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TECHNOLOGICAL MUSEUM, SYDNEY.

Building and Ornamental Stones
— or —
New South Wales.

R. T. BAKER, F.L.S., &C.,
CURATOR.

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BUILDING AND ORNAMENTAL STONES
OF NEW SOUTH WALES, AUSTRALIA.

2ND EDITION.



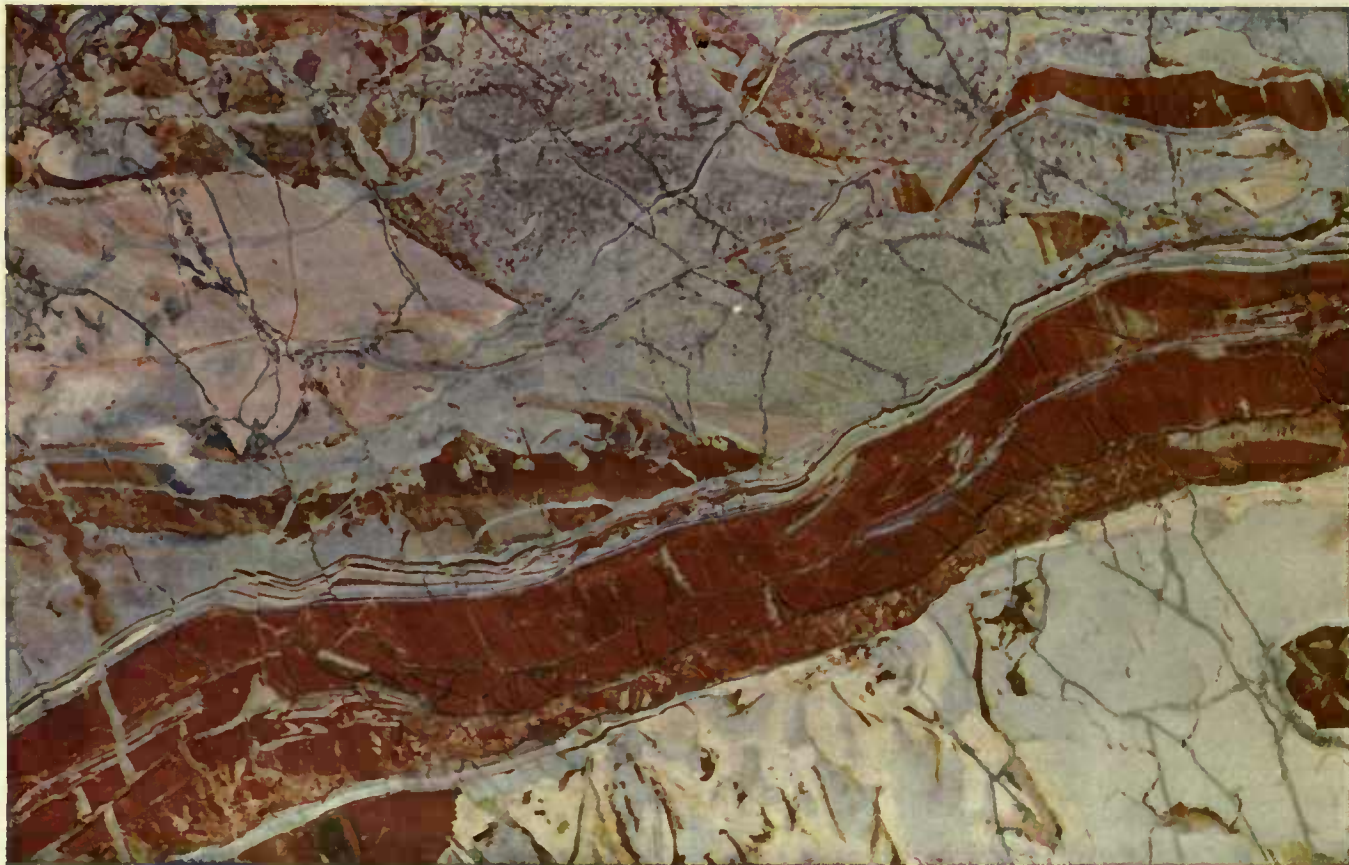
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TECHNOLOGICAL MUSEUM SYDNEY, NEW SOUTH WALES, AUSTRALIA.



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FERNBROOK MARBLE (THE QUEEN ALEXANDRA).

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Department of
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Technical Education Branch.

J. W. TURNER, Superintendent.

TECHNOLOGICAL MUSEUM, SYDNEY.

Building and Ornamental Stones

== OF ==

New South Wales.

[2nd Edition.]



By

R. T. BAKER, F.L.S., &C.,

CURATOR.

1909.

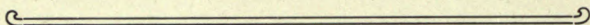
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EXCHANGE

DEPARTMENT OF PUBLIC INSTRUCTION, NEW SOUTH WALES.



Minister :

THE HONORABLE J. A. HOGUE, M.L.A.

