present is the want of good topographical maps.

215. You think a topographical survey should precede a geological survey?—It must do so undoubtedly. There is no possibility of making a good geological survey without a good topographical survey.

TUESDAY, 5th FEBRUARY, 1856.

MEMBERS PRESENT:—Mr. Humphray, in the Chair, Mr. O'Shanassy, Mr. Wheeler, Mr. Cameron, Mr. Benson, Dr. Owens.

Mr. David Wilkinson called in and examined.

216. By the Chairman.—What particular branch of this enquiry do you wish to speak on?—I have a method of obtaining gold from quartz better than any I have yet seen in operation. I am convinced that the present method of obtaining gold from quartz is wrong.

217. By Mr. Wheeler.—Have you seen the Chilian mills at work?—Yes, and I find that the stampers do not bring the quartz down so fine as they ought, and a great portion of the gold still remains in the tailings.

218. By the Chairman.—Is it your opinion that the present machinery employed in the crushing of quartz is not effective?—It is effective to a certain extent. The best crusher I have seen is one in the town, but there the heavy weight passing over the quartz reduces and presses the gold almost to a fine leaf, and this again is cut up by the harder particles of quartz and pressure upon it, and a great portion of the fine and thin gold passes off coated with quicksilver. I have found also that quicksilver becomes negatively electrical under pressure and under great friction.

219. Do you think that iron is the best material for the vessels used in the amalgamating processes?—No; I think there is an oxidation takes place, which, in some measure, prevents the affinities between the gold and the quicksilver.

220. Could you suggest to the committee any mode that would tend to improve the present system of crushing and amalgamating?—There are two other ways besides using quicksilver for getting the whole of the gold; one is by smelting under chemical action, whereby the whole of the gold is deposited; and then I have another plan, by galvanism.

221. The processes are still secrets with yourself?—Yes. For the smelting I merely want the quartz brought down to the size of peas and beans; for the other process I require it reduced as fine as possible, and in both cases I get every portion of the gold without amalgamation.

222. By Mr. Wheeler.—Would your process be more expensive than the present system by amalgamation?—The smelting process is much less expensive and exceedingly simple in the process.

223. By Dr. Owens.—Have you tried this plan which you are now suggesting to any extent?—I have tried it upon the tailings, but upon a large scale it would be far better.
Mr. D. Wilkinson, 5th February, 1863.

224. By the Chairman.—In the smelting process would you not require a very great heat?—Yes, rather; but gold melts at a lower temperature than iron.

225. Do you smelt the quartz too?—Yes, you can do this.

226. By Dr. Owens.—Can you smelt quartz?—Yes, you can bring it down to quite a slag.

227. Will it run into a slag without any flux?—Yes; but if you require to have it in this state it is better with a flux. Carbonate of soda is a good flux.

228. Have you ever run it into a slag without a flux?—Yes; but that is not my plan, and there is another method by throwing the whole of the quartz into solution.

229. Are you aware what the expense of extracting the gold from a ton of quartz by your process would be?—If the pieces of quartz were brought down to the size I have been speaking of, it would be very few shillings, say under ten.

230. By Mr. Cameron.—Is that for crushing and all?—No, the mere process of extraction.

231. By the Chairman.—Is there much expedition in your mode?—Yes; in the smelting process it can be done very quickly. The heat is most intense if you like to produce it.

232. Do you think any advantage would accrue from a commission of inquiry going through the gold fields to examine the machinery used, and recommend improvements?—If the parties would take what could be suggested, I could propose far more effective means than they are now using.

233. Would your system economise labor?—You would not economise labor, but it is the effective manner in which the work is done.

234. If you could get ten pounds of gold where you now get two you would economise labor, would you not?—You would benefit the party.

235. By Dr. Owens.—Taking a ton of quartz, what would be the expense of crushing and extracting the gold from that by your process?—My process would involve the same proportionate amount of cost for crushing to the size required as the present. My principle I am here alluding to is smelting, instead of the amalgamation with quicksilver.

236. What length of time would it take you to melt and separate the gold from a ton of quartz?—I would say an hour I could get the whole. I could charge my furnace, light the fire, and get the whole gold from a ton of quartz in an hour.

237. How much labor would you employ for that?—A ton of quartz might take two men two hours; it would take an hour for the smelting process, but double the amount of quartz would occupy very little more time.

238. By the Chairman.—You have no peculiar machinery yourself for the crushing process?—No.

239. You have confided yourself principally to the separating process?—Yes.

240. By Mr. Wheeler.—Have you paid much attention to the alluvial workings?—Yes.

241. Do you think the present system is one that might be improved upon by machinery?—Yes; the cradle in use at present is very rude, and there is a great deal of gold passing off from it.

242. Surposing a lease were given of a couple of acres of worked out land, do you think, by the introduction of machinery of any kind, that land could be worked at a very much less cost than by the present machinery, the best machine at work now being the common horse pudding machine?—The plan I have adopted for pudding machinery is very effective. [The Witness explained the same to the Committee.]

243. By the Chairman.—Are the committee to understand that with regard to the extraction of gold from quartz you have only experimented upon small quantities?—Yes; and I am perfectly satisfied the results would be much better on a large scale than on a small one.

244. As you believe, you have thoroughly succeeded in extracting the gold without the aid of mercury at all?—Yes; and a great deal more economically. I am sure a great portion of the gold passes away where mercury is used.

245. Do you intend taking any steps for introducing this machine of yours?—I intend going up to the gold fields with the smelting process. I am making two or three experiments with quartz previously to doing so, because I fancy after the quartz has been thrown into solution, there can be a very nice kind of porcelain made of it.

246. Do you think the quartz possesses some of the qualities of spar, and might be manufactured into china?—Yes.

247. By Dr. Owens.—Are you aware that quartz is being now exported for that purpose?—I was not aware of it.

248. By Mr. Cameron.—Have you seen Nasmyth's hammer applied to quartz crushing?—I have seen Nasmyth's hammer at work, but not on the quartz.

249. Do you think that would be any improvement upon the present mode of crushing quartz?—I think not. You could throw in greater power with Nasmyth's hammer than with any other; but I do not think that would be any great advantage.

250. By the Chairman.—Are there any other statements which you wish to make to the committee?—Not that I am aware of.
TUESDAY, 19TH FEBRUARY, 1856.

MEMBERS PRESENT:—MR. HUMFRAY, IN THE CHAIR; MR. BENSON, MR. CAMERON, DR. OWENS, THE SURVEYOR GENERAL.

MR. SAMUEL GORDON CALLED IN AND EXAMINED.

251. BY THE CHAIRMAN.—WHAT ARE YOU?—A LAND AND PARLIAMENTARY AGENT; THAT WAS MY PROFESSION AT HOME, AND IN THAT CAPACITY I WAS AGENT TO THE COLLYERY OF BALLYCASTLE, IN THE COUNTY ANTRIM.

252. IT IS UNDERSTOOD THAT YOU PROPOSE TO GIVE THE COMMITTEE SOME EXPLANATION AS TO THE BEST MODE OF EXTRACTION OF GOLD FROM QUARTZ?—YES; BY ELECTRICITY.

253. BY THE SURVEYOR GENERAL.—HAVE YOU PATENTED YOUR PLAN?—NO, I HAVE NOT.

254. DO YOU DESIRE TO PROTECT YOURSELF WITH RESPECT TO IT?—I WOULD BE GLAD TO DO SO TO A CERTAIN EXTENT.

255. BY THE CHAIRMAN.—DO YOU WISH TO HAVE YOUR OWN PARTICULAR MODE OF APPLYING IT RESERVED TO YOU?—THE MACHINERY I WOULD LIKE TO PATENT, IF THE VIEWS I PROPOSED AS TO THE POSSIBILITY OF REDUCING QUARTZ BY ELECTRICITY WERE APPROVED OF.

256. WILL YOU FAVOR THE COMMITTEE WITH THE EXPERIENCE YOU HAVE HAD IN REGARD TO ELECTRICAL SCIENCE AS APPLIED TO THE FUSION OF METALS?—I WAS AN APPRENTICE UPON THE EXPERIMENTS MADE BY DR. BARKER, AT THE THEATRE OF THE ROYAL SOCIETY IN DUBLIN, WHEN LORD CLARENDON AND A NUMBER OF DISTINGUISHED MEN WENT TO SEE HIM OPERATE BY ELECTRICITY UPON METALS AND OTHER SUBSTANCES. THAT WAS THE FIRST PRACTICAL EXPERIENCE I HAD OF THE SUBJECT, THOUGH I HAD BEEN PREVIOUSLY ACQUAINTED WITH THE THEORY AND PRACTICE OF REDUCING METALS BY ELECTRICITY IN THE LAST CENTURY, AND SUBSEQUENTLY TO THAT I AND SOME OTHERS FUSED SOME OF THE QUARTZ FROM THIS COLONY BY ELECTRICITY. THERE WAS A GREAT NUMBER OF OPINION THAT IT WAS POSSIBLE TO DO IT ON A LARGE SCALE AND AT A VERY SMALL EXPENSE, AND I AM STILL OF THE SAME OPINION; AND I BELIEVE THAT WITH PROPER BUILDINGS AND PROPER MACHINERY THERE WOULD BE A VAST SAVING OF THE METAL AND A VAST SAVING OF EXPENSE, AND ALSO A PREVENTION OF ROBBERY, AND THE PREVENTION OF LOSS BY OXIDATION AND WASHING OR FLOATING AWAY OF THE METAL BY THE PRESENT SYSTEM OF CRUSHING AND WASHING AND ANAGAMATING.

257. HAVE YOU MADE ANY CALCULATION AS TO THE COST PER TON OF REDUCING THE QUARTZ BY YOUR PROPOSED PROCESS OF EXTRACTION OF THE GOLD FROM QUARTZ?—YOU WOULD TAKE TWO SMALL BITS OF CHARCOAL, EACH NOT LARGER THAN MY FINGER, WHICH WOULD BE SUFFICIENT WHEN ATTACHED TO THE WIRE COMING FROM THE BATTERY TO REDUCE A VERY LARGE PIECE OF METAL. I IMAGINE THAT IN A COUNTRY LIKE THIS, SO ABUNDANTLY SUPPLIED WITH TIMBER, THE PRICE OF THE CHARCOAL WOULD BE VERY SMALL, SO THAT I THINK THE EXPENSE WOULD BE VERY TRIFLING.

258. YOUR CALCULATION OF THE EXPENSE IS PURELY INFERNIAL?—YES.

259. HAVE YOU NOT MADE SUCH EXPERIMENTS AS WOULD WARRANT YOU IN SAYING WHAT THE EXPENSE WOULD REALLY BE?—NO; I AM JUDGING FROM THE POWER OF ELECTRICITY, AS APPLIED BY SMALL BATTERIES. I THINK THE EXPENSE WOULD BE VERY SMALL. IT WOULD SAVE SOME OF THE PROCESSES AT PRESENT IN USE, AND IT WOULD ALSO, AS I HAVE SAID, PREVENT LOSS IN RESPECT OF THE METAL.

260. IN FACT, THE COMMITTEE ARE TO UNDERSTAND THAT YOU HAVE NOT MADE ANY EXPERIMENTS IN THIS COLONY EVEN UPON A LARGE SCALE?—NO, I HAVE NOT.

261. NEITHER ON A LARGE NOR ON A SMALL SCALE?—NO. I HAVE FOUND A TOTAL DISINCLINATION AMONG THE PEOPLE HERE TO JOIN IN COMPANIES; IN FACT, ALL THE COMPANIES THAT HAVE BEEN FORMED FOR THE PURPOSE OF WORKING THE GOLD FIELDS UPON A LARGE SCALE HAVE BEEN FAILURES. BY THE LAST MAIL, OR THE PREVIOUS ONE, I FORGET WHICH AT THE MOMENT, THERE IS AN ACCOUNT OF THE FAILURE OF TWO COMPANIES IN THE COLONY. ONE OF THEM THE DUKE OF MARLBOROUGH HAD 2500 SHARES, AND HE SENT OUT LORD ALFRED CHURCHILL TO LOOK AFTER THE AFFAIRS OF THE COMPANY. LORD ALFRED DESCRIBES THAT HE FOUND THE MANAGER OF THE COMPANY IN A HOUSE AT SANDHURST, FOR WHICH HE WAS PAYING £600 A YEAR, AND GIVING CHAMPAGNE PARTIES; THAT HE HAD ERECTED THE MACHINERY UPON GROUND OF WHICH THE GOVERNMENT WOULD NOT GIVE THE PRE-EMPTION; AND THERE IS BY THE SAME MAIL AN ACCOUNT OF THE MEETING OF ANOTHER COMPANY IN THE COLONY FOR EXTRACTION OF GOLD, WHICH HAD ALSO BEEN MISMANAGED AND FAILED.

262. BY THE SURVEYOR GENERAL.—BUT YOUR OBJECT IN GIVING EVIDENCE BEFORE THIS COMMITTEE IS UNDERSTOOD TO BE, TO PLACE BEFORE THE COMMITTEE A DISCOVERY YOU HAVE MADE IN THE REDUCTION OF QUARTZ, AND EXTRACTION FROM THAT QUARTZ THE GOLD OF THE COUNTRY, RATHER THAN THE ACCOUNT OF THE FAILURES OF ANY COMPANIES THAT HAVE BEEN ESTABLISHED FOR THAT PURPOSE. IS NOT THAT SO?—YES.

263. HAVE YOU MADE ANY CALCULATION OF THE COMPARATIVE COST OF THE MACHINERY NECESSARY FOR THAT PURPOSE; AND WILL YOU INFORM THE COMMITTEE WHAT PER CENTAGE YOU COULD RECOVER OF THE GOLD ACTUALLY EXISTING IN THE QUARTZ, AND HOW YOU WOULD BRING THE ELECTRIC ACTION TO BEAR UPON THE QUARTZ ITSELF?—IN THE FIRST PLACE, AS TO THE EXPENSE, THERE SHOULD BE A BUILDING ERECTED FOR THE PURPOSE; AND I THINK THAT THAT BUILDING, AS THE PARENT ESTABLISHMENT FOR REDUCING QUARTZ UPON A SCIENTIFIC PLAN, SHOULD BE IN MELBOURNE, AND THERE SHOULD BE SUITABLE MACHINERY FOR THE PURPOSE.

264. WHAT SORT OF BUILDING SHOULD IT BE?—A BUILDING CONTAINING RETORTS, PANS, AND OTHER MACHINERY, WHICH I THINK WOULD REQUIRE, UPON THE WHOLE, ABOUT SOME £15,000. THEN THE PRODUCE OF THE COLONY HAS HARDLY BEEN, ALTHOUGH IN A SHORT TIME IT WOULD BE, IN THAT STATE TO MAKE IT WORTH THE WHILE OF THE QUARTZ MINERS, WITHIN A REASONABLE DISTANCE, TO SEND DOWN THEIR QUARTZ TO BE REDUCED AT THIS FACTORY OR BUILDING; AT THIS PARENT ESTABLISHMENT, WHICH, ACCORDING TO MY VIEW, SHOULD BE THE MOTHER TO USE SCIENTIFIC APPLIANCES FOR ALL THE PURPOSES OF MINING, FOR INSTANCE, THE BLASTING.

265. HOW DO YOU BRING THE ELECTRIC ACTION TO BEAR?—IT IS A VERY SIMPLE PROCESS. YOU HAVE A BATTERY; SAY THERE ARE TWO COPPER WIRES PASSING FROM THE BATTERY, AND EACH WIRE IS COILED ROUND A BIT OF CHARCOAL; THOSE TWO PIECES OF CHARCOAL MEET EACH OTHER, AND A LIGHTED PAPER IS APPLIED TO
each end, and the two pieces of charcoal emit a heat and light also, which, I believe, cannot be matched by any other contrivance.

265. By Mr. Benson.—By that means you dissolve the quartz?—It will disintegrate it. It will, in fact, perform by force the action which the geologists say has been performed upon the quartz by the decomposition of the primitive rocks by which it has been surrounded. Those rocks, they say, having fallen away, the quartz has lost its support. And I then contend that this process of electricity will force the quartz into fragments, and force it open in a way which enables you to get at the gold; and by means of pans and other contrivances you need not lose any of the gold, because I do not propose to throw away the tailings before we have resorted to a process of even applying acids in the building I propose to have erected.

266. What positive experience have you had of the quantity you could do in an hour?—From the pieces of ore we were able to reduce by those very small pieces of charcoal, I think that you could reduce a ton of quartz in something over an hour.

267. But what have you actually done yourself in that way?—Nothing but assisted at those experiments.

268. And in small quantities?—In small quantities, and that not in this country. There are no facilities for carrying on experiments of any kind here.

269. By the Chairman.—Your theory as to quartz is "that the sudden expansion of air contained within the quartz is the cause of its yielding to the pressure of electric power."—Yes.

270. By the Surveyor General.—Did Dr. Barker publish those results?—I am not sure; but I recollect that the Earl of Clarendon was present at the experiments, and I think they were published.

271. You believe that the process may be economically applied?—Yes. I will make enquiries as to whether the results were published, and I think I shall find some printed results of the experiments.

272. You believe that the process may be economically applied?—Yes. I will make enquiries as to whether the results were published, and I think I shall find some printed results of the experiments.

273. By the Chairman.—Supposing a ton of quartz to be brought to be operated upon, what method of operation should you suggest. In what way could electric action be brought to bear upon that piece of quartz?—I explained how Dr. Barker did it.

274. But I do not see how by that explanation you propose to do it. I want you to show how you will bring that power to bear upon any mass of quartz. Will you explain how that is to be done?—We will say it is in the pan, and I take the first pan to be constructed of the same material as a crucible, which will bear a great deal of heat. A ton of quartz is not very large. Two large pieces of charcoal applied to it will fritter it away.

275. The whole of it?—The whole of it.

276. By Mr. Benson. You have got to place every individual piece of quartz, or at least certain quantities of it, within the operation of the agent, and that constantly, to produce the effect?—I can have those pans movable or shifting.

277. By the Chairman.—So as to bring the hard lumps to the surface?—Yes. If there be any other process equal to electricity in reducing large pieces of quartz that can be applied.

278. Up to the period of the present investigation you have not really matured your machinery for carrying out these experiments?—No.

279. You have merely come to the conclusion that there is a power existing in electricity which may be applied in the manner you have described?—Yes.

280. But as to the precise mode of operation you have not yet made up your mind?—I could give drawings of the machinery, and also of the machinery I propose with relation to the refuse of the quartz if there were any metal left in it.

Mr. Charles Kinnaer called in and examined.

281. By the Chairman.—What are you?—I was a jeweller and gold refiner. I am now an assayer and gold refiner. Perhaps it would save time if the committee would allow me to read the substance of the evidence I could give, and which I have prepared for the purpose, as more concisely stating my views upon the subject; the committee could then further examine me upon any points arising out of my statement. It may at first appear rather lengthy perhaps, but I believe that the course I propose will be found ultimately to save the time of the committee.