Under Secretary and Director of Education :

PETER BOARD, Esq., M.A.

Chief Inspector of Schools :

J. DAWSON, Esq., M.A.

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INTRODUCTION

to 1st Edition.

(BY THE MINISTER OF PUBLIC INSTRUCTION.)

GEOLOGICALLY one of the oldest, and historically one of the youngest, of inhabited lands, Australia is rich in many things more substantial than those amusing paradoxes which invested some of the pages of its early history with an atmosphere of romance, and made old-world naturalists smile. Its wool has helped to clothe most of the civilised races of the world; its corn and the produce of its dairies have fed millions outside its own borders; foreign markets the world over are open to its coal; and its wines are winning favour and compelling recognition wherever the juice of the grape is a popular beverage.

But for a country which, after its cradling, has little more than a century of life to look back upon, the mineral wealth it has already yielded seems almost fabulous when it is remembered that those engaged in its development have as yet, as the popular saying goes, only scratched the surface. It amounted to no less a sum than (for the whole Commonwealth) £660,000,000, up to the end of 1906. The State of New South Wales alone contributed, up to the end of 1907, £180,000,000.

Beyond such brief generalisation it is not necessary to go just now. Here is dealt with one section only of the mineral products of one State—the building and ornamental stones of New South Wales.

Quarrying for ordinary building stone may be said to have begun, practically, with the laying of the foundation of the Mother Colony 120 years ago; and Pyrmont stone, to mention one variety only, has acquired an imperishable reputation for its wonderful durability, its easy yielding to the touch of the mason, and the smoothness and beauty of its surface.

Marble quarrying, on the other hand, is yet in its infancy as an industry. Very few persons are engaged in winning this species of wealth. Mr. ARTHUR LEE, in his work on "Marble and

Marble-workers" (1887), makes but a brief reference to what, when he wrote, was known of the marble beds in Australia and New Zealand. Mr. S. M. BURNHAM, in his "History and Uses of Limestones and Marbles," while giving little more than a glance at the geological aspect of the subject, as regards Australia, pays that land the easily misunderstood compliment of calling it the "El Dorado of the Southern Hemisphere." Other than scant recognition, however, of Australian wealth in limestone and marbles is not at present, of course, to be looked for. That will come in time. Meanwhile, it is scarcely too much to say that Australia, from its immense yields of gold and other precious metals, to say nothing of its vast mineral wealth generally, is one of the realised El Dorados of the world.

It is the purpose of the specimens of marble forwarded from New South Wales to the Franco-British Exhibition to give the nations some slight idea of what can be produced in the way of building and ornamental stones in this part of the Southern Hemisphere; and it is the purpose of Mr. BAKER'S short lay sermon in stones to afford some information as to the nature of the minerals so produced, and where they are to be found.

When it was determined that the New South Wales Technological Museum, of which Mr. BAKER is Curator, should forward samples of the State's building and ornamental stones to the Franco-British Exhibition, it was felt that illustrations and descriptive matter should accompany the specimens. No attempt has been made to deal exhaustively with the subject, but it is hoped that the necessarily brief account which Mr. BAKER gives, with the exhibits themselves, will stimulate interest abroad in what must prove a priceless national asset.

A description is given of the localities where the extensive deposits of building and ornamental stones are at present known to exist, with details as to the colour and texture of those now being quarried for architectural purposes.

In this way the brochure may serve rather as a handbook, for the time-being, for those interested in the subject, than as a work for students of petrology. A more comprehensive work, in which the subject will be dealt with scientifically and in detail, is in contemplation. The importance of the subject, indeed, and the rich field to be worked in, call for some larger work, which should have the element of permanency.

J. A. HOGUE.

February, 1908.



Building and Ornamental Stones of New South Wales.

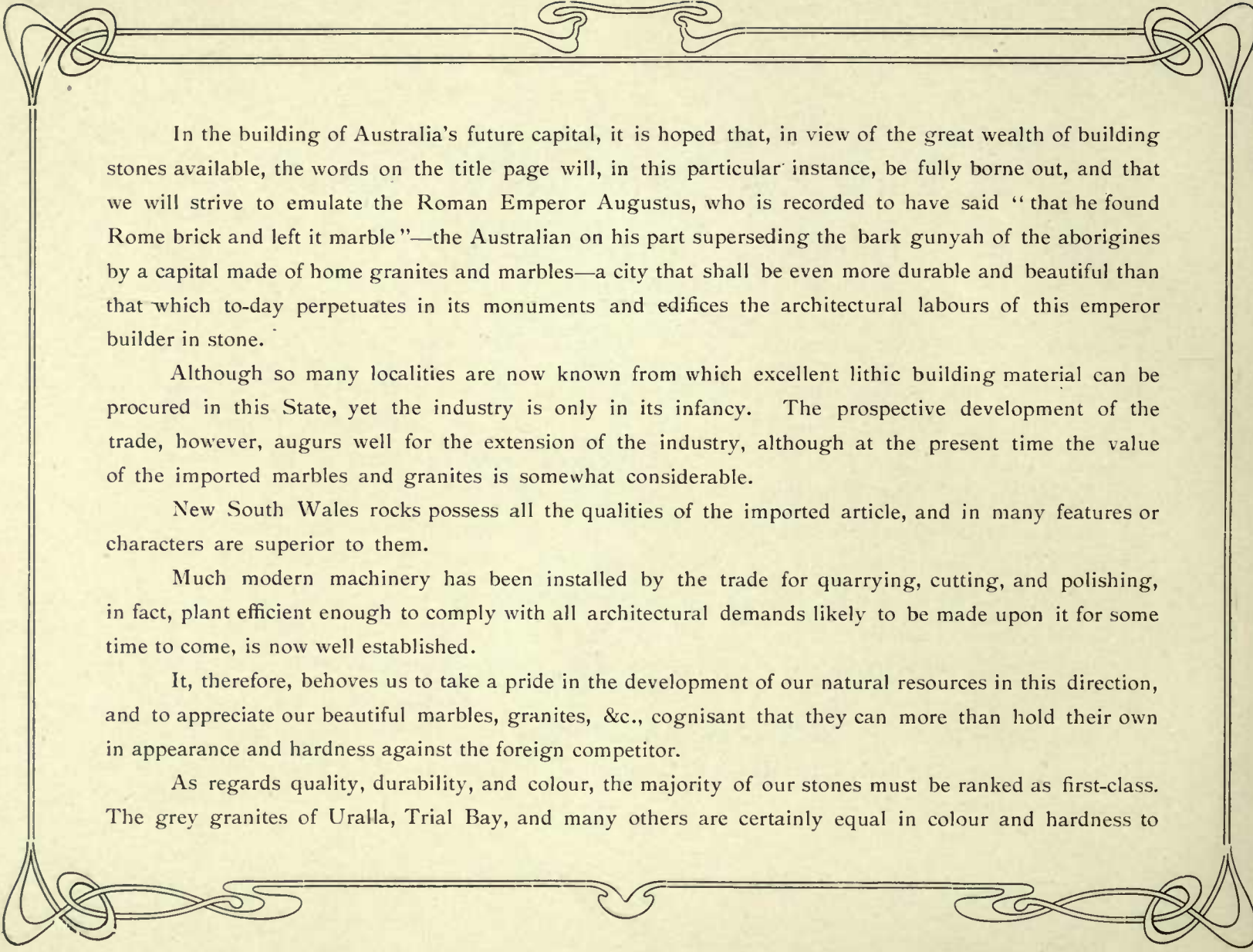
[2nd Edition.]

SINCE the first, or Franco-British Exhibition edition of this work became exhausted, almost daily applications have been received for copies, and, to meet this demand, the Minister of Public Instruction, the Hon. J. A. HOGUE, M.L.A., has authorised the publication of this edition.

When preparing this reprint, the opportunity was taken of adding to the original several new plates,—coloured as well as black and white, and also adding data concerning many new localities for our building and ornamental stones, whilst advantage was also taken to add an Appendix detailing the distribution of such material throughout the southern plateau, as events seem to point to this being the area in which the final selection for the Federal Capital Site will be made.

The records herein given may thus be of use to those architects to whose lot it will fall to build Australia's future metropolis.

The greater part of the material for this particular survey was collected, although rather hurriedly, owing to the time being limited, by Mr. C. F. Laseron, of this Museum, and the route of his travels, is given on the map appended.



In the building of Australia's future capital, it is hoped that, in view of the great wealth of building stones available, the words on the title page will, in this particular instance, be fully borne out, and that we will strive to emulate the Roman Emperor Augustus, who is recorded to have said "that he found Rome brick and left it marble"—the Australian on his part superseding the bark gunyah of the aborigines by a capital made of home granites and marbles—a city that shall be even more durable and beautiful than that which to-day perpetuates in its monuments and edifices the architectural labours of this emperor builder in stone.