282. Will you be so good, then, as to furnish the committee with your views in the manner you propose?—I will do so: "Melbourne, 19th February, 1856. To the Committee of the Legislative Council on Gold. In attending to your summons this day, I beg to submit, in writing, for your consideration, the substance of the evidence I am prepared to give on the subject matter of your investigation, with my reasons and qualifications for laying my opinions before you, and most especially on the ground that for some years my attention has been directed to the necessity of such comprehensive measures as must arise out of this enquiry; and that I have considered most carefully the nature and import of the several motions of different members of this committee—on the establishment of Government assay offices—on the amount of £10,000 for the best described practical mode of reducing auriferous ores and earths—on the necessity of a comprehensive mineral and topographical survey of this colony—on the advantage of obtaining for the instruction of the mining community the experience of European gold refiners and sweepers, together with the occasional publication by authority of a miner's manual. There are many other features of enquiry bearing on this question of gold on which I should have desired to enter, such as the tenure of occupation, or the right of working minerals on crown lands, the question of mining on private lands, water supply, &c., &c.; but as these questions will not, I presume, be directly entered into by your committee, I allude to them incidentally only, as they must be involved collaterally in the suggestions or propositions I am about to offer on the special subject.
before you. Allow me, then, to say my profession in England was a jeweller, gold refiner, and dealer in bullion, residing at 11th-street, King-street, and Gerrard-street, Soho, and now of Melbourne, assayer, gold refiner, and quartz crushing and amalgamating machinist by letters patent; that I have had the experience of thirty years in England in my profession, and that during the last three years I have constantly communicated with, visited, or resided at the principal gold workings in the colony, and am perfectly acquainted with the mode of mining operations, and of the use and application of the various machines employed. I have promulgated the fact that the supposed exhausted gold workings would have to be reworked by scientific appliances and the aid of capital or co-operation. I have examined most of the quartz reefs of the colony, and ascertained their extent, traceable longitudinally, from the southern to the northern boundaries of the colony, and laterally spreading in parallel lines from east to west, the whole breadth of the land, interrupted only by the granite formation, and have found every reef more or less auriferous, and that if operated upon on an extensive scale, might be reduced by amalgamating machinery of my invention at a cost of 20s. per ton, and yield an average produce of at least one ounce per ton of fine gold. And further, that with moderate selection these reefs would supply quartz for an incausal period of years of an average richness of four ounces of fine gold per ton, at a cost not exceeding 40s. per ton. I have asserted, over and over again, that the supply and export of gold would continually increase, and that to an extent unprecedented in the history of nations. That the true key to this progressive wealth would be found in the adoption of social order, skilful combination, and a just appreciation of the rights and value of labour and property. I propose the formation of a mining board, consisting of a president, a responsible minister of the Government, a deputy president or prime warden, and three junior wardens, the four latter officials not removable through ministerial changes; the duties of this board to be as follows: The entire charge and management of the mines and all offices connected therewith; the responsibility of advising, from time to time, the construction of such engineering works as may be necessary to facilitate the progress and well-being of mining interests and persons engaged therein; to settle and register the occupation of mining grounds, and the quantity of ground and tenure thereof that may be granted for mining purposes under circumstances; to be a court of appeal from the local mining courts; to establish and control a central bullion and assay office in Melbourne, and district offices at those mining districts of sufficient importance to justify the consequent expenditure as a reproductive outlay. These bullion offices will assay and convert into bars or ingots of the standard fineness of 22-carat gold taken to the office for that purpose, and impress the colonial stamp, together with the weight and number of each ingot, that it may be paid away or transmitted to foreign parts as an article of fixed commercial value; those ingots to be made a legal tender at 77s. 6d. per ounce, and the export duty paid, together with all charges for refining, assaying, and alloying at the time the ingot is taken from the office; the applicant to have the option of sending his ingot or ingots per escort free of charge, or of having in lieu a treasury bill or order at seven days date. The latter would be a safe and convenient instrument, lessen the chance of robbery, and facilitate commercial business. (See Note A.) The district offices will have in addition to the necessary furnace and assaying arrangements, a complete working apparatus illustrative of the best kind of mechanical or chemical appliances in use for the reduction of quartz and other ores. (See Note B.) This machinery to be exhibited at convenient times, at work, in order that these establishments may form a practical mining school of instruction; and to give occasional lectures, and publish annually a Mining Manual, with the latest and most useful inventions applicable to the mines. (The Prussian and other German States have acted on this principle, with most beneficial results, in the development of their mineral resources, as also in conferring mining professorships as University honors.) The mining board at Melbourne will collate information from the district offices, and occasionally, at distant mining colonies, commission into the field, and comparative success of the mining community, to report on the working efficiency of the different offices, and generally to ascertain the exigencies of each locality. A practical mineralogical surveying party to be attached to each of the district bullion offices. Each of these establishments must be visited as often as practicable by a chief inspector; and as the suggester of the proposed bullion offices, I request that I may be entrusted with that appointment, as necessary to the furtherance and success of the plan, for which my professional experience gives me the qualification. That the effect of this mining board and bullion offices, carried out honestly and on a broad principle, must eventually in a great increase of colonial wealth, is self-evident; and not the less from the influence of a sound feeling on the part of the miners that a Government can initiate something more than a mere machine for obtaining revenue; and may have an advantage in promoting the real interest and prosperity of the people; and, for the first time in the colony, obtain credit for the design, out of which must arise a degree of confidence in the hearts of the mining community, that will in the course of a short time prepare the mind for that system of co-operation and reliance on the utility of capital which will give labor its due reward. The intelligent and thinking part of the miners are quite aware that if the same amount of labor was concentrated in large or even small associations, that a much greater aggregate result would be obtained. It is quite well understood that if the waste of fruitful industry could be avoided in the sinking and slapping a dozen shifts, where one would do, to get at the auriferous drift or deposit, by unity of purpose and common interest, as also in the very important matter of drainage or turning a stream, or in the construction of dams, in conjunction with capital, that the present estimate of gold produce might at least be multiplied by five. But the difficulty lies principally in the absence of that class of roving individuals who are ever on the search for large nuggets, and miss the substance in striving for the shadow. It will

GOLD COMMITTEE—A.
be the duty of the officials to illustrate the comparatively unprofitable result of individualism. I have an instance, a fact worth a hundred arguments, that higher wages must be earned by the labor in a large operation in mining than is earned by any other class of workmen in any part of the world. A Mr. Johnson, of the Ovens, has had reported to him a very highly complimentary testimonial from a large number of his workmen for his liberality and general conduct as an employer. He has paid his men thirty shillings per day, constant and steady labor in a gold mine, and yet, they could possibly obtain if they were all working, divided in wages for each man, for himself, on the same ground. It may occur that the Ovens diggings offer peculiarities for this kind of concentrated labor. But I believe that Ballarat especially requires this kind of operation; and it is notorious to all that quartz mining is nothing but a lottery for small parties, and is only fit for a large work. What a wondrous fact remains, that the labor of (say) 60,000 men, actual diggers, or, avoiding fractions, the present defective arrangement of the present value of £62,500, equal to £200 per head for a year's work; and that in spite of sinking and shabbng innumerable shieers, an enormous waste of labor, and an incalculable loss of gold by defective manipulation! What would England (i.e. Great Britain) be if its mines were worked on the Australian system? In what state would have been its collieries; her iron works; her tin, copper, and lead mines; and the state of her textile manufactures, if capital and genius had not been welcomed by the working classes of the country? It has been feared that gold might become depreciated in value by abundance. That theory has long been exploded. While England (i.e. Great Britain) can maintain her elevated position, so long her system of metallic currency will govern the price of gold and its value in the commercial world. The increase of gold can only increase the representative power of capital, and set it free for objects of great enterprise and colossal magnitude, the construction of harbors, canals, and railways, and support and foster the onward march of science.

Notes to the Foregoing.

Note A.—A very important security against fraud and robbery will be provided by a separate number stamped on each ingot, and registered with the name of the party for whom it is done. The duty will be paid, on delivery of the ingot to the miner, and the advantage and convenience of having this stamped representative of money will commend any disposition for smuggling, and will lead to an increase of duties paid at least £50,000 per annum, and I calculate on more than sufficient for the fitting up the bullion establishments. The miner will have in weight the value of his gold, on its conversion into bullion as standard gold; the advantage of a fixed price; being a legal tender, the ingot will become an article negotiable as current coin; together with the certainty that he obtains the full value, instead of being exposed to the prejudice or caprice of the gold buyer, particularly in amalgamated gold. This is frequently discolored from the presence of a minute quantity of antimony, &c., and although possibly of 23 carats fineness, and sometimes 24 carats, is priced at 75s., 76s., or 76s. per ounce, according to circumstances. Now, 23 carat gold is worth at the Bank of England, at 77s. 6d. for 22.5 grams; or 23.3 grams; export duty on miner's ingots, 2s. 6d.; assay ingot, £1 per ounce. If the whole reefs will be at least one-half of the whole produce of the district; and from the extension of quartz works in other districts it may be inferred that within a short period the predecessor will be in favor of amalgamated gold, and the saving to the mining interest exceed £200,000 annually.

Note B.—It does not follow that my machinery will be adopted, but I shall contend for the honor and the prize, at all events. My machines have this peculiarity, that they are alike suitable for the smallest party or the largest company, and are perfect amalgamators.

283. In one part of the statement which you have just read, you recommend that this mining board should be a court of appeal from the local mining courts?—Yes.

284. Will you state to the committee the reasons upon which you have come to that conclusion?—I think a court of appeal is necessary, and I think you would go to a court there thoroughly acquainted and conversant with all the details of mining operations, and with the government and management of a mining community.

285. Do you not think it would be rather an expensive system of appeal, to have a court like that, unless there could be a court in each locality, and so entailing a very great expense upon the country?—I think it would be too great a responsibility to deputize to a minor officer such an authority as that; I think a court of appeal is necessary, because I find that those courts are not always acting on one principle.

286. Do you not think that that arises, in a great measure, from the defective state of the law, at present their power not being defined?—To a great extent, does not it arise from that?—I think so, and I think it is a great defect that the law should not be clearly defined on all subjects relating to mining and working.

287. What do you think of a power of appeal of this kind—that there should be an appeal to the general sessions held in the locality, from the local court, or, with the consent of both parties to the suit, that it should be transferred, with a report of the proceedings in the local court, to the law officers of the crown?—I do not think the law officers of the crown are qualified to decide a case of general merits. I think there are so many circumstances connected with mining property and mining operations it would require almost an education for it, and which you could only find in such a body as the representatives of that mining board. My idea is that a mining board is as material as a board of trade and board of customs.

288. A kind of mining bureau?—Yes; I think when you consider of what immense consequence is that link of communion with the mining interest and the Government, and how great the interest of the community, it is of the greatest consequence that it should be an office of
sufficient importance to induce the best talent and the best men in the colony to take a position in it. That would be a board giving confidence to all.

289. You think that the great benefit that would arise from the establishment of such a board would quite justify the Government in incurring any reasonable expense in carrying it out?—I think so. I think the return to the community as the result of their services, making mining labor more profitable, and in every way more available, would more than compensate for any charge that might be occasioned.

290. Would you not think that an authorised report at shorter intervals than a year would be very desirable?—I think it is imposing too much duty on them to call for a summary of their proceedings too quickly; monthly reports are generally very hastily got up.

291. Are you satisfied, what would you think of this?—That might be better.

292. Do you not think it desirable that this board should give some plain, simple instructions, which would be practicable and useful to the miner, and that they should not seek to give so much a report of philosophical transactions, for instance, to meet only the scientific eye?—That might form a useful portion of a lecture occasionally; but what I think are more particularly wanted are plain, practical instructions; and that is why I suggested that there should be actually an exhibition of working apparatus, so that the working man could see what was produced.

293. I was about seeking you your opinion of having a kind of mining museum, in which models or drawings of all machinery should be exhibited for public examination. What do you think of that?—I think it is an excellent suggestion; and if accompanied with specimens of ores, mining specimens to an unlimited extent, and general geological specimens, it would be exceedingly valuable. And I think that this country could make such an exhibition as no other country could offer, for the reason that we have so many people concentrated in that particular way.

294. And would not a scientific lecture, which I think you suggest in your paper, given at that institution, illustrated by diagrams and machinery, be highly conducive to the mining interest?—Yes.

295. By Mr. Benson.—And those proposed tillion offices should be established in various parts of the country?—Wherever there would be really a demand for them. I think the miner should be content to travel a few miles rather than involve the colony in extravagant expenses. Where practicable, they should be everywhere.

296. By the Chairman.—You have made some observations upon the great expense entailed upon the mining community in sinking and slabbing so many holes when one would do; that is having reference to the associative principle of labor?—Yes.

297. What is your opinion of the practicability of boring, to ascertain the alluvial deposits and other auriferous deposits?—My opinion is, that in looking for auriferous deposits, frequently the gold is so minute and so irregularly spread, that boring would give an uncertain result. I know the operation to be an expensive one. The far more practicable plan would be to sink a shaft and drive from it laterally. A gully could always be thoroughly examined by making a drive right and left from the shaft, or again at right angles, and you would then trace out the whole mineral deposit.

298. Do you not think something like a useful and efficient apparatus could be made for that purpose; for instance, Brach's machine, or some invention of that kind, supposing the country were bored in cross sections?—Looking for gold is different to any other mining operation; labor is more profitable, and in every respect, but the scattered gold that is found in the alluvial deposits has been spread irregularly by some operation of nature, and so discontinuously that no system of borings would give the slightest test of the real value of a gold field.

299. Do you think that that which would apply to Ballarat, where there are straight gutters, probably the beds of the ancient creeks?—I think we must take into consideration the substance they have to go through, which are very often great masses of basaltic rock. A practical shaft there could be sunk at less expense than the rock could be bored by any machine that could be constructed. No species of tools could be made to go through that rock to do anything that would be effectual and economical, so many borings would be required.

300. Suppose you do not meet with that basaltic rock, then the argument is in favor of boring would apply?—I think so; in soft earth boring would be very applicable. The boring operation is expensive in the hard rock.

301. In the alluvial lands which are soft and loose, though wet, it would apply?—The boring apparatus, under such circumstances, would be advantageous.

302. If your machinery is efficient for 50 feet, you could make it efficient for 250 feet?—Yes.

303. You think, under such circumstances, though there would be practical difficulties in the way in the case of basaltic rock, yet where the ground is loose and drifty, it might, as now suggested, be practically worked?—Yes.

304. Do you not think that in regard to a great deal of this sinking and slabbing in wet, loose, soft material, a great deal of the expense attendant upon such sinking and slabbing might be avoided under a proper system of boring?—Yes; but under any system boring would not be resorted to on a large tract of ground. To sink two or more shafts, and make cross sections, would be a saving beyond everything. Now, a great deal of gold is lost and passed by altogether. In many instances, it would not be necessary to go through the rock but once.

305. What would be your opinion as to the best mode of carrying out those associated communities you have referred to?—I think an extension of grants should be given to a number of men on condition that they worked in proportion to the ground they proposed to open, allow-
Mr. G. Kennedy, 
Mr. C. Kinnear, 
Chairman, 
16th February, 1860.

ing a certain space for each man’s labor, allowing them to work the ground out. You might give a piece of ground on those terms conditionally to a body of men. That would be an incentive to the formation of such companies.

306. Do you not think that making these large grants to any party would be establishing a species of monopoly destructive of the rights of individual miners?—If the field were limited it would be so; but believing the field so extensive that if there were as many claims as there are now individuals, and every claim an acre, they would be all provided with good ground, that objection would not be applicable.

307. Do you not think it is important to consider not only the abundant extraction of this gold, but its equitable distribution among the mining community?—Yes.

308. Would not that be best secured by limiting the number of workers in a company?—No, I see no advantage to arise from that; but on the contrary, the profit of associated labor would be alike open to all. If capital was invited by a liberal extension of claims the funds would be easily found—£5000 is all that would be required for the largest company or union of practised miners to obtain mechanical aid, and give to each adventurer his fair share of a great result. That must be so under any circumstances. That would be so with one man as well as with one hundred. I think the interest of the laborer is clearly provided for in such an association.

309. Do you not think that some rule after this fashion would be desirable, under the present circumstances and temper of the colony (because we must consider things), that taking the number of workers to regulate the area, it should be limited to, say, ten, or not more than twenty? Would not this be far better than giving any hundred men in any one party a piece of ground?—I think, in quartz mining, particularly in alluvial mining, it might be practicable to carry it out with a small company, but in other cases I doubt it, because I believe the larger the company the more the expense is reduced and the more certain the results. The system of overlooking, superintending, and so on, would be comparatively expensive in a small establishment, whereas in a large establishment it forms but a small per centage, when you are superintending a large number of men and large operations. That is the system that is applied in all the factories of the world where co-operation is practised. That argument applies especially to mining operations. In quartz digging it is well known that the claims may be very rich, and yet, perhaps, for one hundred feet the sinking may be very poor; so that, looking to the operations connected with a quartz establishment, I believe one hundred men would work with more advantage considerably than ten; and one thousand with more advantage than one hundred; and so on in proportion to larger numbers, providing they are properly superintended and guided, which they would be in a large establishment; and the result to the working man would be, that his service would be better remunerated, provided he received his proper share of the profit. It would be a question of co-operation. It should be a question of cooperation; and an experiment might be made upon that scale with perfect safety, because it would be impossible for the working man to complain of a monopoly when in truth he is a partner. The present system I consider to be quite a monopoly.

310. In what respect?—The confining the principles of digging to a limited space of feet, which is very well for a few strong hearty men, but throws out of participation others who could supply substitutes—men who are not so strong, but possessed of abundance of capital. It shuts out that portion of the community from going into mining operations at all. The object of the miner is not to confine the operation of mining to the thaws and muscles of the strong man out, but to be in the capitalist as well.

311. Are the committee to understand you to say that you require the laws to be so framed as to give the capitalist a piece of land simply because he is a capitalist?—Not at all, but adding the condition that he employs a certain number of men. He is only then the man who finds the money, and who has been considered by men in every country and in every operation to be an advantageous auxiliary; the capitalist in most operations being considered as everything. Would you not also make it compulsory that he should not only employ a certain number of men, but that they should be actually miners interested in the result of the working?—It would be difficult to do that; but I would make it compulsory that he should employ a certain number, leaving the terms of employment perfectly open. It would throw too much impediment in the way of the operation otherwise.

312. In fact, you would not leave the grading of a piece of ground for mining purposes to be regulated by the claims of the individual miner?—No.

313. Your argument is that because you undertake these conditions you would have a right to such a claim?—Yes.

314. That is what you wish to convey?—Yes, that is the principle.

315. Would it not be contributing far more to the interests of the country, and dealing more rightly with the individual miners, to leave it optional to the hundred miners to form themselves into a body?—I do leave it optional; I give them the opportunity of doing it. The capitalist might be left out of the consideration. If one hundred miners were willing to do it let them do it, finding the capital for the purpose.