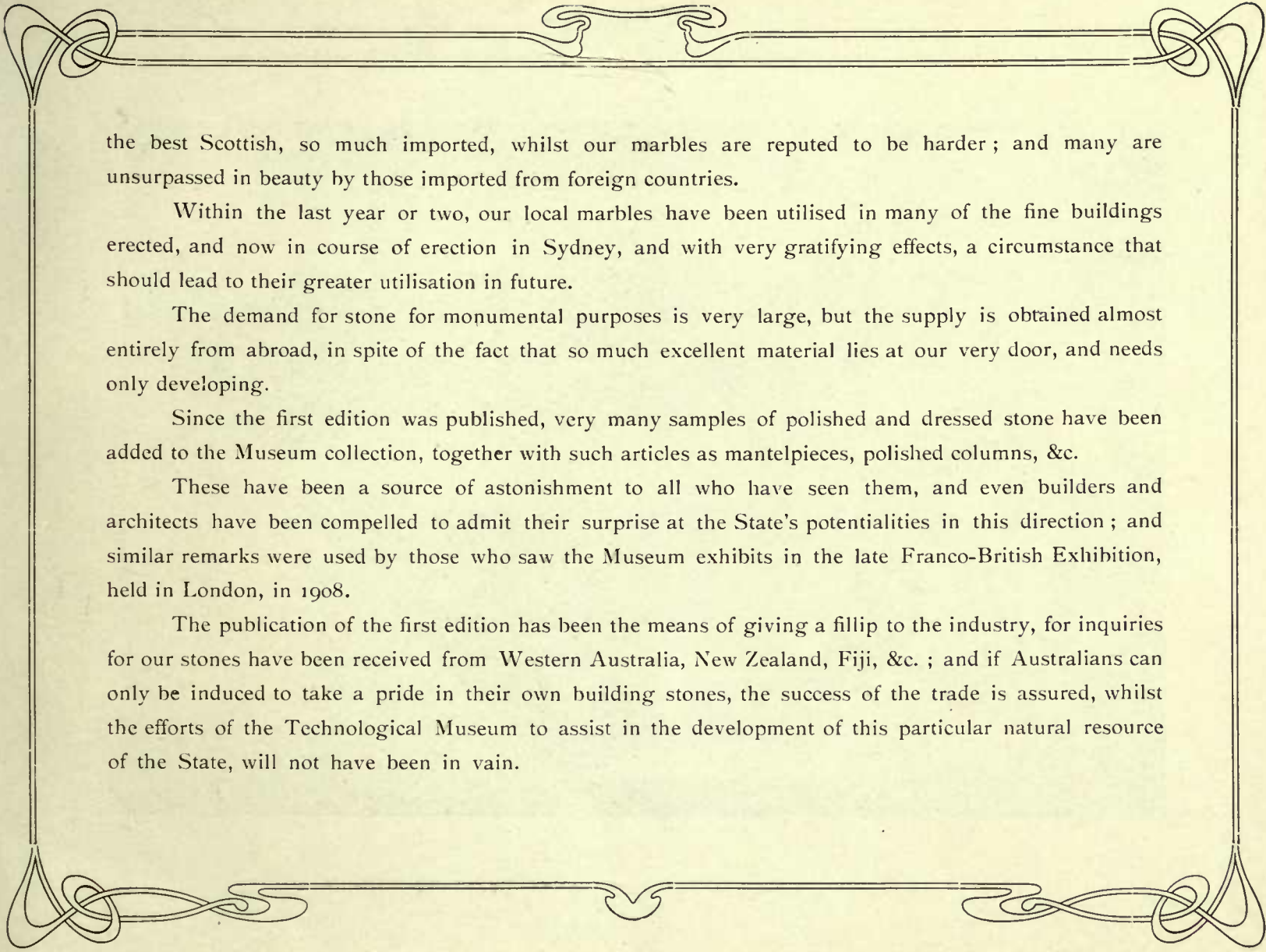
Although so many localities are now known from which excellent lithic building material can be procured in this State, yet the industry is only in its infancy. The prospective development of the trade, however, augurs well for the extension of the industry, although at the present time the value of the imported marbles and granites is somewhat considerable.

New South Wales rocks possess all the qualities of the imported article, and in many features or characters are superior to them.

Much modern machinery has been installed by the trade for quarrying, cutting, and polishing, in fact, plant efficient enough to comply with all architectural demands likely to be made upon it for some time to come, is now well established.

It, therefore, behoves us to take a pride in the development of our natural resources in this direction, and to appreciate our beautiful marbles, granites, &c., cognisant that they can more than hold their own in appearance and hardness against the foreign competitor.

As regards quality, durability, and colour, the majority of our stones must be ranked as first-class. The grey granites of Uralla, Trial Bay, and many others are certainly equal in colour and hardness to



the best Scottish, so much imported, whilst our marbles are reputed to be harder ; and many are unsurpassed in beauty by those imported from foreign countries.

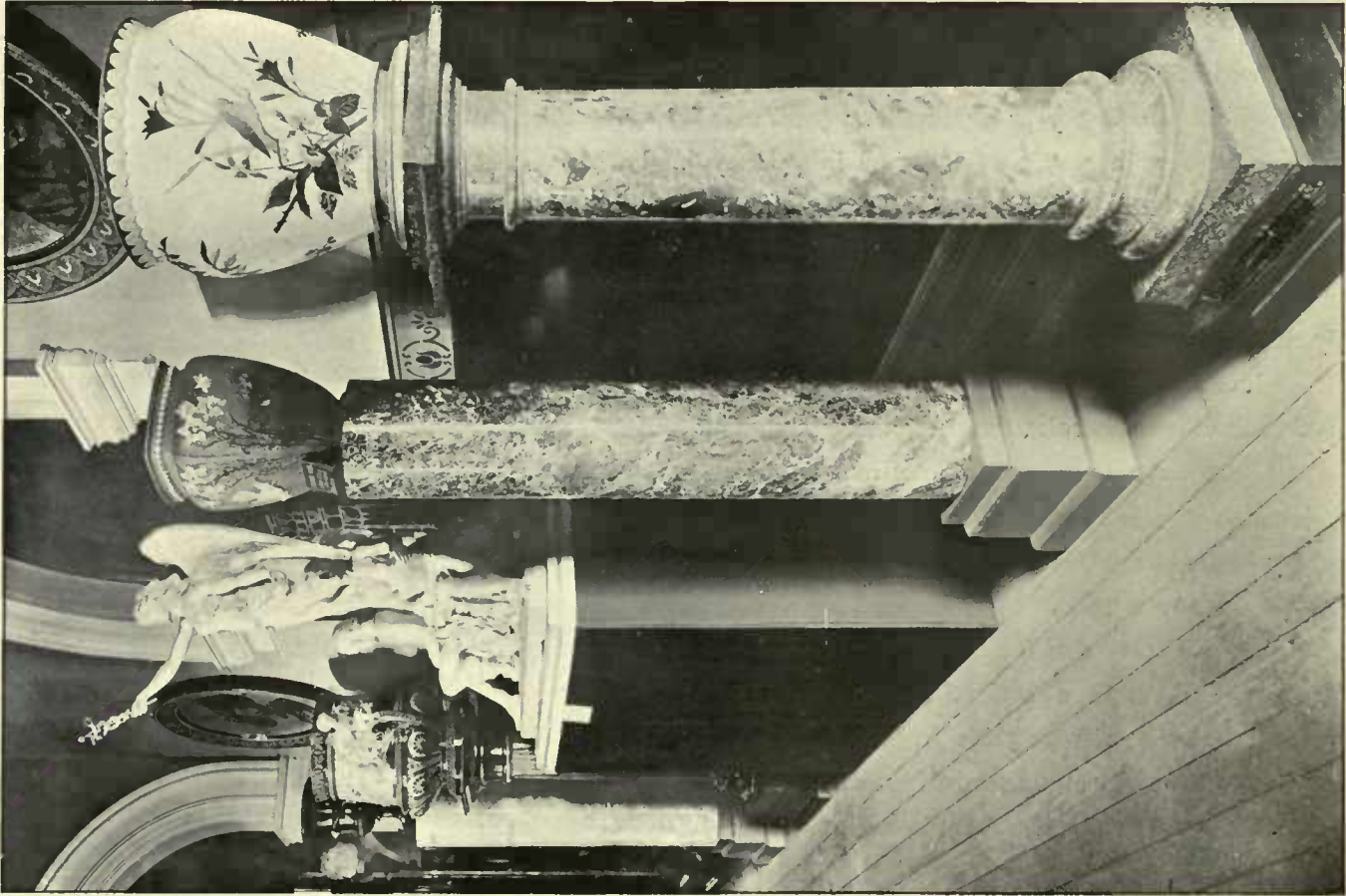
Within the last year or two, our local marbles have been utilised in many of the fine buildings erected, and now in course of erection in Sydney, and with very gratifying effects, a circumstance that should lead to their greater utilisation in future.

The demand for stone for monumental purposes is very large, but the supply is obtained almost entirely from abroad, in spite of the fact that so much excellent material lies at our very door, and needs only developing.

Since the first edition was published, very many samples of polished and dressed stone have been added to the Museum collection, together with such articles as mantelpieces, polished columns, &c.

These have been a source of astonishment to all who have seen them, and even builders and architects have been compelled to admit their surprise at the State's potentialities in this direction ; and similar remarks were used by those who saw the Museum exhibits in the late Franco-British Exhibition, held in London, in 1908.

The publication of the first edition has been the means of giving a fillip to the industry, for inquiries for our stones have been received from Western Australia, New Zealand, Fiji, &c. ; and if Australians can only be induced to take a pride in their own building stones, the success of the trade is assured, whilst the efforts of the Technological Museum to assist in the development of this particular natural resource of the State, will not have been in vain.



VESTIBULE, TECHNOLOGICAL MUSEUM.



Building and Ornamental Stones of New South Wales.



[Written for 1st Edition.]

IN this comparatively newly settled country of New South Wales, where the art of city building may said to be making great strides, it will be found that, in spite of the small and sparsely scattered population, a fair amount of attention has been given to our building and ornamental stones.

Building stone, such as sandstone, has, of course, been used in Sydney since the city's foundation, and this beautiful working material being ready at hand and in great abundance, was early utilised, with the result that some very fine and noble edifices adorn the streets of this,—the Queen City of the South.

In recent years our architects, desiring to materialise their conception of beauty, but wanting variety of material, have turned to sources of supply other than the Sydney sandstone, and in searching for material to meet their requirements it was discovered that, in building and ornamental stones of first quality, New South Wales has few compeers.