316. I understood you to say that you would give such a privilege to the capitalist—that if he undertook to employ one hundred men you would give him his hundred individual claims?—The same.

317. Would not that be giving to the capitalist practically a monopoly?—I do not think so; I think there is great advantage in it.

318. Would not he have it in his power to dictate terms and wages according to the circumstances of the market?—That would only be imaginary.
320. He would have the power of engaging and discharging the men of course?—Yes.

321. Which would not be the case if a man had his own claim?—The scarcity of labor acts as a check. I mentioned the case of Mr. Johnson as a proof of the operation of the very thing. He is a man who had a large gold and a friend of his showed me a testimonial of his workmen. Talking of rushing private lands, I should like to see some of the rowdy miners try it. On the Ovens there are several of the working miners determined to run any risk for the preservation of the rights of the capitalist, because the working miner has found his advantage in it. Any man who has capital and assists his nephews or family to go into business, receiving a per centage upon his capital, is considered a benefactor; and the man who will furnish the money and run the risk in the case of mining, thus enabling the man to earn better wages than they could obtain by other means, is also a benefactor. I cannot understand the argument that he is to be treated as a monopolist simply because he stands in the position of a master.

322. Do you not think the capitalist becomes a monopolist when he denies to the laborer his fair reward in respect of the produce of the joint working?—Unquestionably; but in this colony he could not control labor to that extent; but quite irrespective of that, I believe he would find it to be his interest to allow those laborers a fair share of the general produce.

323. Do you think in the present state of the gold fields it is impossible for a capitalist to become a monopolist?—Yes, perfectly; practically the disposition may exist, but actually he could not do it. That is why I think he might be entrusted to any amount.

324. By Mr. Cameron.—Do you think it would be of advantage to the individual miners to have the capitalist acting in that way?—I think so, and I think they would be quite as free and independent and satisfied when it was once understood that they gained any special advantage by it; but there is an ignorant alarm of their real benefactor.

325. By the Chairman.—You think then if the diggers really understood the value of that power, to the great prejudice of the working people at home; and quite the same, from my experience in England, that has not universally been the case. In many of the establishments the employers are beloved by their workmen. I believe that a great deal of that oppression, as it is called, arises from the extremely low rate of wages; and then there is the fact staring the working man in the face, that his master is a man of property, riding in his carriage, and representing his county in Parliament perhaps, while he is struggling from day to day for a bare subsistence, and hardly that. That has tended to generate a feeling of that kind in the minds of men interested in that description of employment.

326. Does not that feeling of the miner arise from the recollection of the oppressions he has received at home; that is to say, does not a great deal of that prejudice in his mind result from his recollection of the oppressions he has undergone at home from the capitalist?—I think that the competition of labor is so great that capitalists have had the opportunity, and have frequently used that power, to the great prejudice of the working people at home; at the same time, from my experience in England, that has not universally been the case. In many of the establishments the employers are beloved by their workmen. I believe that a great deal of that oppression, as it is called, arises from the extremely low rate of wages; and then there is the fact staring the working man in the face, that his master is a man of property, riding in his carriage, and representing his county in Parliament perhaps, while he is struggling from day to day for a bare subsistence, and hardly that. That has tended to generate a feeling of that kind in the minds of men interested in that description of employment.

327. By Mr. Benson.—You consider that the establishment of those bullion offices would be beneficial to the interests of the miners as well as to the interests of the colony in general?—I have endeavored to show that, I certainly think the colony would be greatly served by it.

328. By the Chairman.—It would tend to give a more marketable value to the gold?—It would give a more steady value to the gold. It would be of great advantage to the miner as tending to secure to him his fair price for it, whereas he has now a very uncertain price.

329. By Mr. Benson.—From the experience you have had, you think that adopting a general principle, making it of a relative amount and quality, would be equal, if not superior, to establishing a mint?—I think it far more advantageous than establishing a mint. I see no advantage in a mint. There are the difficulties of collecting the duties and other questions of that kind. The question of the duty is one in which Victoria stands alone in Parliament perhaps, while he is struggling from day to day for a bare subsistence, and hardly that. That has tended to generate a feeling of that kind in the minds of men interested in that description of employment.

330. You think with regard to the establishment of your system, that it would be nearly self-supporting, and at the same time realise an advantage to the commercial welfare of the colony?—I am of opinion that it may be made quite self-supporting, and the advantage to the colony is almost inconceivable.

331. By the Chairman.—What are the special objections you have found in regard to the export duty and the establishment of a mint? You say there are difficulties. Would you favor the committee with your opinion as to those difficulties?—I imagine in this way. We have a duty now chargeable. The Government would be compelled to do this: to make that coin subject, on exportation, to a duty, and that I consider would lead to a most iniquitous system, that coin circulating so freely amongst the people as it must do, otherwise they would lose the value of all that quantity of gold coined.

332. What other difficulties are there? I quite agree with you as far as the export duty goes. Supposing the export duty abolished, do you see any practical difficulty in the way of establishing a mint then?—No. The only real practical difficulty I see is the question of the duty.

GOLD COMMITTEE.
Mr. C. Kinnear.

1806.

Mr. H. Harris.

333. By Mr. Benson.—In regard to the question of joining, the coin should be of the full value which it represents. That must be affected and regulated by the currency of the particular district or colony in which it is issued?—Certainly. In arguing the question affecting the coinage I should say that there is a prejudiced feeling on my part. My bias and leaning is in favor of a paper currency, and a mint is, therefore, for that purpose unnecessary; and then your coin would be of no value out of the colony, except for the metal of which it is made. But you abolish everything as regards the use of the coin by this bullion office, and I think that the objection which exists to the specialties of the coin is removed by making an ingot which would be received in every part of the world. The sovereign has almost received that reputation. But I think the Victoria sovereign would not do so, from the fact that the Sydney sovereigns have been repudiated in this colony.

334. In fact, the issue of any district must be more or less affected in that way?—Yes.

335. And therefore you consider that the making of ingots, possessing a definite value, is a more judicious arrangement than even the establishment of a mint?—Yes. I have thrown out a suggestion there that the Government should have the opportunity of taking this gold from the miner, and giving for it a treasury note payable in return; and I should allow those treasury notes to represent that gold so transmitted, or that the miner could have sent; as to that piece of gold (not the same ingot of course) be might send that or only circulate the treasury note. It might be convenient to the Government to establish such a circulation as that. I consider that those notes once in circulation would pass like a bank post bill. It would be of the specific value of the gold deposited. It might be given as a deposit note without the issue of the ingot for the actual amount; that would be one of the advantages of that office.

336. By the Chairman.—You wish to convert the present deposit receipt note into a negotiable treasury note?—Yes. The digger would no longer have to wait a week, and take a journey to the nearest market to get his hold of a kind of money, but he could have a kind of money; but he could have a negotiable instrument at his command?—Yes, with which he could pay his storekeeper, or go to land sales and make purchases, and in every way realize the value of his commodity.

337. By Mr. Benson.—You think in the amalgamation and refining of the gold on the gold fields, its being now produced from various kinds of quartz, that an establishment of that kind, where the gold could be reduced to a positive and regular value, would be of great advantage to the miner?—I think it would be of the greatest advantage to the miner; because I believe he labors now under the difficulty of sending the article to the gold buyer, which is unfavorable to him in this part of the colony, where it is probably of so much value. I have known instances where the gold would look black and spotty prejudice in the mind of an inexperienced individual to reduce the price 10s. per ounce, and this gold to be 20 carats fine by assay.

338. You think that by the establishment of these assay offices on the gold fields the diggers would be relieved from their present dilemma, in respect of color and appearance?—Yes. I have known instances of £3 10s. being given for gold that I have assayed at 25 carats.

340. By the Chairman.—And that arising principally from its bad color?—And that arising principally from its bad color.

341. By Mr. Benson.—A Rising from the way in which it is now extracted from the quartz?—Yes.

342. And not having the usual appearance that gold has when taken from the alluvial soil, necessarily affords the dishonest dealer in gold the opportunity of taking advantage of those who have it to dispose of?—Yes. I have frequently of late been concerned, when on the diggings, in giving information to the men how to put a good color on the gold.

Mr. Henry Harris called in and examined.

343. By the Chairman.—The committee understand that you wish to give them some information with regard to a mode of extracting gold from quartz. Perhaps you will favor the committee with your views on that subject?—I will explain my views with regard to the extraction of gold from quartz. They arise from this idea. I think the only means of producing every portion of gold contained in quartz is by amalgamating the quartz entirely—utterly destroying it; and I have arrived at that process by means of experiment; by intense heat which I produce, I utterly destroy the dress, and leave it in a state of almost impalpable powder; so that the slightest breath will blow off everything but the gold—the smallest portion almost. In fact, infinitesimal portions of gold I have brought and allowed to remain, while the quartz has been blown away.

344. What has been the extent of your experiments to enable you to come to these conclusions?—I have tried two or three times in town here with a small piece of quartz—a piece say ordinarily yielding about three grains of gold, and having produced ten after the destruction. The process is very simple, and I require no machinery. The only machinery I should require would be the assistance of crushing, which I consider of no consequence; because everybody knows quartz may be crushed in various ways.

345. By mechanical pressure?—By mechanical pressure, or in any way whatever; but that is of little consequence. I have seen quartz reduced to a very fine powder, in fact to flour; and it has been known that by means of blowing it, the gold has been blown away with it, disguised and wrapped up as it were in the quartz, and therefore not perceptible to the eye, and indeed not even to the glass. But by destruction by means of heat, every portion that has existed has been produced from the quartz; the gold itself being of course incapable of being destroyed.

346. Are you able, from any practical experiments you have made, to give the committee something like reliable data as to the time it would take, and the expense that it would cost (to
use your own word] to "annihilate" a ton of quartz?—By calculation I have roughly made it, but how much it would cost, with the labor, for a ton of quartz, about from £2 10s. to £3. The cost would greatly depend upon the price of the material required to be used, which in this colony is high, because it is not much required. In England it is about one-tenth of the price that it is here. In this country the price is about 8s. per lb., whereas in England it is only about 10d. The price here, therefore, is no criterion, because if the thing were carried out, the ingredients could be imported from England in any quantity that might be required.

347. If I understand you rightly, judging from your latter observation, it is a chemical process which you adopt?—It is a chemical compound; but it does not require a chemist to use it.

348. Still you annihilate the quartz by chemical action?—Yes.

349. By Mr. Benson.—Is it practicable to do it in large quantities?—In any quantity; and, as I have before said, the process is very simple, and requires no machinery.

350. By the Chairman.—Would the cost you have given to the committee be the cost if you had the quartz crushed already?—Yes.

351. By Mr. Benson.—Are you to have it crushed in the first instance?—We are to have it crushed in the first instance.

352. Would you have it calcined or not?—It might be calcined, it is easier crushed.

353. By the Chairman.—Does it not interfere with your operation whether it is calcined or not?—No; I could destroy the quartz entire. I could destroy a mountain of quartz. But I prefer it being crushed or calcined, because it is then more simply and readily done.

354. By Mr. Benson.—And you save time?—I will explain it. We know that on the diggings where the quartz ranges are, there are parties made up, say of eight men; two would be employed in crushing by a simple machine which I have seen and admire for its simplicity, probably there would be two engaged in annihilating the quartz, and two employed in blowing; and in that way the labor of the operation would be divided very easily, and each party could do its work without further assistance. The only machinery which they would require would be iron pots—any sort of iron pots would do—and the rest of the operation would merely be blowing after the quartz was reduced to powder, and which children could do as well as men—indeed better, because their breath would be lighter.

355. And it would be done without quicksilver?—Decidedly. I have enquired about town because however effectually quartz may be destroyed, and the gold be able to be extracted by various processes, still the majority of the diggers object to machinery, and peculiar machines which they are unable to understand. Then those expensive quartz crushing machines now at the diggings were often set on spats subsequently discovered not to be sufficiently rich to pay for working them. The consequence is that the expense incurred in taking them down and transporting them to another place and putting them up again is so immense that they are, in preference, sold at frightful sacrifices where they are fixed. Therefore the simpler the means that can be produced, and carried out effectively, the better. Indeed, it would be a grand desideratum for this country, and the means of working up, in my opinion, more gold than has been hitherto
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continued.
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...taken from it; because there are known to be immense tracts of quartz country on and in the vicinity of all the diggings. I have not been to Bendigo or Forest Creek, but I understand there are extensive quartz veins there, where the working man could do all himself, upon my principle, without having recourse to companies, or entrusting his property in the hands of strangers, to have the quartz crushed and the gold extracted under the existing process.

366. By the Chairman.—Do you think that the process you have described is so simple, efficient, and inexpensive that an ordinary miner would be able to put it into practice?—I do, decidedly.
MEMBERS PRESENT.—Mr. Huntstree, in the Chair; the Surveyor General, Mr. Benson, Mr. O'Sullivan, Mr. Wheeler.

Professor McCoy called in and examined.

367. By the Surveyor General.—The general object of this committee are thus set out by Professor McCoy, on 10 March, 1856.

368. It is not proposed to enter upon the larger sphere of mining generally, because that is a wider scope of investigation than that which has been referred to the committee. But confining the enquiry now to the object which I have stated, and having special reference to the establishment of a Mining Board; there, supposing such Mining Board to be established, what should be the character of its duties; to what particular subjects should its attention be directed; and how far, in your opinion, could it exercise any influence on the investigation into the subject of gold mining machinery generally; and, particularly, into the best mode of perfecting machinery for the working of the gold fields. Upon these points the committee would be glad to have the benefit of your opinion as the result of your experience stated in the form most convenient to yourself?—I shall be most happy to give the committee any information I can upon the subject stated.

I have, of course, reflected, as every one living here has reflected, upon the best means of bringing the resources of the country into use. In the first place, it seems to me to be necessary to carry out, and it is exceedingly desirable that it should be done without loss of time, the first suggestion in your minute, namely, that a mineralogical and topographical survey should be made, not only of those districts that are now known to be auriferous, but a survey of the whole colony: to get topographical maps, with the physical features as well laid down as they can be; sketched, as the Surveyor General of course knows thoroughly well how to do, in the first instance in outlines to be filled up more in detail by the labors of after years; and then to enter upon such maps the mineralogical and geological information that may be obtained. This is a work which all the countries in the world having intelligent governments have done long ago. Nearly all the governments of the Continent have spent large sums of money upon maps and investigations of that kind. But I would particularly refer to America—to the United States—to show that in a great utilitarian, commercial, money-loving country of that sort, which presents remarkable analogies to our new home here, the government have found it desirable to expend, within the last fourteen years, enormous sums of public money in making geological and natural history surveys of the most accurate and admirably perfect kind that can be made. I look upon it that the government of the United States is one of the most economical of governments, and one which we might well look to here as a safe guide in the expenditure of the money of the public upon scientific researches; and I may say, from my own experience, having been for the last twenty years exclusively occupied with scientific investigations of this nature, that the labors of the geological and natural history surveys of the United States—of New York in particular—are superior to those elaborated by any government of Europe, not only from their greater extent and detail, but from the rapid and full publication of the results in convenient volumes abundantly illustrated with plates of unrivalled artistic excellence, the whole being done on a scale of liberality that shows a high appreciation or the part of the government, of the mercantile value to the nation of ascertaining the natural products of the country in the most complete manner possible, by the employment of scientific men of the first talent, giving them ample staffs, and providing them with museums in which to deposit the results of their investigations, for public instruction. Results of great practical value have, in all places, followed from such proceedings. I should say, that to make this great extent of investigations in the field trustworthy or satisfactory, it is absolutely necessary to have a permanent public museum, in which every specimen referred to in the maps should be deposited, upon the plan of the engineer department both of Great Britain, Russia, Austria, and France; and upon the plan adopted in the United States of America. I believe, however, from my experience, that whenever a government employs scientific men, and sends them into the field to observe, they make observations and send them in, in considerable apparent detail, but when they come to be investigated afterwards, either by a person of superior attainments (or even by the same person) with more accurate resources in the closet, it will be found that the field determinations, being of a hurried and imperfect kind, are very often erroneous. Now if it be permitted that a scientific, or a topographical survey, goes into the field, and gives a safe guide in the particular mineral, and throws the specimen away upon his own individual authority when he has looked at it, it will be found, as it has been found in the geological surveys of the old countries, the Great Committee.—
that the result of such labors is a large portion of the national money thrown away; that you can never trust implicitly to results so obtained; nor can the word of the most scientific man in the field be worth much, from the hurry and imperfect means of examination used there. He must bring his specimens, whatever those specimens may be, home to his laboratory or museum, and examine them where he has his books and appliances, and philosophical instruments, to compare and test them accurately; and then write the determination down. For this reason, it is absolutely necessary that there should be a museum established, in which every typical specimen might be deposited, and having been properly tested, be accurately inserted by name on the map: and there it should remain for reference whenever any question in regard to it, or to a similar material, should arise. That, I look upon as a thing that ought to be done without loss of time; it is of the utmost importance in relation to these investigations, and it is the only way in which you can give confidence to the public that the work will be properly done. I would also add to my description of this museum which I propose, that there should be in connection with it a small laboratory with a set of chemical analyzing or testing apparatus, to furnish elementary instruction for ordinary miners, to enable them to ascertain by cheap implements (such as a simple blowpipe as big as a tobacco-pipe, and eight or ten tests, costing as many shillings), the nature of all ores which might occur to them in the course of their labors on the gold field. There also analyses at a cheap rate might be procured, made by practised hands, as in the government museums of economic geology in England and Ireland, and as in the chemico-agricultural societies now established throughout Great Britain. I need only add that I think such a public museum should be under the direction of some person who is completely master of the many various branches of his subject, and who will carefully determine the various specimens so deposited, which specimens should be exhibited openly to the public; and so that any person, whatever his rank in society, might receive verbally the information he might require; or learn for himself by an inspection of the specimens there laid before him. Combined topographical and geological surveys of the kind you propose have been made very cheaply by the Ordnance surveys of Great Britain and Europe generally, particularly in Russia, and also in France; and after Colonel Colbie's suggestion, it was done in Great Britain with rapidity and accuracy, by using men of comparatively small scientific acquirements—by using men, in fact, holding the position of privates in the Corps of Sappers and Miners. Those are trustworthy men, but men not able to say exactly what it was they collected; for instance, they would break up a lump of rock or ore and say, "I cannot tell what this is, whether it is tin or magnetic iron; but there it is, Number so and so, and that I found on such a point on the map and extending so far." That numbered specimen is sent to head quarters, analyzed by the proper authority in the museum, and, ultimately, its true name or proper rock-color marked on the map. In that way you may employ a very large number of observers over the country, none of whom may have the scientific acquirements necessary to say exactly what they collect, yet, by a little training, they will do this work over an immense tract of country very rapidly and well; and the results can be reduced to more perfect accuracy by the subsequent examinations of other persons in the city, than could be the case with men of more scientific attainments employed in smaller numbers and sent into the field, where, as I before explained, from want of proper means of examination their additional knowledge could not be advantageously brought into play.