Although practically only the surface has been scratched, the indications show that the supply of building material is inexhaustible, and one is, therefore, perhaps justified in stating that this unquarried material represents a latent wealth that is of sufficient importance to give employment to thousands of workmen, and will be in the future a considerable factor in the prosperity of this island continent, especially when it is remembered that Belgium employs at the present time 37,000 men in its stone and marble quarries.

There can be no doubt that many more beautiful stones will yet be unearthed when increase of population brings an increased demand; and further, the specimens exhibited in London and in this Museum, together with the illustrations and information herein given, will, without doubt, carry conviction concerning the extent of our wealth in building and ornamental stones.

The output is certain to increase, inasmuch as the "skyscraper" is a forbidden structure here, and so steel is not likely to enter into competition with other building material in the proportion that obtains in some other countries.

The desiderata at the present time in city structures of New South Wales, are durability, utility, and stateliness, combined with chaste decoration. All these qualities can be found in, or produced from, our various natural building stones.

The atmosphere of these climes is so pure and dry that little or no artificial measures are required to prevent the inroads of adverse climatic conditions upon our stones, and it is pleasing to note that stucco is a thing of the past in our buildings.

As every beautifying effect can be obtained from our natural sources of building material, there is no necessity to resort to artificiality, and the magnificent buildings of our towns bear full testimony to this.

Another important quality of our marbles and granites is that very few flaws occur in them; so that in their preparation for use, such as turning, polishing, carving, &c., no "filling in" or other methods of cobbling are needed to produce a regular and even surface. This, of course, is a distinct gain.

In the matter of nomenclature, some Continental designations, such as, St. Anne's, Brocatella, &c., &c., have been introduced; but this want of originality is to be discouraged, and the trade, falling into line with the example set by this Museum, is now bestowing Australian names, and it is by such names that our building stones will in the future be placed on the world's markets. It is obvious that this will be a decided advantage, for, besides giving the nationality of the product, which is only right and as it should be, it will prevent a confounding of our building stones with those of other countries.

As this Museum is specially rich in large specimens of building and ornamental stones from other parts of the world, there are thus unusual facilities here for comparative work in connection with the State's lithic productions.

At present only a limited number of quarries are working, yet the output of these is sufficient to show that, for variation of colour, figure, hardness, polishing qualities, &c., New South Wales possesses some particularly fine building and ornamental stones ; and the same remarks apply in nearly every instance to the known but unworked deposits.

Accessibility is an important factor in this connection, and so, fortunately, most of the quarries and known deposits are within reasonable distance of Sydney or existing and prospective towns, and easily reached by road, rail, or water ; so that, with the opening up of the country by railway extension, these and other fields will be still further developed.

As previously stated, this brochure is written for the purpose of introducing our building stones, not only to the architectural world of the Commonwealth, but also to those interested in the subject who are likely to visit the Franco-British Exhibition from British and foreign parts. This is the first time that such an exhibit has left the Australian shores. It should, however, be stated, in fairness to New South Wales, that the best have by no means been sent to London, but only typical specimens,—some of them having been taken promiscuously from the surface ; but even these need no apology, for they give a good index to the character of the material, and cannot be otherwise than much admired.

It is further hoped that this publication will have the immediate effect of at least creating a local or Australian demand for our marbles, granites, trachytes, &c., for public and private buildings ; if not for other parts of the Empire as well as the rest of the world.

I wish to acknowledge my indebtedness to the Hon. J. A. HOGUE, M.L.A., Minister of Public Instruction, for so kindly writing the Introduction, and for several hints in the preparation of this work.





SYDNEY SANDSTONE AND MORUYA GRANITE.
(GENERAL POST OFFICE, SYDNEY, NEW SOUTH WALES.)

PLATE II.

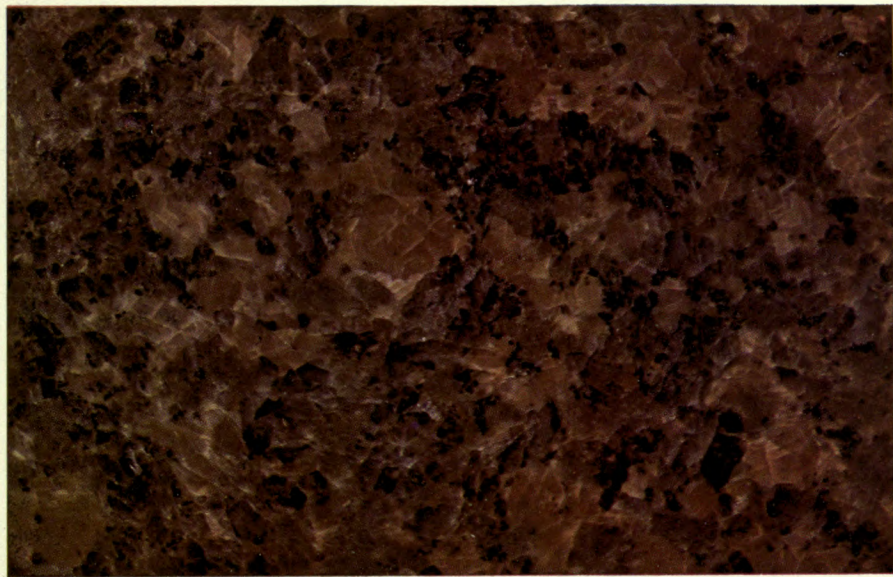


GABO GRANITE.

Nat. Size.



PLATE III.



MUDGEE GRANITE.

Nat. Size.



I.—Granites.

THESE are fairly well distributed in the eastern portion of the State, over areas of various extent, in bosses and huge masses or deposits as well as in veins or dykes.

They range (1) in colour from dark red to pale pink, and in the various shades of grey ;—(2) in texture, from a fine to a very coarse grain ;—(3) in varying degrees of hardness (apart, of course, from the weathered or semi-disintegrated portions); and, (4) from uniformity to unevenness in the proportion of mineral constituents.

(a) Red Granites.

[See also Appendix]

Very few of these are being worked, but from numerous surface specimens obtained from different localities there can be no doubt that some good stones are to be found in the State, and only require to be prospected.

The following are the principal known sources :—

ALBURY.—Some good granites occur here, but are not worked; the coarse-grained depicted will give some idea of the red varieties.

BARREN JACK.—A light but pleasing coloured, red granite, with the facies of a marble; occasionally having a wavy figure. Mica is rather sparsely scattered, and the felspar here and there has a green tinge. It is hard, heavy, and a first-class building stone. The dam at Barren Jack Reservoir is practically built of this granite, some of the blocks weighing 15 tons.

BRAIDWOOD.—*Vide Appendix.*

BUNGENDORE.—*Vide Appendix.*

BUNGONIA.—*Vide Appendix.*

BROULA HILLS (COWRA).—This rock consists of an outcrop, or, more correctly, a series of outcrops, in these Hills about 12 miles westerly from Cowra. Apparently it occurs in a belt about half a mile to a mile wide, and over two miles long. It runs nearly north and south (J. G. Wyndham). It is a fine-grained granite with pegmatitic veins, and possesses a good rosy colour, and further developments would no doubt yield excellent ornamental stone. It is a promising red granite.

CARRICK.—A very fine pink granite is found at Lockyersleigh, along the railway line. This granite is very hard, and takes a splendid polish.



GABO GRANITE COLUMNS AND SYDNEY SANDSTONE.
(THE TREASURY BUILDING, SYDNEY, NEW SOUTH WALES.)



ALBURY RED PORPHYRITIC GRANITE.

Nat. Size

COOMA.—*Vide* Appendix.

GABO ISLAND.—From this Island have been obtained some of the best red-coloured granite used in the building trade of New South Wales; it is the only red variety that has so far been quarried to any extent in this State.

It is a particularly good granite, the constituents being mixed in about equal proportions, and so producing a fairly uniform texture. The colour is often a deep red, and so is spoken of in the trade as "possessing plenty of life."

It is specially suited for building, ornamental and monumental work, and the specimens exhibited at the recent International Exhibition held at Christchurch, New Zealand, were much admired by those interested in building and ornamental stones.

The deposit is large, and of easy access from the sea.

GRENFELL.—The low hills lying to the north and west of the town are composed of this material. The rock consists almost entirely of even-grained red orthoclase and quartz. It is, however, unworked.

INVERELL.—A pale-coloured stone, with fine-grained felspar predominating. Area of deposit not known.

JERANGLE.—*Vide* Appendix.

JINDABYNE.—There is material here of unsurveyed area, and which has not been worked. It much resembles Gabo in colour and texture, and may, perhaps, belong to the same formation.

I am indebted to Mr. W. A. Gullick, Government Printer, for the record of this locality.

MAFFRA.—*Vide* Appendix.

MUDGEES.—The material occurring between Wellington and Mudgee consists of a remarkably coarse-grained, red granite. The felspar occurs in large, irregular, red and dull-greenish or glassy-like patches rather than in well defined crystals, and gives the stone a characteristic appearance, which is quite unlike any other granite at present recorded for New South Wales. It may be said to resemble somewhat the coarse-grained specimens of granite of Norway in colour and texture. It takes a good polish, and arrises as sharp almost as a knife. There should be a good commercial future before this stone.

MULLOON CREEK.—*Vide* Appendix.

MURRUMBATEMAN.—*Vide* Appendix.

RYLSTONE.—This large area of granite is said to produce a stone of great rarity and beauty.

TARAGO.—*Vide* Appendix.