369. By the Chairman.—Do you not think that competent parties might be appointed on each gold field, and also that small museums might be opened on each gold field, wherein specimens might be deposited, and eventually be transmitted to head quarters here?—I think it very desirable.

370. And that encouragement should be given to the miners to attend to the collection and preservation of mining facts?—Local collections would be very valuable, but at head quarters there should be a great public museum.

371. By small museums is intended mere collecting houses; whereas now a digger will come perhaps upon very excellent geological specimens and throw them away?—Yes, just so; what I was particularly desirous of making clear was, that by adopting this old Ordnance plan you might have an immense spread of observers over the face of the country, at low wages, bringing in the materials they have collected; and then you would have a few good men understanding the point thoroughly, who might not have the physique to do it themselves, or whose time would thus be economized. Having had a good deal of experience in connection with the Ordnance geological surveys at home, under the Commissioners of Woods and Forests, (at present they are conducted under the Board of Trade), I may mention that it having been found that the old system of making geological maps merely upon the word of field determination of the observer, without having the specimens to refer to to see whether the determinations were right or wrong, was imperfect and very unsatisfactory work; it was recommended by Colonels Portlock and Colbie, to the English government, as absolutely necessary for the satisfactory expenditure of the public money on these mineralogical, natural history, and geological surveys, to establish certain public museums in which these specimens might be deposited for public inspection, and kept as the data of the surveys, and the government accordingly, about ten years ago started what they at that time called the Museum of Economic or Practical Geology, of which subsequently Sir Henry De la Beche was appointed director. It is now called the "Museum of Applied Science and School of Mines." I think that the establishment of the Mining Board which has been suggested would not do the work that is required without the establishment of an auxiliary, corresponding to the aforesaid School of Mines of London, the Museum of Practical Geology of the Irish Geological Survey, and the mining schools of Germany, the Mining School of St. Petersburg,
the Ecole des Mines of Paris, and the similar public institutions in all the countries of the world indeed having civilized governments and having mining property, even though infinitely less valuable than ours. In all these localities there are establishments bearing the names of schools of mining, and those schools of mines which I have been told have been established in the House might be done by this Mining Board. Now, if we consider a moment how the Mining Board would act, you will agree it will not act so satisfactorily as a mining school. Supposing you had such a board, and a miner came and wanted information on how to mine a certain district, or how to prepare a certain ore, or how to recognize certain valuable products—supposing that members of the board were the best possible authorities on those matters, it would be impossible to give the information required verbally to the miner, or to the person interested in those matters; I therefore think, that the establishment of a mining school, or what perhaps is more clearly expressed by the term a mining museum, would be absolutely necessary to carry out the work which is cut out for this Mining Board. In this museum I think there should be, as there is in the schools of mines of St. Petersburg, Paris, Germany and London now, specimens of all the ores that are known, carefully and fully labelled with their composition and the modes of their occurrence. And there should be geological sections and geological maps hanging up, not only of the country in which the museum was formed, but also of other countries to which the rocks or minerals could be referred, to understand their mode of occurrence. There should be then, examples of the processes used in various countries for dressing all the different ores, and examples of all the different kinds of pigments, alloys, salts and other materials prepared in various ways for the arts and manufacturing purposes from the different ores. The details of all those processes should have examples in this museum, in connection with the ores in their different stages of preparation. Then, not only should all those be there, that the miner's eye might be familiarized with the appearance of these valuable products, but there should be in immediate contiguity to them working models of all the machinery in use in various countries for working and preparing those different metals. I think this is of very great importance for this reason, that I have seen in the newspapers and various other places vague notions, coming apparently from practical men as they call themselves, saying that the circumstances under which gold occurs here are quite new, and that the world knows nothing about them, that we must begin de novo; whereas, in fact, there is nothing remarkable in the occurrence of either gold or other ores in Australia. It is precisely the same as in all the great mining districts of the world, where, for centuries the most intelligent men have been stimulated by the liberality of intelligent governments, to elaborate the best and most economical modes of working these various mines, and they are consequently perfectly well known. You see sometimes metallurgical people here assuming the world that the affinities of gold, or quicksilver are quite unknown; that the true method of amalgamating has yet to be discovered, &c., &c., while they are perfectly well known, and were so some hundred years ago, as well as any scientific man cares that they should be known. But then it is very important that working models of all the machinery required for mining the ores or preparing the ores on the ground, and all the processes for making them useful for the purposes of life should be there exhibited, that there should be a great public collection of such matters in immediate proximity to the specimens of the ores themselves. This, I consider, would be a very useful thing in a great mining country like this, and it is one that might be done at a small cost. I may perhaps be allowed to mention that as professor of natural science in the University here, I have considered it to be my duty to get permission of the University, that the museum might be perfectly open to the public; and the money voted by the University, of it, that is, which is left to my charge—getting as perfect natural science collections as the funds will allow, and among them are almost perfect collections of all the known minerals of the world (which have already arrived), and these will be exposed for the benefit of the miners, or any other person desirous of seeing them; also very perfect collections of fossil organic remains which are required for working out the geology of any new country, and without which for comparison the geological survey of this country could not be satisfactorily carried out. There are available to every one, and those two portions would form almost the most expensive items in the establishment of the school which I recommend. But the University has no funds to get those models of mining and metallurgical machinery made, and for getting examples of all the processes of changing the various ores into the forms in which they are used in the arts and manufactures, and the House would have to provide funds for that purpose. I want to have machines, not merely such as are new, but such as have been made two hundred years ago and have been used to do the work well ever since. Now with regard to getting not only those models, but getting examples of the various manufacturing processes, I may state that I believe from what I have seen in the formation of the first British Geological Museum—the practical mining museum—that all the proprietors of mines would be most happy to send examples of their products. In the instances I have mentioned the copper miners and others were delighted to send specimens, and have their names appended and paragraphed, and the manufacturers of mining implements were also most happy to send examples of their instruments and models, and the larger machines were sent by very many companies. So that if the thing were once set going and put in some working tangible form (though I would not build much upon private liberality), in a short time those additional things that are required to make a working school of mines might be obtained. The museums of practical geology, both in Ireland and in London, now exhibit cubic pieces of all the building stones of the country. Those I am anxious to have in the mining museum, and that would only be rapidly added to if mining could be rapidly added to. The building of a great advantage to the builder in future. They can then refer, and even now do refer to them in the London and Irish museums, when the Commissioner of Public Works wants public buildings
Prof. McCay,

11th March. Dear Sir,

I understand that several new public museums are to be erected; and even the private contractors refer to these museums for the specimens of the stones they specify in their contracts. It is, therefore, with regard to the stones that have been used for the great public buildings, their durability is absolutely tested. In the annexed sketches are all the improvements in manufacturing processes, they have their representatives there and they have proved of very great value. In the Irish Museum I may be allowed to mention one instance coming under my knowledge, which will tell in illustration of the value of a collection of this kind. A person in the north of Ireland, who had been looking at some of the ores there, noticed one ore—the chromite of iron—which looks like the common road metal you see on the road, and was struck with the exceeding beauty of the “chrome yellow” produced from the same black looking stone placed immediately under it. He looked at the process and saw how simple it was, and passed on without thinking more about it. The same summer he went to one of the northern islands of Scotland, and, to his surprise, saw the country people metallizing the road with chromate of iron; they thought it was ordinary stone like our common blue stone, and so were, as I said, actually mending the roads with the chromate of iron, which this gentleman recollected having seen at the origin of the beautiful yellow pigment in the museum. He bought up many hundreds of tons of that, and had been prepared for the roads, and, getting a lease of the principal quarry, immediately commenced a chrome yellow manufacture. He is now one of the wealthiest men of his county, and has almost the monopoly of the chrome yellow manufacture in the country. Numerous other cases occur, in even the most practical mining districts, where very valuable ores and other materials are found, that the inhabitants neglect and are quite unused to the appearance of. I was in Cornwall some years ago, where you would imagine the ores of copper were all known, and found that they were working ores, in some of the mines near St. Agnes, having the general appearance of brass—the sulphur of copper, and the walls of a miner’s garden were built of a grey stone like our blue stone here in appearance, but which was in reality one of the most valuable ores of copper, of the nature of which the miners were ignorant, from its being so unlike that which they were in the habit of meeting. On mentioning this in Tresco, to the proprietor of a neighboring mine, I learned that hundreds of thousands of tons of this most valuable ore has been thrown over the cliffs into the sea. The men worked the sulphur of copper, and had been earing hundreds of thousands of tons of this much more valuable though very different looking ore of copper into the sea. Now, I think, in a country like this, so rich in mineral treasures, it is very desirable that all these ores should be exposed to the miners gaze—exposed to the view of people who can learn by their eye when they would not read a scientific treatise upon the matter, and, if they did read it, they would not recognize the different objects in the field; and in the same way, connect them with all the branches of preparation of these metals for the useful arts of life. The objects which it is proposed for the Board to carry out, it seems to me then, would be much better and more fully carried out by the establishment of a museum of the kind I have mentioned. The object might be attained by establishing a public mining museum or school of mines at the University; by adding examples of metallographic and art products, and the buying of models of the working machinery, and taking advantage of the building, the halls, and its collections of minerals, rocks, and fossils already there, and the chemical laboratory which will soon be finished. I think it right to mention what portions of that school we have already in operation in the city.

372. Your decided opinion is then that the Board cannot carry out the scheme we propose except there is such a museum?—This is my decided opinion, because, if you have the first men living members of your Board, each unapproachable in his particular department, he could not give verbally the information to the common man requisite for it. There is another reason that looks forward with great hope. I think that if such a school of mines were established here the notion would save a very great deal of money, and its equivalent, time, now wasted by the prevalent system of mining, by which every man wholly ignorant of mining, ignorant of all the processes, ignorant of the appearance of the most valuable products, goes and gets his miner’s right or license, and endeavors to mine his own piece of land at once there. In any part of the world, if a man wants to farm on a large scale, and knows nothing about it, his first plan is to hire a steward who is a first rate agriculturist; so, if a wealthy man establishes a manufactury or anything of that sort, his first object is to hire a foreman who has made that his particular business. Now I think that the mining resources of the country can never be fully developed until foremen, as it were, make it their trade to do work for a number of those miners, to direct their mining operations. Their very likely, there will be men educated themselves for the situation of mining stewards, so to speak, like the captains of mines in Cornwall, but with more general knowledge.

373. Like the captains of the Bourn Bourn Mines in South Australia:—Those are men from Cornwall. All those mining operations are now badly performed, and there is a great deal of labor wasted at the present time, which might be advantageously directed under the guidance of a paid agent of this kind, but who, at the present moment, know not of acquiring that sort of knowledge. It is very desirable that examples of the machinery used in mining the various metals in different localities be put here, because the machinery which would be perfectly useful for mining a given ore in one locality would be quite inapplicable perhaps twenty miles off to the same ore. For instance, in a great part of Cornwall the tin distributed in the granite requires stamping with heavy beams of wood shod with iron, and moved by very ponderous machinery; in some, however, in the part near St. Austell, the same ore is moved by the men near St. Austell, and in some cases men do not even put it into the washing apparatus; so that even there, in the tin mining, which is very like gold mining, in the granite, two totally different kinds of machinery are in operation within a very few miles of each other.
Do you not think that in order to carry out that idea it would be very desirable that reports should be made of each gold field now open, and of all the machinery in use upon it; for which purpose there should be an inspection made of all the machinery now at work on the gold fields of Victoria? I should expect that when such a source of information was opened the people would very readily communicate the information they required by a day or two's trip, and thereby be enabled to draw conclusions as to what kind would be best suited for a particular place.

Now the superfluous gravels—the gold drifts of this country—are wrought in a way that in any other part of the world would be considered most outrageously extravagant. The washing is so coarse and rude in its manipulation, that the refuse would be considered rich gold washings in any other part of the world. The great Roman gold fields very rarely indeed reach the richness of the refuse that they have to throw away here. It is permitted to consider that the men here habitually break up and go over immense quantities of fresh ground unnecessarily, and by washing it in the present rude and imperfect way, they extract from it, in consequence, a much smaller quantity of gold than exists in the material.

I understand that the Chinese can make very good livings out of the refuse thrown away by the other men. In that point of view it is obvious that there is a great deal of gold and silver lost, from the men not being aware of the more careful and elaborate processes of washing used elsewhere. The most improved processes, and which have been established for centuries, should be exhibited here, to teach caution to the workers, who take unnecessary trouble in breaking fresh ground to take out only two-thirds of the gold from it. The additional labor to get out all the remaining gold would be completely spared, compared with the waste of labor in breaking fresh ground to take out this smaller quantity which they now satisfy themselves with.

The amalgamation, as practised here, is also on the most extravagantly rude scale. The idea of throwing the crushing water and the quicksilver into one mill, and grinding them all up together, would create the utmost astonishment in any of the well regulated old gold fields. In all other gold fields where crushing is used there is a very different system of washing, shewing a result containing a large portion of earthy matter and a small quantity of gold. That is amalgamated, and the amalgam is carefully compressed afterwards and the mercury distilled, so that they have it nearly all to the good at the end of the year, perhaps, for the crushing of thousands of pounds worth of gold; whereas, with us, at present, a great part of the mercury is wasted and only a small portion of the gold obtained.

I should mention that in all cases the amalgamation should have great experience; even those men who have the best machines require a certain amount of skill, because there is a certain amount of manual labor necessary to prevent the missing of those machines. In the ordinary case of stamping gold, as is used in some gold fields, if the stamper is allowed to fall so as merely to crush the grains of quartz and scarcely act upon the particles of gold it contains, the work would be best done; and then as the particles of quartz containing gold will be so much heavier than the others, they will be easily separated instead of being got together. But if the stamper be used in a violent way the whole is reduced to such an exceedingly fine state that it becomes, according to a well-known law, capable of floating in the water, and so is floated away like the common earthy dregs, and in that way is lost. The machinery may be good, but a little practical teaching also is required; and thus a small amount of practical knowledge so obtained would enable one man to superintend the operations of the diggers over a large area, and to see that they were going on right; and so the fullest results might be obtained for the community. In quartz reefs there is a very small quantity of gold in a very large quantity of quartz; when the mass is broken to pieces certain of the fragments have got a little gold, and in a larger number of those fragments there is no gold. If you operate upon them both by the stream of water, you move away the fragments containing no gold with a snare of the stream that will not be sufficient to remove those containing gold. I should mention that in all cases when water is used there should be, not one only, but a series of several troughs at different angles of inclination with transverse groovings, and the latter, or lower ones, should be covered with cloth, so as to catch the smallest particles of gold. The material should pass with the stream successively from one to the other, and should be swept up the inclines frequently.

There is a practice obtaining now of a series of inclined planes—Long Toms, as they are called—in which a blanket is used much in that way; are you aware of that?—Yes.

By Mr. Benton.—Another thing is the obtaining the quartz properly; can you give the committee any information upon that subject?—The calcining the quartz is only useful to make it brittle, and that should be combined with throwing it into cold water. It then becomes so very brittle that such a stroke of the stamper as will not reach the sand will separate the quartz from the particles of gold. All these things should be explained by the aid of working models, together with the specific, and maps and drawings.

By Mr. O. Shanassy.—Have you seen the patent taken out for the original Chilian mill?—I know the original Chilian mill; but I do not know what patent the question refers to.

There have been two or three taken out.—Just so. The amalgamation should be an entirely separate subsequent process to the crushing. The amalgamation should be once a week, perhaps, for the crushing of every day, or something like that.

By the Chairman.—Then the committee are to understand you to say that you would not have the amalgamator in connection with the quartz-crushing machine at all?—I would not have the amalgamator in connection with the quartz-crushing machine at all; that is to say, I would not have the mercury in the crushing machine at all, as is the practice here. In the first place, the mercury cannot get to the gold while it is enclosed in the slightest film of quartz; and, in the next place, there is so great a waste of material.

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381. You believe that has been entirely overlooked here?—In speaking to some miners I showed them some platina, and asked if they had seen it; "Oh, yes, that was zinc," they said; that they were told so, and that it was exactly like the zinc they had seen being boxes and roofing houses. I told them the form and appearance under which zinc was found in nature, and that it never resembled the manufactured metallic zinc, and that it had a totally different appearance. On directing their attention to the platina, and saying that it was silver by touch, and gold by point, and pointing out that it was quite as heavy, and that they would catch the platina by the same washing process as the gold, they seemed surprised, and several of them said they would look out for it in future, but that they had heretofore been in the habit of throwing away the metallic sand which they understood to be zinc. As for the native platina, I have put into the geological case is the University museum examples of it from the Transylvanian gold fields, to catch the eye. The platina occurs in little grains, exactly like the gold in form, and also exactly in the same way as gold, in nuggets and occasional crystals.

382. By Mr. Benson. — In very small nuggets?—Yes, usually very small, sometimes larger; and when it appears crystallized it assumes the same crystalline form as gold. The specific gravity of platina is about 21.

383. If it is pure it is 21, and gold 19?—Thenceforth, it is very seldom that either the gold or the platina are quite pure, which makes a variation of 1 or 2 in the specific gravity. You catch these two metals at the same point in the washing process from their nearly similar gravity, which was the point that I was more particularly directing the attention of the Committee to.

384. By Mr. O’Shawassy. — Do you think there is a probability of any other description of metals being found in like manner?—I have seen abundance of tin. But I may mention, in regard to the steam tin ore, that on going into a shop where they had purchased some of this black sand, I suggested that "a great deal of this is magnetic iron sand." They said that they had never seen nor heard of such a thing. I said it was found in every part of the world where gold was found. At my request a nugget was procured and plunged into a handful that the miner had bought; a large number of particles of the magnetic iron adhered to the magnet immediately, showing the necessity for caution on the part of the buyers of this black sand, and for the use of this simple mode of separation.

385. By the Surveyor General. — Are the gold washings here full of it?—Yes.

386. By Mr. O’Shawassy. — Do you expect that diamonds also may be found?—I expect so; diamonds are found in nearly all the gold fields of the world, although very rare in most of them.

387. There has not been an instance I believe, at present, in these gold fields; have you heard of any?—Mr. Tennent has shown me one, and I saw one in London said to be from Australia; and there is likewise a gentleman of this town whose name I forget at this moment, who has brought some home along with some gems which he collected in the gold fields here. However the thing has been so carefully looked for I believe at all, and is not likely to be practically useful. Zircons, rubies, and sapphires are often found here; and even if not fit for jewellery purposes they would be useful when ground to powder, for various trades, where this powder is used, and for polishing other stones.

388. By Mr. Benson. — They make very good paper, such as emery paper?—Yes; but the principal use is for cutting and polishing other stones.

389. By the Chairman. — Will you favor the committee with your opinion with regard to smelting the quartz for the purpose of extracting the gold from it—does that appear practicable? I do not think it would pay. The most economical method of extracting gold from quartz reefs would be by breaking the quartz into moderate sized pieces, making it very hot and throwing it into cold water to render it brittle; then stamping it, and then carefully and elaborately washing the stamping that, and using the rich ultimate results upon the amalgamation. Thus, I imagine, to be the process that would be the most economically followed here; as it is the process that has been used for ages among the best managed gold districts in the world. I may be, perhaps, permitted to state that the mining of quartz reefs—of the gold in the matrix— is not to be expected to be so profitable as the alluvial diggings. Experience has shown, in every part of the world, that when quartz reefs, or when the solid rock, whatever it may be composed of, has been mined for the extraction of the gold, less has ultimately occurred. It is found that in every part of the world (we must follow the Baconian method of observing first and getting the general law by induction), and all experiments would show, that, in every case, the mining of gold in the solid rock has ultimately proved too expensive to pay for the time and labor and cost, by the quantity of gold extracted. I may mention that along the Andes, several hundred years ago, the gold being found in such quantities on the surface by the natives, the Spanish miners, who were the most admirable hands, set to mine into the solid rock, under the full impression that there was so much gold in the drift on the surface, they would be able, by the help of machinery and their mining skill and experience—by the combination of science and art—and to extract it from the bowels of the earth. But the deeper they went the less gold they got, and they had ultimately to give up mining for gold, though they continued to mine for silver and for copper. In most of those mines silver and gold and copper, and some lead were found. That was an experience that fully demonstrated that the further you go down the gold decreases, and the other materials increase in value and quantity. The silver mines, the copper mines and the lead mines repay you for sinking; they are richer the deeper you go; but,
on the contrary, the deeper you go the less gold you find. The theory is adopted now by nearly all practical geologists of Europe, and also of America, that the metallic veins are all found most abundantly at the junction of granite with the slates or stratified rocks; that those veins run more or less in a vertical direction from the interior of the earth, or from a great depth towards the surface. In those veins you get the ores of copper and silver and of lead richer and richer as you descend into them; but the gold and the plataue have invariably been found in greater quantities in the extremities of the veins close to the surface of the earth. Therefore all experience would make us rather hesitate in encouraging the mining for gold in the solid rock. The general features of mining countries are these—You get a high mountain range, generally of igneous rock, granite, syenite, or porphyry, as it may be, and over this range you get various stratified rocks, and when those two join you get the richest deposits of metals. You always get streams of water and various other influences acting on the high lands, and wearing away and carrying off a considerable quantity of the surface to the lower levels, by which the thin, delicate, uppermost branches of those metallic veins are also carried off. According to that theory, or more correctly speaking, according to experience derived from observations of this kind, it is proved that the parts richest in gold and plataue are the superficial tips of the original mines, and of course the first to be worked off; consequently, where you have a ridge of country of this sort, over which rains and streams of water have acted for centuries, carrying off each time a little piece of the surface, you have carried away the richest part of the gold and plataue from the drift, and deposited it in the superficial diggings, either wet or dry diggings—the alluvial diggings—at the lower level. Now these two sets of observation hang together very well, and go to show the general rules that should guide miners in selecting ground for gold washing. They should look at the junction of these igneous and stratified rocks, and with attention to the physical conformation or shape of the surface, they would be very well able to work with advantage, and bring their machinery or labor to the right spot. In the Russian gold fields, the working of the alluvial deposits is now carried on exclusively, except one small working near Ekaterinburg, where there is one small mine in the solid rock, and also throughout the ancient gold districts of America. In both these instances—in the Russian gold fields and the very old gold fields of America—where the mining has been attempted (with very great skill, and with a great expenditure of money) in the solid rock, in all cases that I am aware of, with the exception I have mentioned, it has been given up, and the attention has been directed in the end exclusively to the alluvial washings, which have been proved to contain a larger amount of gold, to be far less expensive in the working, and to be much more easily and economically developed. I might mention also in the general history of these gold discoveries, in many parts of the world, that this great excitement of the gold discovery in Australia has been paralleled pretty approximately by similar gold fevers in Hungary and America, and various parts of the Continent of Europe, also in Great Britain. In nearly all cases, as may easily be imagined from the description that has just been given of the natural method of forming these alluvial gold deposits, these little valleys, full of gold, have been quickly worked out, and many districts which in the old time were abundantly auriferous, now produce not a particle of gold. We know that in former classical time Spain yielded immense quantities of gold where she now yields none; even in the neighborhood of Prague, in the year 800, or thereabouts, immense quantities of gold were got. The accounts state that as much as two pounds of pure gold could be collected by two men in a day where now not a single particle of gold is to be obtained. So the history of all gold countries would go to show that the richest deposits, and those which it is most desirable to work, are alluvial: small valley accumulations, situated immediately under some hills, presenting the junction of stratified with igneous rocks on their flanks. Mining operations in the solid rock would, however, be, in all probability, productive of great national benefit, if coal, copper, or the like were the objects sought.

390. The committee are not to understand you to dispute the fact of quartz being the matrix of gold, but simply that the richest deposits are found near the surface of the ground? Just so; that the richer deposits are nearer the surface of the ground; and, being so found, experience shows that those veins of quartz and other materials containing gold in various parts of the world have been already scientifically and laboriously worked in other countries; and the gold has been found invariably to fail the lower you descend; and on the other hand, that the silver and copper have increased under the like circumstances. Therefore, I merely wish to allude to the greater mercantile value of the alluvial deposits, and to shew that machinery had been applied to the quartz reefs and solid rock, where they are manifestly auriferous; that it would be wrong to take the quartz reefs in all places as indicative of a large amount of gold, and to advise the planting of expensive machinery on the idea that it would pay well by perseverance.

391. By Mr. O'Shanassy. Are you acquainted with the relative value of quartz as estimated new, between the quartz of this country and the quartz produced in Carolina?—It must be enormously more valuable here, but then that is a thing you cannot trust figures upon, or a single fact. If you go up to any of the gold fields you may look out a piece of quartz reef so rich as to be almost a gold nugget, and you may go a little further off and get quartz with no gold at all in it; so that it is almost impossible to obtain a fair average of quartz reefs, that you could apply to all the quartz reefs of the country. I have just cast my eye over some figures on the table, having the appearance of very exact figures, going to several places of decimals based however on uncertain data and shewing results which, decidedly, you could not obtain in nature.

392. I am desirous of calling your attention to a matter which has been brought before the committee. We have had evidence from persons who have stated that it would pay them to work quartz at 3s. a ton by the aid of science, whereas in other countries that would be looked
In some of the richest gold fields in Russia, where you may calculate on any number of men that you would have to dig in a garden, the same labor would be produced that would carry the mass of alluvial deposit to the slope it will have set out travelling in; and the same thing occurs in the Californian detritus, that is the gold detritus - a peculiarity connected with the gold in that country. It is a merely accidental circumstance?-Yes. It flows out of Vesuvius, Etna, and other volcanoes because there is a very great likelihood of basalt and basaltic lava having been upheaved-upraised from beneath the sea, whereby a “wave of translation,” as Scott Russell terms it, would be produced that would carry the mass further than any stream could carry it; that is any stream that we see originating in those hills now could do it by any possibility; and the same thing occurs in the Californian detritus, that is the gold detritus or gravel is carried much further from the edges of the mountains than any of the present streams could carry it.

392. Have you any idea of the number of miles that it would be so carried?—It varies with the forms of the country and the circumstances just referred to so entirely, that no scientific man could fix a limit; it could only be done by local experiment or examination.

393. Take Gipps' Land for instance?—I could not at all calculate it; it must vary with every small locality. Of course in the beds of the streams it would come further, and according to the slope it will vary, and the nearer to the junction of the stratified and igneous rocks, the more rigid it would be the obstructions and the heavier the nuggets and the richer the gold; so the smaller the particles the further they will have been carried by the stream according to the
transporting power of the current and the difference of velocity. You must take each locality by itself. You must start from the junction of the stratified and igneous rocks on each particular range.

404. The current has no reference to the great dividing range?—It must have had; still there is a subordinate radiation from all hills.

405. We have had a sort of approximate opinion given to the committee of the extent of land worked over—115,000 acres. Taking that and comparing it with the whole area of the country, could you give any opinion as to the probable extent untouched?—That you cannot do at all. It would only muddle you to attempt to give any idea of that kind.

406. By the Surveyor General.—You can only get at that where experience has proved the presence of gold?—You must first look at the "back bones" of the country, is miners at home call the great lines of elevation. Those are the igneous rocks flanked by the older or pelozoic beds, of this regular appearance, and usually here auriferous character. You then note the physical conformation of the country. Take the valleys, and you know that, starting from this line of junction of the stratified with the igneous rocks or the flanks of the hills, you know the richest parts, and if you examine or survey at right angles to that line, you will, by experience, see how far particles of a certain size have travelled. When the particles become very fine at a very considerable distance from the dividing range, they are more numerous, but so minute that they no longer pay. As a mere labor speculation it would pay a man better to grow corn or dig cabbages than dig for gold under such circumstances.

407. By Mr. O'Shaunessy.—My reason for going on with this examination is of a twofold character. First, I want to know whether it is possible to ascertain the future probable chance of wealth from the mines, looking at the quantity mined and the quantity to be mined; and, second, whether there is anything like an ascertained law by which this property may now be sold, supposing we have a fair average knowledge of the soil in which it may be reasonably presumed gold existed to prevent the alienation of the real mine?—Upon that point I have to say that I think it is very clearly attainable. You will look out the highest dividing ridges of igneous rock, by your geological survey which is suggested in the first paragraph of the minute which has been read, and picking that out you get the line marked where the stratified rocks repose upon it; then you can very easily fix for yourself a limit at right angles to that line, which would reach the limit of the probably auriferous land. You can calculate that in every case, but you must have your topographical and geological surveys made, so that you may have some knowledge of the geological constitution of the country first. It would be impossible to say, "so many thousand acres have been mined, and there are so many thousand acres in the country, and therefore we may calculate on so many tons of gold," as men calculate the probable duration of a coal field at home. The cases are not at all alike; for, in the latter case, the boundaries of the field are known exactly, and the coal is in beds, the number and thickness of which are known to an inch; while, in the other case, all is uncertainty as to the quantity of metal in any district.

408. I only want an approximate view of the subject, not a surveying view?—Even far that you require some idea of the extent of the boundary line between the stratified and igneous rocks.

409. Is that attainable by a survey?—Very rapidly.

410. Within what time?—Oh, very rapidly indeed.

411. The auriferous character of the country could be ascertained and surveyed very rapidly?—Yes.

412. I am not speaking of a survey by chain?—No; a geological survey. The only thing is, that having got this line of junction of the stratified and igneous rocks, you must survey a number of parallel lines at right angles to it, which will be the direction of the gold valleys.

413. By Mr. Benson.—Since the commencement of the gold mining here, there have been 115,000 acres turned up by the diggers. Is it probable from the general appearance of the country that what has already been produced is anything like an estimate of the future auriferous produce of this Colony?—The probability is that it would be too high to be continued—that as you go on the product would be less, especially if persons seek with care. As the knowledge passes from man to man and from mouth to mouth that the heaviest nuggets are found close to this line of junction, those places (pockets as they are called) will be lit upon in the first instance, or early in the mining history of the place, and will be worked out completely and rapidly. Then gold fields will be established in all those localities where those rich pockets are ascertained to be, and, after the first rush; so to speak, there will be no more Capability of fortunes in a few days. It will then come down to ultimately something like the profits derivable from the exercise of great skill in very successful farming, or something of that kind.

414. If you got into a new range similar to that you have worked, the probability is you might realize much?—Quite as much. As long as there is any part of this line of junction unworked, so long you may expect equally rich deposits.

415. We have worked a certain number of acres up to the present time; if you have ten millions more acres left that may be auriferous, the probability is, that being similar to the district already worked, we may produce the same effect or nearly so?—If the two districts are of the same geological character, and that those millions of unworked acres have the same character and are located at the same distance from the line of junction of the stratified and igneous rocks, you may fairly count upon the same amount of gold in them.

416. By Mr. O'Shaunessy.—Does it come within your province to say, or do you consider the subject one fairly within the scope of your evidence, and if so, will you inform the committee whether you think it practicable to obtain any auriferous survey of that portion of the country.

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which is now auriferous, within a reasonable time?—It scarcely seems to me to be a thing very desirable to undertake. I do not see quite well how it would be done, unless you mean to ascertain what area is probably workable by experiment. If you want to do that, the way would be, to take, in the first instance, the line of junction between the stratified and igneous rocks; that would run along the flank of the great mountain ranges, and at intervals of five or six miles get observers to make traverses at right angles to that line; and at various distances into the flat country to take and work a certain area of the land, and carefully mill it, and draw a number of parallel lines of observation at certain definite distances from the line of junction, those auriferous surveys being parallel to each other and at right angles to the chain of hills.

417. Supposing that we did not go into the exact distances, but sought such a survey merely with a view of reserving that part which was auriferous; looking at it as an auriferous survey with a view of taking the probable result, seeing that auriferous land may be taken as more valuable than ordinary land for agricultural purposes. Can that be done, and would it be available when done?—It can certainly be done, though there are two difficulties. If you do it, it is to be supposed you do it in the most intelligent manner you possibly can, which will scarcely give a fair average, as your surveyors will of course come at once to the right places, exactly where the most intelligent persons would seek for gold. Hundreds and thousands of people who come to this country, go and spend themselves on the contrary all over it. The surveyors go to the very places where successful results might be obtained by scientific observation, going to the most probably auriferous spots; but then their observations and those of unscientific or ordinary ignorant inquirers would hardly coincide. You would know in looking at a great tract of country if you got a mountain ridge of this sort, with igneous and metamorphic bedded rocks on the flanks, striking with the line of hills, and deep valleys and rivers cutting them at right angles. Your surveyors would go to those channels and find abundance of gold nuggets; and thousands of other people arriving, would go and find plenty of room a little further off, and so on, and they would find an exceedingly small proportion of gold indeed compared to what your surveyors would find in the other spots to which theory and induction from observed facts would lead them.

418. Would the Government of the country be put into sufficient information of the character of the country, by such a survey, as to be able to say, "that is so valuable we will not alienate it by public sale, but reserve it to get gold either now or at a future time"?—I think so. My suggestion is, that several sets of surveys should be made along lines across the strike a few miles in length, say twenty, or thirty, or forty miles in amount as the case might be, and small areas worked, and the gold ascertained; then the other sets of surveys parallel to the first as two or three miles off. Then you would obtain the information you require in a most satisfactory way.

419. By Mr. Benson. —Your idea is, that it is the secretions of those mountains that are being constantly washed down?—Not merely the secretions of those mountains, but of this particular junction.

420. Of those particular rocks that rest upon the granite?—Yes; and the granite or other igneous rock itself as much as the bedded rocks near the line of junction and the quartz veins which chiefly abound in such disturbed lines.

421. By Mr. O'Shaunessy. —Do you think it is quite practicable for the Government of the country so to offer lands for sale as to make a reasonable certainty that the lands they are offering for sale are not of that character? For instance, can they take agricultural land by a survey of the country, that is a survey of its geological features, and fairly choose it out from that land which is more particularly auriferous?—That is much more easy.

422. That would clearly indicate and keep separate, as it were, the auriferous land from the agricultural—that is land that ought to be fairly sold for agricultural purposes, and land that ought to be reserved because of its auriferous character?—Yes; in the first instance you say "which is the land which contains the gold?" Well, as I have pointed out, these would be certain difficulties in that, but then, on the other hand, I am rather to say that what is not certain to contain gold? That is much more easy. You take in the first instance the same ridges, and get into the perfectly flat land at a considerable distance, (the Surveyor General or any of his staff would be able to say what was a reasonable distance, taking the slope of the country in each particular locality into account) and mark it down; and you would very easily then get a distance from the great source, a distance so remote, within a mile or two, that then would be very little likelihood of gold being found there.

423. By the Chairman. —The committee are to understand you to say, that a survey, such as that which is proposed here, would enable the Government to have such data, as would guide them in the disposal of the land?—Of the agricultural land and the gold land.

424. The Government would have sufficient information to know the agricultural from the auriferous land?—This survey would enable them to separate the lands, which were probably or certainly auriferous from those which were not. But in the auriferous tracts of land, a considerable quantity would not be auriferous. The actually auriferous lodes would be so interlaced and mixed up with intermediate spots containing no gold; that it would not be easy or practicably possible to prescribe any common rule for separating them, and therefore I do not advise the Government to suppose they could sell land as auriferous guaranteeing it to contain gold. But it would be easy for the Government to point out that the greater part of the colony is non-auriferous land at once; but in auriferous lands it would be less so. You receive the reply that the fair man would not say "here is gold," and, on the other hand, there are considerable districts where there is gold, but gold in such fine particles and so dispersed that it would not pay for working it.
425. With regard to extracting the gold from the quartz by electricity, as proposed by Mr. Gordon, what is your opinion of that proposition?—That it is perfectly impracticable.

426. Another witness, Mr. Wilkinson, says: "For the smelting, I merely want the quartz brought down to the size of peas and beans; what is your opinion upon that?—As long as the quartz is of the size of peas and beans, though each particle may contain any quantity of gold, that gold so contained is perfectly protected from any smelting or wet chemical process for its extraction.

427. Is there not a galvanic process or method of obtaining other metals from their ores? Yes; there is one in operation in many copper mines of extreme simplicity and cheapness. That depends upon the fact that most masses of copper ore contain certain salts of copper which are soluble, and those soluble salts of copper run away in the waste water of the mine. In such cases, when this electrico-chemical action is brought to bear upon it, it supplies you with quantities of the very purest copper, the apparatus required being simply fragments of old iron hoops thrown into the water containing the salts of copper and an electrico-chemical action is produced, which, by precipitation, covers the fragments of the old iron with large deposits of perfectly pure metallic copper.

428. With regard to the best material in which to form the amalgamation, would you recommend iron or other material?—I think iron is as good as need be. I do not see any objection to the use of iron, which is satisfactorily used in many amalgamating establishments in the world that I know of.

429. I put a question to the same witness, "Do you think that iron is the best material for the vessels used in the amalgamating processes?" His reply was, "No; I think there is an oxidation takes place, which, in some measure, prevents the affinities between the gold and the quicksilver." What is your opinion upon that?—Oh not that is not so. I see no objection to the use of iron vessels for amalgamating and distilling the quicksilver from the amalgam afterwards.

430. With regard to the patent law; do you not think that if that law was amended it would facilitate the carrying out of this scheme, so far as mechanism and models are concerned. At present there is a fee of £100 before a man can obtain a patent, which prevents many a poor man, who could bring some very valuable inventions before the public, perhaps, from doing so. What is your view upon that subject?—I should think there ought to be a registration of patents, and a small fee for a small number of months or years. A small fee for a short period has been found to work very well in England; I believe it began at the Exhibition. A man might have an idea of a machine which, as a model, would work well in a room, but which, perhaps, would not work in nature. You might get a model which would do what was required to be done, and for a small fee you might register it for a certain time, and then in security perfect the machine by experiments upon a larger scale; and if it did not succeed, the inventor need pay no more, while, if it succeeded, the inventor could renew his time, so that an ingenious person would run no risk of being ruined by a trial of his ingenuity. At the same time I might state, that as the Australian gold fields are so very much richer than any of those in operation in any other part of the world, the probability is that the machines which are found to give profitable results in those places where you have ingenious men devoted to them (and the question has been carefully considered by many governments), will very probably be found sufficient in those workings in this country, where you are satisfied to get a small amount of the whole gold existing in the formation; therefore I think the exhibition of working models of machines is a museum or school of mines would show that you have already in operation, in some part of the world, a machine that would do everything you require to have done in each particular locality here, without wasting your money (I mean the graduates who know nothing of it), in running to buy the first patent they see advertised in the newspaper.

431. You believe that that would economise labor and save an immense deal of disappointment?—Yes.

MONDAY, 17TH MARCH, 1856.

MEMBERS PRESENT:—Mr. Humphray, in the Chair; Mr. Benson, the Surveyor General.

The Honorable Andrew Clarke, Captain R.E., Surveyor General, a member of the Committee, examined.

432. By the Chairman.—The committee wish to know from you what steps have been taken under the Survey Department to obtain a topographical survey of the Colony?—On assuming office in July, 1853, I found that a very fair general map of the Colony, perhaps better than any other map of any of the Australian Colonies, had been compiled by Mr. Hoddle to a scale of eight miles to the inch, and which map has since been published in England by Arrowsmith. This map, whilst showing the general features of the country, could lend little or no assistance either as the economical distribution of the lands nor for any purposes where minute topographical knowledge was necessary. I, however, found that the great demands for the permanent settlement of the Colony, the sale of farms, required the whole or the greater part of the strength of surveyors I could obtain in the Colony, and looking at the very great expense attending the employment of labor, I did not feel myself at that time justified in withdrawing from the actual
17th March, 1856.

...survey of lands for sale, any of the assistance I had. I, however, took immediate steps to address, through the Government here, the Secretary of State, with the view of procuring from the mother country the necessary instruments, and also assistance in the shape of qualified surveyors who had been engaged in the Ordnance survey of Great Britain and Ireland, and whom I should have had under control with very great economy. Unfortunately, England at the time being engaged in a great war, the Home authorities could not spare the number of men I asked for, which was thirty, and only sent me out six. I have, however, endeavoured to arrange the survey of lands for sale so as to make it as far as possible completely subsidiary to the general triangulation and survey of the country, so that at any time these surveys can, without re-survey, be connected. I have in the meantime, commenced fixing stations in present, a series of large triangles. Observations are going or steadily, and have reached the Murray to the north, and as far as the Pyrenees and Gappans under control of the country, so that in the metrical scale of traced by a line which I believe will be found to answer for all purposes of practical utility. I am now waiting until I get those instruments which I shortly expect from Van Diemen's Land. They are the same instruments which have been used in the southern country, and I believe it is a matter of very great importance that should be used. The same instruments should be used for determining the base lines of the trigonometrical surveys commenced in Van Diemen's Land, and about to be carried on in New South Wales and Victoria. The work that has been already done with regard to the country of Bourke and now extending to the westward and the north has been shown to Mr. Selwyn, and as it shows, the whole contours it will furnish him with admirable assistance in shewing the geological condition of the country. The whole of the western and eastern gold fields have been tolerably well surveyed with the larger triangles, done by theodolite, filled in by compass, shewing fairly and accurately the inferior and smaller features of the known gold fields of the country, on the reduced scale of an inch to a mile. I had had commenced a more minute and detailed survey of the whole of the gold fields in connection with Ballarat, shewing the shafts and drifts and minor details of that field. Circumstances have put a stop to that for the present, but I have taken means to prosecute that work anew. A very good survey of the Sandhurst gold field is now in course of being plotted.

438. Taking what you have done as a basis of calculation, how long do you suppose it would take to have anything like a topographical survey taken of the gold fields so as to enable you to make a good chart of them?—The whole of our known gold fields extending from McIvor on one side to the Mount William diggings on the other, and including Sandhurst, Castlemaine, Kingower, Mingenew, Bet Bet, and Carisbrooke, are now plotted, and the features of the country fairly and accurately laid down to a scale of one mile to an inch, and means have been taken to have those maps published for general information.

434. By Mr. Benson.—Have you any information about the district of the Whipstick? There is a station in the middle of the Whipstick with which the district surveyor of the Bendigo district has instructions to connect, and he has also instructions to open up a road through the Whipstick as soon as he can afford time to do so. The great difficulty I found there was to ascertain the water courses, and it has been with that object I have proposed opening a road through the Whipstick.

455. What information have you as to the lower Bendigo towards the Campaspe?—The whole of the Campaspe as far as Echuca is now in course of being surveyed and connected with Melbourne. The whole of the country between the Murray and Melbourne will be connected by a great series of triangles, and it is a matter of time and expense filling in the smaller details. I would here again state that I have been most anxious to have the trigonometrical surveys completed, but the fact is, that every surveyor who is good for anything has been engaged in surveying land for sale.

436. By the Chairman.—That is to say, the demand for land has been so great that you could not carry on this survey?—Yes; and I have been disappointed in getting the assistance I asked for from home. A trigonometrical survey is not a work of a day. The one in England, where there are cheap labor and good roads, has been a work of years and years, and has cost vast sums of money already.

437. Are the committee to understand you to say, that if your request had been seconded by the Home Government, the topographical survey would have been in a far more forward state than it is?—A far more advanced state.

438. You early saw the necessity for such a survey, but were prevented from carrying it out?—Within the first fortnight of my taking office I wrote home upon the subject, and I have received some of the most valuable and necessary instruments which are here, and I am about taking means to use them.

439. By Mr. Benson.—Have you the respective levels of the Campaspe and the Murray?—I have, but I could not tell them now without reference.
440. By the Chairman.—Have you any observations to make relative to the establishment of a Mining Board and Museum?—The nucleus of a museum has been formed in connection with my department, and I have issued instructions to the surveyors to furnish me with geological specimens of the different localities. I also addressed a circular to the surveyors as to the gold fields, and also to the wardens, and I furnished them with directions to forward me specimens of the different shafts as they went down; but, owing to the absence of anxiety on the part of the diggers themselves, I have not received so many as I expected. Still, an enormous amount of information has been collected in the course of the last two years by the different surveyors, and I am intending to transfer the whole of these specimens to Professor McCoy, at the University, as the nucleus of a more extensive museum in connection with the natural history of the country.

441. By Mr. Benson.—Have you any information relative to lime existing in the auriferous districts of the country?—The only limestone I am aware of is at the Limestone Creek, near the Jim Crow. There is lime in the neighbourhood of the McIvor, but generally there is a great absence of lime.

442. By the Chairman.—Have you any information relative to iron and coal?—There is plenty of iron in many localities, and coal exists at Western Port.

443. By Mr. Benson.—Have you any information relative to iron and coal?—There is plenty of iron in many localities, and coal exists at Western Port.

444. By Mr. Benson.—Have you any information about copper?—None that I am aware of. I have never been able to trace copper. Several specimens have been sent me, but though I have instituted most rigid enquiries, I never have been able to obtain any reliable information of the existence of copper, except at Steiglets, where a small quantity has been found.

445. By the Chairman.—Do you not think the present Patent Law acts as a check upon inventive skill?—I think there should be a registration of patents, enabling any man to register what he considers a new invention. I think there should be a provisional registration to protect him for a certain time, but I should not go to any great extent beyond that.

446. By Mr. Benson.—Do you not think it would be advisable that a certain time should be allowed after first registration before taking out a patent?—So long as it is not too long. I do not think there can be any injury if it is limited to six months.
SUPPLEMENT OF EVIDENCE GIVEN BEFORE THE GOLD COMMITTEE,
BY J. BRACHÉ, C. & M.E.

To the Honorable the Chairman and Members of the Gold Committee.

GENTLEMEN,

The motives of several Honorable Members, made for the purpose of providing a better mining system, have occasioned a very interesting and important discussion.

I had the honor to be called upon to give evidence before you; and as a contribution to the discussion which then took place, I beg to offer the following supplement, containing some general observations, which, as they are the results of personal experience and careful reflection, will, I trust, be considered worthy of your attention. For years past I have made this subject my study, and have enjoyed ample opportunities both here and elsewhere, of becoming practically acquainted with the various mining systems in all their bearings; I venture, therefore, to speak with some confidence of the merits and defects of the various systems in operation.

The matter now under your consideration involves the most vital interests of the Colony. Upon your decision, in a great measure, will depend the better and more systematic working of our gold fields—a question of infinite importance; for already our gold production does not keep pace with our increasing mining population. The timely provision for opening up our natural resources and making room for an increase in our population, by encouraging a well directed national enterprise, is one of the wisest laws or principles of political and social economy. But before this can take place we should have an intimate knowledge of the quantities and qualities of such resources; therefore, in this, or any other country it should be one of the first duties of a wise Government to investigate its natural capabilities. The relative value of the various portions of a country once having been determined, an enlightened Legislature will then be able to lay down a plan for its colonization, successful in proportion to the knowledge attained of the comparative value of the various component districts. That this principle has not been carried out in this Colony as regards our gold fields, is already seriously felt. To the neglect with which our gold fields have been treated, no measures having as yet been taken to develop their vast riches by means of science and an improved mining system (which neglect is chiefly to be attributed to the stubborn prejudices of the miners themselves), may to a great extent be ascribed the general depression under which such a country as this now labouring. Since the discovery of gold here, the produce of our mines became the principal export, and all other pursuits in the Colony became either collateral or subordinate to that of gold mining. Most of all did since then the prosperity of the country depend upon the prosperity of our gold mines, and of the population employed in them; and as soon as that attention shall be bestowed upon our gold fields which their importance demands, we may hope to see the general present depression disappear, as a fog before the powerful rays of the mid-day sun, and may reasonably expect the advent of a time of prosperity, such as no country has ever experienced.

To show the importance of developing the resources of our gold fields I have made the following estimate of the extent and probable value of our auriferous lands, and of the period of time that would most likely be required to exhaust them. At this early stage of our existence as a Colony it has been impossible to arrive at a full statistical knowledge of the extent of our gold fields, and, therefore, some allowances should be made for any inadvertency I may have fallen into; but, nevertheless, my estimate has been made after careful reflection, and I will also provide you with the data upon which it is based. I must, however, mention here, that I have reduced this estimate to the lowest possible figure, and it therefore will form the zero point upon which future similar calculations may be based. To those that might object to the propriety of such an estimate, I can only answer in vindication of myself that philosophical speculations on entering on such grounds possess large privileges, especially when, as in this instance (in the contemplation of the vastness and inexhaustibility of our auriferous lands) there is as yet no thorough path to guide the philosophical conjecturer from going astray; for no definite survey of the entire extent of the auriferous formation of Victoria as yet been obtained. There has been a survey made of the extent of our local gold fields, but the area surveyed falls far short of the actual extent of what is now known to be the auriferous formation of the Colony. Our local gold fields present but isolated, partly worked patches, which can scarcely be styled a commencement towards the exhaustion of our vast auriferous mines. I have also travelled myself over hundreds of square miles of yet untouched auriferous lands. I was therefore fully aware that the latter survey would not in the slightest degree assist us in making an estimate and observations on the probable future prospects of our auriferous mines and their influence on an increasing population and the civilization of this infant gigantic country. My main object, therefore, was to reduce these estimates
to some tangible figures, which should serve as guides for future observers, and which in themselves would tend to illustrate the object at issue better than the best language could have accomplished. I also must remark here that I have subjected these estimates to the criticism of several authorities of the highest scientific attainments—amongst others to that of a gentleman formerly the possessor of several large silver and gold mines in Peru and Bolivia. This gentleman is a lineal descendant of one of the followers of Pizarro in the conquest of Peru, historically ascribed the slayer of Pizarro after he had turned traitor to the Emperor Charles the Fifth. That gentleman, whose family still possesses, by descent from the times of the conquest of Peru, large silver and gold mines in Bolivia, and who has enjoyed an experience of forty years standing in the various modes of gold and silver mining, and also inspected the most important mines of Europe and America, and the gold fields of this Colony, and who has written several excellent pamphlets on mining, pronounced the enclosed estimates not only as fair, but also as the lowest possible figures to which I might have resorted. Indeed I was advised by him to triple the amount of the auriferous per centage both of the auriferous quarts and the alluvial deposits of this Colony which I have selected as the lowest possible data of the quartz as per ton, and the alluvial soils as per cubic yard. But I preferred to fill in my estimates rather short than to be accused of exaggeration, and therefore chose my own data. To those that are extremely sceptical or pedantic as to the propriety of these estimates, I can only say that I entered upon perfect legitimate scientific and professional grounds in making them, for the mineral deposits of all mines (though mostly with more accuracy of detail) are valued in precisely the same manner, and though the thickness and extent of such deposits may be ascertained by a series of boring, still the valuation of the riches of any mine, and the time required for its exhaustion is in all cases extremely vague. All that we must arrive at in making these estimates is to keep from exaggeration, and only then is it that we can divine thing like a true valuation, or at least be enabled to bring forward such figures as remain within the compass of actual facts, whilst the latter, from the vastness of the problem before us as to arithmetical correctness, never can be established. Therefore, whilst I bring forward what must be found, on a close investigation of the subject, to be fair figures, still I do not wish the Committee to look so much to their arithmetical correctness as to the actual fact established through them, that our gold fields may not only for hundreds of years remain profitable to an increasing mining population, but also that an estimate of their probable exhaustion is so far removed from our sight and investigation, that it loses itself altogether within the haze of remote philosophical conjecture.

I find that the Victorian Gold Fields extend from the Steiglitz Diggings (or even further south, as I have heard from Cape Otway), in a north-west direction, as far as the Avoca extends, a distance of about 140 miles, again from the Yarra River mines north-west to Mount Kowong, a distance of about 130 miles, and from the Delegate River north-west to the diggings near Albury, a distance also of about 130 miles. From west to east we find the distance to be 450 miles, from the Glenelg River to the Delegate River near the boundary line of New South Wales; however, the above area is not all auriferous, above one-half of it is covered or intersected by tracts of upheavals of the different older rocks, and the late eruptions of the more recent volcanoes, forming our basaltic plains, the decomposed surface of which supplies us with inexhaustible quantities of the finest agricultural land, whilst beneath these plains lie buried or inundated a great portion of the ancient surface of our auriferous lands, teeming with golden treasures. This we see on the Gravelpits and Frenchman's Leads, Ballarat, and at the Jim Crow Ranges. It will be found similar all over the Colony. The average extent, therefore, of our gold fields is about 200,000 square miles of auriferous lands, of which about one-third are buried beneath the basaltic plains. I find from accurate observations that the maximum surface extent of the quartz dikes or reefs in this Colony in proportion to the alluvial auriferous lands is as 1 to 100, giving 200 square miles of quartz dike surface all over the Colony, of which we may estimate also that the same amount are buried beneath the basalt. In taking the above superficial extent of quartz veins and multiplying it by 50 feet as the average paying depth of quartz on a reef (many being, however, often found remunerative in the silver mines at a depth of from 100 to 1000 feet, in Mexico and other parts), we shall obtain 10,325 millions of cubic yards as the bulk of our auriferous quartz in the aggregate.

The lowest estimate that I can arrive at of the specific gravity of quartz containing but an imperceptible quantity of gold is 2,000 or about 1625 pounds per cubic foot, being 5,839 pounds per cubic yard, or about 2 tons weight. This would give us 20,650 millions of tons of auriferous quartz in the Colony, which if valued at £1 per ton (the lowest paying quality of quartz), will give a value of £20,650,000,000 sterling.

I will now enter upon a few calculations, showing the profits that might be derived from quartz mining, and the length of time that will most probably elapse before our quartz will be exhausted. One miner, provided with the most efficient mining implements, can quarry on an average two cubic yards of quartz per day (on Forest Creek I have seen as much as three yards of quartz quarried and reduced to red metal by one man per day); this will give (taking the year at 300 working days) 1,200 tons of quartz per man per annum. I will now assume 100,000 quartz miners to be engaged in this Colony, divided into companies of ten each, which will be equal to 10,000 such companies spread over the land. I will next endeavour to show at what expense one of these companies could work. Of the ten men composing the company six
would be employed in quarrying and raising the quartz, and four in attending the machine and performing other works. Six men could raise 7,200 tons of quartz per annum according to the above calculation, which in order to have their golden contents extracted would require machinery capable of crushing 24 tons per day. This estimate is based upon such data which could only be obtained, provided the most improved mining system was introduced in the Colony. I have already stated in my evidence that the average earnings of the 100,000 miners now engaged in the gold fields do not exceed 7s. 6d. per day, or about £120 per annum, assuming our gold produce to be in the maximum 121 millions of rounds sterling. Taking then 7,200 tons of quartz at £1 per ton, we have an amount of £7,200 per annum gold produce of one of these companies.

**£**  
**s. d.**

| Outlay for machinery during the first year | 3,000 | 0 | 0 |
| Sundries | 1,000 | 0 | 0 |

Total outlay: £6,600

Proceeds, £7,200; profit, £700 during the first year; and as no new machinery will be required the second year, we shall have a profit of £3,700 for the second and succeeding years. Ten thousand similar companies would produce 72 millions sterling per annum. Of these 7 millions would be profit during the first year, and 87 millions every succeeding year, and if wages are taken into consideration, 62 millions per annum. Having estimated the total bulk of quartz in the Colony at 20,650 millions of tons, and dividing these by 72 millions, the number that could be raised by 100,000 miners, we shall find that the quantity will only be exhausted in about 300 years.

And now let us estimate the extent of our alluvial deposits. Deducing 200 square miles of quartz diake surface from the 20,000 square miles of auriferous lands, we have left 18,500 square miles of alluvial auriferous ground, partly lying bare, and partly covered with the basaltic formation. Comparing the present deep sinkings at Ballarat, Creswick's, the Ovens, &c. (and I have no doubt that sinkings of 300 feet will yet be found), with others, called shallow sinkings, I find that about 20 feet may be set down as the average depth of alluvial auriferous lands. This would give us 20,444 millions of cubic yards of auriferous alluvial soil or deposit in the Colony. It is well known that these lands are auriferous throughout their entire depth, for the same disintegration of our auriferous quartz "reefs" is daily going on which formed the heavy auriferous deposits at the "bottom" of what once formed the ancient topographical features of those special localities. The rich deposits upon the latter may be accounted for by the fact, that all quartz veins, auriferous or argentiiferous, are richest on the surface, and that they were formed by the top part of these "reefs" being first washed down; but the thing to be ascertained was, the average value of a cubic yard of our auriferous soils. This I determined by ascertaining the lowest amount of gold that must be contained in a cubic yard to pay for its being raised from the mine and washed, taking for granted that the necessary quantity of water, as well as the most efficient machinery, was at command to extract the gold; supposing even more perfect machinery were introduced here than that now in use in California, and a most perfect order and working system prevailcd, I found afterwards that this estimate coincided most accurately with data I had obtained in California, considering that our alluvial auriferous deposits are far richer than those found there.

I then put this minimum per centage of gold required down at 6s. per cubic yard of solid soil. Six shillings per cubic yard of solid soil will appear but a very low estimate to those more accurately acquainted with gold mining. I have no accurate data of the average yield of the Ural Mines; but the alluvial sands in that gold-producing country are so poor, that I find on comparing our rich mines, with their imperfect mode of working, to the perfected mining system established in the Ural (chiefly worked by cravvets), that the Victorian Mines stand in point of richness to the Ural in the proportion of about 5 to 1. Six shillings per cubic yard will be found a low estimate by those acquainted with our wasteful mining system. In California whole acres of alluvial auriferous soil are excavated and turned through sluices, and this has never paid less than five cents per bucket of stuff raised and washed, although even there gold is still lost. Five cents has been found to be the minimum paying rate per bucket; and although "stuff" (to use the digger's phrase) has been washed of a less rich quality, it has generally been abandoned as proftless at the present rate of expense, there being vast quantities of richer soil at command. But I have no doubt that with more perfect machinery "stuff" of a lower quality will yet be washed in California. Solid soil, when broken up increases in bulk, and amounts to about thirty-six cubic feet, or buckets of one cubic foot each, which are therefore worth two pence per bucket (at the rate of 6s. per cubic yard). I will reckon three cubic feet to the ordinary "tub" (digger's phrase), which gives twelve tubs to the cubic yard, of the value of sixpence each. On close examination I find that in the Colony "washing stuff" with the best means, such as now are in use, at command, has not been found paying except at the rate of 4 d. per load, that is, 1 1/2s. per cubic yard, or twelve tubs, which would give 1s. 3d. to the tub. This is with the best machinery now in use, not taking into consideration the average amount that would be required to pay wages, if manual labor only were employed. Comparing these results with those obtained in California, I find that there the least rich washing stuff which pays contains 2d. of our money in gold to the bucket, four of which buckets are about equal to three cubic feet, so that...
forty-eight of these buckets are about equal to one cubic yard of solid soil, which amounts to 2 dollars 40 cents, or 15d. in our money. This will be found to be correct, when it is known that the average wages for good working miners paid at the Californian mines never fall below £1 per day, each man being able to raise and wash at the average per day three cubic yards of "stuff," with such perfected machinery as is now in use in California, giving only a gain to the capitalist of 6s. per man per day on the large outlay required, allowing 2s. 6d. per day for wear and tear per man, and incidental expenses. If this were also a man might raise three cubic yards of auriferous earth per day, or if he had access to the most perfect mining implements and machinery he might also wash as well as raise three cubic yards per day, provided ample water was at hand. It may be said the Californian auriferous soils are of a less clayey nature than those of the Australian mines, and that they require less water. Such is in general the case, but this advantage is counterbalanced when we consider the precipitous nature of the ground of the Californian mines, offering more difficulties to obtain water supplies, and other disadvantages for working them. This gives 900 cubic yards per year, consisting of 300 working days. We will now again suppose that there exist 10,000 companies of ten men each, engaged in working our alluvial grounds. Each company would extract and wash 9000 cubic yards per annum, which at 6s. each cubic yard would amount to £27,000 per company, for machinery and other expenses. For the first year the expenses for washing would exceed this amount left as a balance considerably, but on an average £300 per annum would be a large outlay for machinery, &c., for each such company. Ten thousand companies would thus realize £27,000,000, at an annual expense of about £8,000,000; leaving a total balance of wages of £19,000,000, which is double the quantity that we considered the total gold produce for 1856 for Victoria. The above 10,000 companies would reduce the auriferous alluvial lands at the rate of 90,000,000 cubic yards per annum, which will, if divided into the total bulk, as above stated, of the auriferous alluvial soil in the Colony, give 12,250 years as the time required for exhausting our alluvial gold fields. Estimating the value of our auriferous alluvial deposits at 6s. per cubic yard, the total number of yards being rather more than 20,444 millions, we find it to be £6,183,000,000 sterling.

We have already seen above, that the gold produce obtainable by 100,000 miners, by means of quartz mining and crushing, would amount to £82,000,000 sterling per annum; by auriferous mining we find that £24,000,000 might be obtained, the best machinery and ample water being at hand, and the most perfect working system introduced in both cases, giving an annual produce of £66,000,000 sterling, by 200,000 men. 100,000 men, therefore, in the same ratio would produce £43,000,000 sterling, instead of, as now, £12,000,000 sterling (maximum) per annum.

The total value of our quartz we have estimated at £20,850,000,000, and that of our alluvial soil at £6,183,000,000, giving a total of our wealth of £26,973,000,000 sterlmg. We also learn that if our mines were worked under a more efficient system they would produce about four times the amount now extracted annually. This shows us our present mining system under a most grievous aspect, and calls for speedy reform. We need not for many hundreds of years to come be afraid that our gold fields will be exhausted, whilst the average income of the diggers might be doubled.

This last assertion I find corroborated by the data I have collected in California, although I arrive at the conclusion by starting from the opposite basis, which proves to me that scientific inquiry into this subject is not unaccompanied with results approaching somewhat near to the truth. The present known area of the gold fields of California, though is deuced pious, extends over about 25,000 square miles. It is difficult to obtain accurate data as to the present number of miners employed in that country; however, putting it down at 100,000 in the minimum, the same as that now mining in Victoria, I shall not be far from the truth. At all events we will start from this basis in drawing a comparison between the gold mining operations of the two countries and their attendant results. From information I have gathered, and from personal observations, I find in corresponding richness and other advantages, the Victorian Gold Fields stand to those of California as two to one. With this advantage on their side, how is it that the produce of the Victorian mines is only 132½ millions sterling per annum in this year, maximum estimate, whilst California yielded in 1853 £20,000,000, and has gone on increasing at the rate of £2,000,000 per annum, so that we may this year estimate it at £26,000,000? This is more than double the produce of our mines, and can only be accounted for by the improved mining system in California. The soil of Victoria being as rich again as that of California, we arrive at the startling result that one man in California, by means of systematic working and good machinery, produces four times the amount produced by one of our miners, 

GOLD COMMITTEE — A.
Thus we can also account for the fact, that whilst in California miner's wages have never fallen below £1 per day, workmen can be obtained on Balbriggan at 10s. per day, and for less on some of the other gold fields, (the Owens excepted, where the best system in Victoria is worked upon), California has, as a gold country, proved to us that an increase of population ought to be attended by an increase of the gold productions, by the means of scientific working and the introduction of capital. Co-operation and capital can therefore only increase the chances of the individual miner, whilst by isolating himself from the knowledge of capital and machinery he diminishes his chances by day, wages falling in proportion.

Whatever doubts some may express as to the correctness of my conclusions, I can only state that they are drawn from the best data and information that were within my reach. I have been endeavoring to show in plain figures the extent of our wealth, which is only in its very infancy of development.

The total amount of the precious metals in the known world existing previously to the discovery of gold in California, is set down at 2000 millions sterling by P. J. Stirling, the author of some valuable works, of which the amount in specie is estimated at 400 millions. We find, therefore, that the 26,783 millions sterling at which we estimated the gold buried as yet within the bowels of the earth of the Colony of Victoria, exceeds the total amount of specie and precious metals known to exist in the world prior to the year 1845, thirteen times. And if we were to adopt here the suggestions of the gentleman I have before referred to, it would result in three times the amount of my own estimate; we should have instead of £25,783,000,000 sterling, the sum of £50,349,000,000 sterling, as the valuation of the auriferous mines of Victoria, or thirty-nine times the value of the precious metals of the known world prior to 1848, according to P. J. Stirling. Well might this country be called an El Dorado!

Since 1848 the gold produce of California has amounted to about 120 millions sterling, being at the rate of 17½ millions per annum. Since 1851 the gold produced in Victoria has amounted to 45 millions sterling, being 9 millions per annum, or about one-half of that of California, thus corroborating again some of my conclusions mentioned above.

I will now take the liberty of drawing your attention to another subject. It has been said that the immense accessions which are made to the precious metals from year to year will at some future day produce most disastrous social results by lowering the value of gold and thus making gold mining less profitable. Such a conclusion is decidedly false. All that this increase of the precious metals ever can effect, in my opinion, will be to raise the value of real estate, and of all produce and manufactures the result of labor. This effect is not only felt where the gold is raised, but it also radiates to and is felt in the most distant quarters of the world. Already we perceive that in spite of the war, by which commerce is materially checked, wages in general have risen during the last six years. The following circumstances, illustrating my assertion, may be found interesting, and cause some philosophical speculation. My father, who held a government appointment in Prussia, writes to me thus:—"It is most extraordinary that since 1850 all commodities have risen to double the value they were in 1846, when you left us, and in spite of a succession of the most abundant crops, there is no reduction of prices. At first I failed in my attempt to unravel the origin of such a change, for in searching for a basis whereupon to found my conclusions, I had to swim against the tide; but when I looked around and saw what changes had taken place in all productions of labor in Great Britain since the vast amounts of gold had streamed into that country, by which the commerce of the world had been increased one-third, I was at once convinced that this vast accession to the wealth of nations had extended its influence also to my country, and that the waves of this tide of prosperity and wealth were striking like a powerful surge against the mountain barrier of the ancient social and political institutions of my native land." Indeed, I hesitate not for one moment to state here, as my belief, that if this influx or increase to the national wealth of the civilized nations of the world should continue at the present unparalleled rate for a few years longer, it is impossible to doubt that the consequence will be a great social and commercial revolution—a rupture of the relations and present distribution of all property, and yet unlikely will ultimately result in a political revolution of the older states of Europe. For, if the material base upon which the institutions of a people are more or less planted once become disturbed, and lose their equilibrium, there is nothing that can prevent such nation from falling into a revolution. Such revolution must be either social, commercial, or political, and neither the power of the concentrated bayonets of standing armies, nor the profoundest wisdom of the statesman can arrest such a revolution. The increase of the precious metals, of late years, to the wealth of nations, is unparalleled by any examples in history, and most individuals, being at a time pregnant with changes and revolutions, which only by such statesmen as have fully comprehended the phenomenon and its cause can be arrested by timely provisions; and thus, instead of leading to disasters, might readily be turned to the promotion of the prosperity of a nation. However, few of the statesmen on the continent of Europe have as yet anticipated the origin of these emergencies and changes, and many of them will likely not resort to expedient remedies until they are surrounded by difficulties which cannot be settled by practicable measures.

My father, in his letter, goes on to say: "My salary, though the same as usual, like that of my brother officers, is now scarcely sufficient, or what it once was, and few are now applying for appointments, which at one time were considered excellent berths".

This shows that in the Old World the influence of our gold is being materially felt; that like here and in California, wages or salaries must rise in proportion as the commodities of life rise in price. This was the case here under His Excellency Mr. La Trobe, when the gold fields were discovered.
Here and in California the waves started, and in their onward course they will gradually extend all over the world. The progress of civilization and the happiness of the most distant nations will be materially favored, and their social development will be more rapid. How desirable, may how necessary is it, therefore, that we should develop the riches of our mines; humanity and civilization demand it, and have a right to demand it. Looking at the matter from this point of view, the occupation by about 100,000 miners of our gold fields, and the claims which they urge forward to the whole of the auriferous lands of the Colony, and the impediments, which they as a class, through their prejudices and ignorant motives, throw into the way of a proper development of our gold fields, by preventing the proper display of the functions of capital and skill, present one of the greatest monopolies that ever existed, as shown by the foregoing calculations, even a monopoly by far greater than that of our squatters, though with this difference, that the squatter derives benefits from his, whilst the diggers derive not only advantages from theirs, but in their present almost starving condition are so much the worse off for their monopoly.

Indeed, this headstrong opposition of our mining population to a proper development of our auriferous mines, has concealed our real mineral wealth abroad, and thereby prevented up to this time, the world at large, and the cause of civilization and humanity, deriving from the Australian gold fields those advantages for which providence doubtless designed their discovery.

The whole annual produce of gold and silver in the world in 1846 (exclusive of China and Japan) according to P. J. Stirling, amounted to £12,989,677, which we may still consider the present annual production, excluding the above countries, and Australia and California. In 1855 the gold produce of California alone amounted to £25,000,000, and that of Victoria to £12,506,000 maximum estimate. New South Wales may be put down at £4,000,000. Thus the gold produce for the year 1855 in the whole world may be set down at nearly 54 millions sterling, being more than four times the former production. According to P. J. Stirling, I find that in 1856, the silver produced amounted to 729 tons, and the gold to 42 tons, being as 17 to 1. In 1858 the proportion fell to 1 to 1. Although the annual production of silver had been at 1002 tons, that of gold had increased to 189 tons, the proportion being 5 to 1. As yet, says Stirling, there is no change in the relative value of the metals, silver being sold at 8s. or 9s. 1d. per ounce. We find that although the production of silver is increasing, it does not keep pace with the production of gold, and that some change may arise in the corresponding value of both metals, unless the production of silver should again assume its former ratio to that of gold. I find that the matter is one which is likely to happen, for silver mining has been carried on by capitalists more profitably than before, so that the production of silver is likely to increase considerably. In the Bolivian Silver Mines labor is in great demand, and wages are 10s. per day, whilst ten years ago they were only 3s. per day. I think, therefore, that so change in the relative value of both metals will take place for a considerable time, and probably never; for as soon as silver would begin to be scarce it would in the same ratio be mixed for more efficacy, and to greater advantage. Therefore, the relative value of the two metals, though disrupted for an interval, would in time always be balanced ultimately. It is well known that the argen'tiferous mines of America and other countries could supply us with greater quantities of the precious metal. I now enter upon an important subject, namely, how will our gold fields answer the future requirements of an increasing mining population? The only example and the best example we have of a new country rising by degrees from a small community to a powerful nation is the United States. In 1776, at their declaration of independence, they contained a population of 3 millions; and, in 1856, of 24 millions. But assuming the average increase to our population for 25 years, both from generic causes and immigration, to be at the rate of 40,000 per annum, we should then have a population of 1,500,000 souls. Gold mining will always be the principal resource of the population of Victoria; for, surrounded by the other Australian colonies and by densely populated countries of ancient Asia, which can always compare with this Colony in cheapness of general production—and also seceded as this Colony is from the rest of the world, the raising and exporting of grain and other agricultural produce, will not be found an everlasting profitable employment by her inhabitants; for as long as the Colony remains a profitable gold mining country, all wages will command a high price. Sufficient for home consumption will be raised, doubtless, but not more. Assuming then that 25 years hence one-third of our population would be engaged in mining, as now, we should have 450,000 miners in lieu of 100,000 miners now. Gold mining would probably be conducted more systematically, and assuming each member of the mining community to raise £250 worth of gold per annum, the total amount obtained per annum would be £12,500,000. Even at that rate the £20,750,000,000 which would only be exhausted is about 282 years. We thus arrive at an idea of the inexhaustible mineral wealth of our adopted country.

I should be happy if the above remarks were to stir up some influential men to contemplate the vastness of our resources and the means required for their development. Let the Government not forget that it has the management, and the people's representatives that they are the trustees of this enormous wealth for the people at large. These riches are now as in a safe locked up in the bowels of the earth; they are within our reach, and might be termed the real Bank of Victoria—her strength and basis of power. The safe requires only to be unlocked by the people, and its riches to be turned to that account which progressing civilization in the southern hemisphere demands. Contemplating the immense mineral riches contained in this Colony and Australia at large, and which, in the course of time, will be found diffused further than at present known, we must revere the hand of Providence that thus pointed out our golden treasures to mankind, to the existence of which the Australian Colonies not only owe their present flourishing condition, but upon which their progress and power will
depend for ages to come; for gold alone attracted hundreds of thousands to our shores, and gold will remain to be the great magnet of attraction. In their infancy the colonies were being prepared for the great event to come; millions of cattle and sheep were being scattered all over the land, and in rapid succession Australia passed through the primitive stages of colonisation, until gold acted as the all-powerful lever that raised the colonies to their present power, and upon which the future prosperity of this continent will depend most materially. Without gold the Australian Colonies, so remote from the centres of civilization, might have slowly progressed for America; and as long as Australia had little or no influx of immigrants, it would have continued only the land of promise, being as much nearer to Europe; but since the discovery of gold in Australia, the tide of emigration has been in a great measure turned to our shores, creating here a great empire, which, in the course of time, will be destined doubtless to civilise the densely populated countries of ancient Asia.

But whilst I have been endeavouring to depict to you the wealth, condition, and future prospects of the colonies, which I shall proceed to detail by your attention for a period of years, I shall draw your attention for a period of years to a striking example of what influence the development of a country's resources can exercise on the destiny of a nation; I allude to despotic Russia. Surveying the policy of its autocrats, I find that since the accession of Peter the Great a succession of energetic despots have raised that country to the enormous power it now possesses, chiefly by devoting their entire attention and every available means towards the development of the resources of their immense empire. Thus I find that Nicholas, more perhaps than any other monarch before him, on his accession to the throne in 1825 (from which time we may date the history of mining in Russia), with all the scientific attainments of Western Europe at his command, commenced his career by colonising the world with discoveries of immense mineral wealth in the fastnesses of Siberia. In 1828 he invited Humboldt, Ehrenberg and Rose to investigate Siberia; and in the same year rich deposits of gold were collected in the Ural, amounting to 4,900,000, and yielding at the same rate to the present day. Large quantities of gold were also produced in the Alai mountains. From 1838 to 1848, for twenty years, until gold was discovered in California, Russia produced more gold than the rest of the gold mines known in the world. This will to a great extent account for the rapid development of Russian power; for the mines being the property of the Crown supplied the Czar with the necessary means for strengthening his armies. If this unequal proportion of national wealth had continued to pour into the Russian exchequer without a parallel, Russian money might eventually have controlled Western Europe even if its armies had not partly done so already by subduing Poland and part of Turkey, and latterly by crushing Hungary. Indeed, I venture to say that Nicholas commenced his aggressive career from the moment his mines supplied him with the means of aggression. On investigation I find that in the year 1825 more than £8,000,000, gold and silver, were raised in the Siberian mines. With such means at command, and in the same year, Nicholas entered upon that campaign with Turkey which ended by the latter being deprived of her northern provinces. Thus we see how the single will and energy of a despot, concentrated on the development of the mineral resources of his empire, and which are not by far equal to those of California or Australia, accumulated within a short time sufficient means to threaten the liberties and the progress of civilization in Western Europe, eventually causing the present war. But the will of Providence, which directs the progress of humanity and civilization, destined it otherwise; for when the growing power of Russia became more apparent to Western Europe, the discoveries of gold in California and Australia, in possession of the two freest nations upon the globe, established a counterpoise. I may therefore safely venture to say that the inexhaustible mines of California and Australia, pouring their treasures at an unparalleled rate into the hands of the two greatest commercial nations, are already causing vast changes in the political, social, and commercial relations of the world, by which the power of Russia would have been limited ere long by the conflict that has been so by the competition of those powers. The above example illustrates how the development of the mineral resources of a country becomes dangerous, if centralised in the hands of a despot; but it also tends to show how the more enlightened nations ought to make use of those resources by every possible means at command, to preserve their national independence, and to grow in prosperity and civilization.

The time has come, and having thus far occupied upon the committee, I beg to make them acquainted more fully with the sources from which Iderived my information. Ten years ago I left Europe, with an intense desire to travel, having received the education of a civil engineer in Prussia. I first directed my course to Columbia, South America, but a revolution in that country soon compelled me to leave. I then passed over to the United States, and was for seven years variously engaged as civil or mining engineer, in order to secure my livelihood. I traversed the whole of the American continent during this period, from the Canadian mountains to Chili. In this journey I had an opportunity of becoming intimately acquainted with the social condition of the inhabitants of those countries, more especially the miners, as well as the various modes of gold and silver mining in California, Central and South America. I was soon convinced that the discovery of such vast and inexhaustible gold fields in California and Australia could not fail, within a short time, to raise gold mining to a regular science as its importance required; I therefore devoted myself without delay to the study of the comparatively new science of gold mining.

Whilst engaged in 1851 and 1852 in making a survey for the Panama waterworks on the Isthmus of Panama, and subsequently whilst employed as engineer on the Panama railway, I discovered gold in various parts of the Isthmus, especially along the coast of Cheppio, on the Pacific, about thirty miles north-east of the city of Panama. Mr. Lloyd, C.E., mentions in his notes on the Isthmus of Panama the existence of gold mines, but none were known on the Isthmus.
shortly after the discovery of gold in California. The gold fields which I discovered had never been known to the Indians, of whom I made the inquiry. These my discoveries, at one time, caused quite a rush of Californian adventurers, who had been detained at Panama, waiting for their passage to San Francisco; however, the want of provisions and the insalubrity of the climate soon caused them to leave their work, which under more favorable circumstances would have proved successful. I never entertained any doubt, from my own explorations, of the existence of rich gold mines on the Isthmus, and was just about to enter more fully upon the subject, when the astounding reports of the discovery of gold in Victoria reached me and interrupted my undertaking. I determined to leave for Australia, but postponed my departure for some time, not giving full credit at first to those reports. But when each new report of the richness of the Australian mines threw the preceding ones into the shade, and when from every information I gathered I found that the Victorian gold fields offered such great inducements and natural advantages to the exertions of a mining engineer, I left for Victoria. For three years engaged in mining in this Colony, I observed the turbulent commotions of the gold mining community. For three years I looked with impatience at our absurd mining system with its destructive tendencies, adverse to a moral and social development of a large portion of our population, which politically at one time threatened to overwhelm us with the violence of a tempest, when as a safeguard political representation was extended to our gold fields, and the tempest was once more dispersed, our political horizon partly clearing off. But there remained clouds at a distance, consisting of the evils of the social condition of our miners in a material and moral point of view, almost bordering on a state of anarchy; and unless these clouds be dispersed in time by wise and judicious measures, we may expect continual storms to break in upon our peaceful development. This can be averted by the introduction of an economical mining system, the creation of public works for mining purposes, and the establishment of various institutions for the guidance, instruction, and enlightenment of the miners on the various gold fields. If the evils above noticed are allowed to grow, instead of being speedily remedied by the introduction of necessary reforms, we may look for social results of a most disastrous and momentous character. Yet many men in this Colony regard all this with apathy; and turn away with repugnance from everything which requires thought respecting it.

With extreme anxiety therefore I looked to the first assembly of a Legislature in this Colony which embodied the representatives of the gold miners, who represent the most important interest of the Colony, and from whose successful legislative career under the New Constitution I hope we may date in a great measure the future prosperity of the Colony. I was exceedingly gratified by the various motions brought forward by several honorable members of the Legislative Council with the intention of amending our present mining system. If these measures are carried out they cannot fail to effect most beneficial results, which will ensure to the miners not only the gratitude of their constituents, but also place them in the position of general benefactors to the Colony.

In writing these statements I have not been urged by any presumptuous motives. I have felt it deeply my duty to do so, and I am also aware that much could be said, and more than what I have said in relation to an entire reform of our present mining system. The statements and deductions I bring forward are partly gathered from my own experience, being extracted from my journal which I kept during my travels, and partly collected from the most authentic information on record. On examination they will mostly be found correct. They are startling facts, which at first sight might appear more romantic than reality; but realities they are, and thinking men will see that our present mining system is not only capable of many reforms, but also that such reforms would cause the most marvellous and astounding changes in our social condition, and an unparalleled addition to our national wealth.

If I have been deficient in the style of my writing, remember that I am a foreigner, and that the English language is not my mother tongue. If I have failed in some of my conclusions and deductions it must be taken into consideration that the data upon which they are based cannot be fully relied upon. For accurate conclusions accurate data are required, and where these are wanting errors may occur. Still I have brought the above estimates forward in the hope that others, other than I, may give the subject their careful consideration, and investigate it accurately and scientifically.

I have the honor to be,

Gentlemen,

Your obedient servant,

J. BRACHE.

187, Lonsdale-street east, 14th February, 1856.
To the Honorable the Chairman and Members of the Committee on Gold.

GENTLEMEN,

When I had the honor of being examined before you on the 25th of January, 1856, as to the benefits which might arise to the mining community from the establishment of Assay Offices on the various gold fields, which was one of the subjects of inquiry in your committee, and about which a motion had been made in the Legislative Council by Mr. Benson, I was scarcely sufficiently prepared to enter upon the subject in a manner worthy of its importance.

Since then I have considered the matter in all its bearings more elaborately, and therefore beg your indulgence for the following remarks.

Considering the matter in the abstract, it might be supposed that the establishment of assay offices on the gold fields would be a national saving, as the purity of the metal would be ascertained, and all doubts as to its intrinsic value in a raw state removed, thus securing the highest price to the miner for the result of his labours. But we must also look upon the subject from a commercial point of view, and will then arrive at a different result.

We shall then see that for a long time to come the establishment of assay offices in the Colony by the Government would be impracticable and useless, because it would not bestow any benefits upon the miners or other classes of the Colony. Gold being the staple product of Victoria, which is sent in return to other countries for the necessaries and luxuries of life, is essentially an article of commerce, and must participate as such in the fluctuations of trade.

We find that the price of gold advances when many remittances home have to be made, and falls when there is little or no demand for them. For this reason that gold, even if assayed, could never be of the same value here as in England; for, as long as our Colony will not be self-supporting, it is the fullest sense of the term, gold would have to be sent in return to other countries for imports derived from them, and the merchant or individual accepting it in return for his wares or imports would very naturally expect some interest for the risk of shipping and loss of time incurred by having it transmitted to his place of abode. In the same manner a merchant here or a bank remitting gold home, either in exchange for goods or as a mercantile speculation, would expect some profit for their trouble and the delay and risk attending such remittances. In this respect our gold occupies the same position as our wool. A profit must be realised by our merchants in buying wool here and having it shipped to and sold in England and other parts, to pay for the risk and trouble of shipping it. And similarly does this doctrine hold good with all other articles of trade; for, if no profits were or could be realised on the export or import of an article from one country to another, the interchange of commodities would cease, and no trade in them exist. This is taught us by the philosophy of trade.

But the traffic in gold, as now carried on in this Colony, is injurious to the people at large, as it is monopolised by the banks and a few private individuals, who have it at present in their power entirely to regulate its price. As it is the duty of every government to do the greatest good to the greatest number, some measure, however, should be adopted to raise the price of gold at its place of production as much as possible and practicable with the laws of commerce. As the matter stands now, we may safely assume that the difference of value of one ounce of gold here and one ounce of gold in England is about 2s. 6d. sterling, amounting, therefore, to about £275,000 annually on our three millions of ounces exported. If this profit would fall or return into the hands of many residents in Victoria there would be no injury to the state inflicted; but the banks, the shareholders of which are mostly foreigners and absentees, are monopolising this £275,000, the greatest part of which is therefore an annual drain upon the Colony, for which it receives nothing in return. It must, however, be borne in mind that the banks have obtained this monopoly by paying a higher price for gold than private individuals could afford, thus benefiting the miners as a class.

In any country, the establishment of banks, if founded and managed upon good principles, has been attended with great benefits to the community, whilst, on the contrary, if said banks were started upon imaginary capital, and managed recklessly, the direst results to all concerned would be the consequence.

Of this last assertion we have an example in the United States banks. "The history of banking in that country affords a striking proof that a country, however prosperous in other respects, if its banks are managed viciously and recklessly, will, every now and then, have to struggle against great difficulties, and may even be reduced to almost general bankruptcy. If we take into consideration the boundless extent of fertile land, the noble rivers, and mineral wealth with which the United States abound; if we, moreover, look upon the energy and intelligence of their citizens, we might safely assume that their panics and bankruptcies would only be known by name. But the fact is, that want of confidence and failures are by far more prevalent in the States than in any European country; and any industrial undertaking and menial fortune is by far more secure in Russia than in the United States." (McCallum's Commercial Dictionary.)

It is remarkable how the words of the writer quoted above are applicable to Victoria also. From the enormous wealth annually raised in this Colony, from the rapid strides it has made during the last few years in increase of population, from its fine climate and enormous extent of fertile land, a person at a distance might be led to believe—and reasoning in the abstract he would be perfectly correct—that there could be no country like ours; that every body here must be wading in wealth; and that commercial among the classes unknown. And what a spectacle has this Colony presented to the world during the last few
years. Bankruptcies and stoppages without number, creating a universal distrust amongst the public here, and undermining our credit abroad, which will for some years to come be a material check upon the development of the Colony; for what capitalist, with the experience of the last two years before him, will venture to invest his fortune in Victoria? And here again we may safely appeal to the history of the Colonies, which are but the mirror of this country. In the year 1830, when the whole Colony was in a state of bankruptcy, there were, say some, the seeds of a revolution being sown throughout the land. The revolution took place in 1835, and it is one of the most formidable that has ever taken place in the world. It was a revolution of the people, for the people, and by the people. When they suddenly found their coffers filled with the produce of the mines, and when enormous amounts of gold weekly flowed in upon them, they extended their credit most unwarrantably, and encouraged and fostered the mad projects and speculations of the day among individuals as well as societies. This went on for a long time after the exchange had set in considerably against the Colony. And when, after this fever heat of speculation, which ought to have been checked by the Bank of England, not encouraged, there came that violent reaction from which the Colony is now slowly recovering, the banks again became most unscrupulously severe, and their conduct on that occasion will be remembered by every merchant whose credit was suddenly stopped, and who, although he might have pulled through the crisis, was thereby driven into the Insolvent Court. The whole population almost had, through the reckless credit system then prevalent through the example of the banks, been created into a body of gamblers and swindlers—a state of things that could not last, and of which the reaction must be at once sudden and severe.

"In America, banks are all joint-stock associations. The partners, instead of being liable for the whole of the debts of the banks, are only liable for the amount of their shares or for some fixed multiple thereof. It is needless to dwell on the temptation to commit fraud held out by this system, which has not a single countervailing advantage to recommend it. The worthlessness of the plan on which the American banks are founded was evinced by the fact that between 1811 and 1816 more than 150 banks became insolvent, and many of these paying only an insignificant dividend; and this, exclusive of a much greater number that stopped for a while and afterwards resumed payments." (Report from the Secretary of the Treasury of the U.S., 15th February, 1841.)

Here then we have an example before us which it would be well accurately to consider and examine into. Already we can perceive the seeds being scattered of a similar state of things in this Colony. The success which has attended banking operations in Victoria induced the establishment of similar institutions to those already existing, each of which necessarily considers its neighbour a rival with the public. Each bank will therefore endeavour to get as many of its notes into circulation as it possibly can, without regard to the case of the exchange being against the Colony, and then, as the other bank, by its doing so gain an advantage. This state of things will last until the pressure from without will, as it eventually must, affect the banks themselves, when they will most likely rush into the opposite extreme and let unreasonable suspicion take the place of blind unthinking confidence. Once we have seen this has been the case already in Victoria, and as the exchange is now again in favour of the Colony, and as money will again become plentiful, we may once more see the banks participate in and encourage all sorts of mad speculation, instead of being a guide to and checking them. Neither is there any reason to suppose that the number of our banks is a complete. We may live to see others spring up, offering apparently greater advantages to the public than those now existing, and eventually in a case of sudden recidive such as we have passed through during the last two years, we might witness the same lamentable events in banking establishments as have time to time sped such disasters and ruin through the community of the United States. Enormous as in every such case the loss to private individuals may be, the utter demoralization of men who are tempted to speculations which end in swindling, is by far a greater evil to society.

In order to avert such a disaster, and to establish a banking system that would be really safe and beneficial to the community, it would be very desirable to confine the issue of paper to one source only. This, we believe, might be affected to a considerable extent by the establishment of a National Bank of Victoria, in connection with a Mint and Assay Office, giving the Crown lands of the country as security.

Here, again, let us once more refer to the example and lesson set us by the United States. In the United States a national bank was attempted in the year 1816. But at that time a large number of private banks existed in the Union, the shareholders of which very naturally exerted themselves to the utmost to counteract its establishment. Before the United States Bank received its charter, therefore, its capital had been materially weakened, and competition with other banks, which ended in reckless improvidence, in making advances on state stocks, stocks of public companies, and the products of private individuals, completed its ruin. Since then, however, the necessary experience having been gained and duly paid for, an attempt at the establishment of another United States bank has been made by a considerable minority in the Union; however, the large number of private banks, of which hundreds exist, having shareholders throughout the country in tens of thousands, has prevented its consummation.

We see therefore how difficult, nay, how impossible it would be in this Colony to establish a national bank, whenever a large number of private banks would already have sprung up, the shareholders of which would be spread throughout all classes of the community, and who would through self-interest be urged to oppose such a scheme to the utmost. Already we have had an example of the jealousy existing amongst the present banks, in the attempt made by the Bank of Australia to put down the newly started Colonial Bank of Australia. How much more, then, would one that had a similar object have to oppose a scheme by which their most vital interests would be affected? But of what benefit a Bank, though not a quite a Government bank, may be, under
able supervision and management, we have an example in the Bank of England, founded in 1694. Through its history we learn that it is the duty of a Government to watch over the banking institutions of a country. In all emergencies the Parliament of Great Britain supported the Bank of England, which has hitherto so triumphantly faced all difficulties and panic, whilst hosts of private establishments of the same kind have failed, and invested vast sums in serious losses.

Why then should not our Government, under the New Constitution, follow the example of the British Parliament, and establish and support a bank which in this new country would have for its principal object the development of our vast natural resources? Railways are talked of, and loans proposed for their execution; other reproductive works are to be carried out; and why not use the British support of the national establishments of the same kind we have built, and invested all connected with them in serious losses.

Let the Government establish a Bank in connection with a National Mint and Assay Office, issue notes to be made a legal tender on the security of the Crown Lands, and the required capital will be created. Why not interest on a loan when you have capital of your own lying idle and unemployned? Why incur a debt when you have boundless resources at hand? Why, I may ask, tax the people with interest to be paid to foreign bank shareholders and absentees, when there is an enormous capital lying useless for want of proper means being devised for its profitable investment?

For the establishment of such a bank, it would be necessary that an Act for its incorporation should be passed as soon as the New Constitution is in force—the proceeds of the sale of Crown Lands, either in half or in toto, to be the security given to the community for their deposits and for the notes issued by the bank—such notes to be enacted by law to be a legal tender in the Colony—a composition to be made with the other banks, allowing them 1 per cent. on national bank notes issued and kept in circulation by them—or if we wish to start a Bank on the following manner:—Assayed or standard gold to be taken at a fixed price, making our sovereigns worth 10l. 6s., &c., instead of £3 18s. 6d. According to the passing of the Restriction Act in favor of the national bank would have to be passed similar to the one passed with regard to the Bank of England in the crisis of 1797, by which the directors of that bank were prohibited to pay their notes in cash. Although it may be generally supposed that bank notes would not circulate unless immediately convertible into cash, experience after the passing of the Restriction Act in England at that time has shown that such is not the case; and we may expect also here, that with such security as our Crown Lands afford, the credit of a national bank would be sufficiently good to make its notes pass easily as a legal tender among the public. It would, however, be very desirable, as soon as sufficient capital would have accumulated in the bank, to abolish such a Restriction Act, and to make its notes payable in coin on demand.

The bank would be connected with a mint and assay office, and would have branches established on the various gold fields. The object of establishing the above conjointly, would be to obtain the highest price for our gold at the place of its production. This can be done in the following manner:—Assayed or standard gold to be taken at a fixed price, making allowance for the present export duty, the trouble and expense of assaying, and also shipping and insurance expenses.

Should, however, the miner find it inconvenient to wait until his gold is assayed, or should the quantity he offers be too small to admit of its being assayed at a cheap rate, he should be able to sell his raw gold at the bank at the highest price, and as we have set down 25s. 6d. profit for every ounce of gold exported to England, on the average the miner might receive £3 18s. 6d. per ounce, instead of £3 18s., as now. This would make the gold traffic not a profitable speculation for our banks, which legally, in the opinion of many, have no right to enter upon it, and would make the national bank the central depot of our gold produce, which would be converted either into bullion or coin. The mint might also issue new coins, such as gold 5s. pieces, ounces, 5 ounces, 10 ounces, &c., as might be found most convenient.

The bank would perform all the functions of a bank, with the exception of discounting bills, and a very large revenue would doubtless be obtained thereby. But the principal advantage that such a bank would afford to the community and to the Government would be, that a large capital would be constantly on hand to be employed in reproductive works, without having recourse to loans, on which interest would have to be paid.

The bank would also be the principal exporter of gold, and might enter into an arrangement with the Bank of England to have its drafts honored, for which bullion would be forwarded.

The above scheme, which I think would be of great benefit to our adopted country, has not been fully detailed by me, but as I shall most likely have occasion to address you again upon the subject, I will conclude for the present, inviting all that may have more experience in such matters to make their views public, in order to arrive at a sound knowledge of its merits and defects.

I might add, that throughout my labours on the above subject, I have received the most valuable assistance from Mr. Wm. Schultz, whose intimate acquaintance with the history of banking institutions I have found of great value, and who, amongst others urged upon me the desirability of coming forward with the scheme.

For the present I have the honor to be,

Gentlemen,
Your most obedient humble servant,

187, Lonsdale-street east,
26th February, 1856.

J. BRACHE

By Authority: John Franks, Government Printer, Melbourne.