TRIAL BAY.—This is a coarse, pale-red coloured stone, judging from surface specimens obtained and polished. The colour would probably improve on going deeper into the rock mass, and if so it should prove an attractive building and ornamental stone, as the texture is rather pleasing. It has the facies of the Jonesborough granite, Vt., U.S.A., or Trowsworthy granite, Gloucester, England. It is the hardest granite yet turned in a lathe in Sydney.

WOMBEYAN.—A red granite occurs here in a large boss, but has never been worked. Only surface specimens have been examined, so that no correct data can be given concerning its commercial value.

(b) Grey Granites.

[See also Appendix.]

These varieties of granites, as far as at present known, are more extensive and numerous than those of the red varieties. Like them, however, they also vary in texture and structure, as well as in shades of colour. They are all excellent building stones, and will, without doubt, be largely used in our city architecture of the future.

The following are some of the best-known localities for grey granites :—

ADELONG.

ALBURY.—In this district a great number of granites abound, the varieties being too numerous to particularise here. There is a dark-green granite that is worthy of development, as it much resembles serpentine in colour (*vide* Coloured Plate).

The fine-grained granite reminds one of that of Richmond, Va., U.S.A., but is a shade darker—a rather good feature; the coarse-grained samples are very distinctive and quite unlike any others from New South Wales. With such variety and choice of stones the cities of the future of this district should be amongst the most beautiful in the Commonwealth.

ARNPRIOR.—*Vide* Appendix.

BATHURST.—A coarse-grained stone occurs here.

BRAIDWOOD.—*Vide* Appendix.

BREADALBANE.—*Vide* Appendix.

BREDBO.—*Vide* Appendix.

BUNGENDORE.—*Vide* Appendix.

BURROWA.—A coarse-grained grey granite is found in this district.

COOMA.—*Vide* Appendix.

COWRA.—This rock is very abundant in the immediate neighbourhood, the lofty hill to the North of the town being entirely composed of this material. The texture of the stone is medium, and the colour is dark, taking, when polished, a slight bronzy lustre, which makes it a very handsome stone. It is easily quarried and worked, and outcropping within a short distance of the railway line, this should be a valuable building stone in the future.

GOULBURN.—Granite is one of the most common rocks in this district.

GUNNING.—There is a large outcrop of a good free-working grey granite at Collingwood, near this township. The stone punches well, and is hard enough to take a good polish. [*Vide* also Appendix.]

HARDEN.—*Vide* Appendix.

INVERELL.—A pale-coloured coarse-grained granite is quarried here and used for building purposes in the town.

JERANGLE.—*Vide* Appendix.

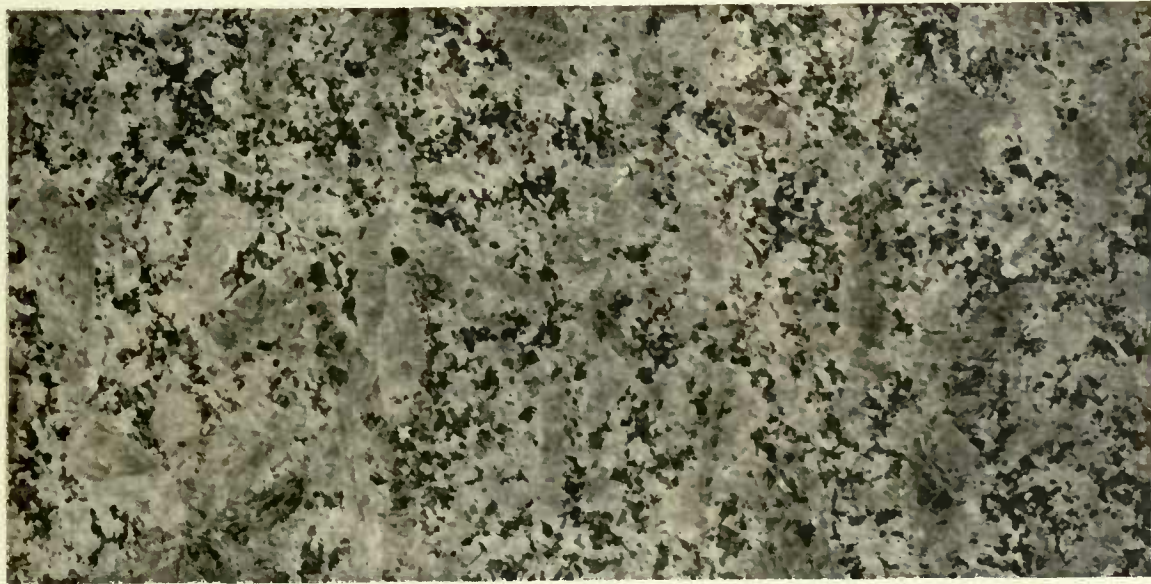
LAKE BATHURST.—Grey granite is plentiful in the neighbourhood of this sheet of water.



ALBURY DARK GRANITE

Nat. Size.

PLATE VI.



MONTAGUE ISLAND GRANITE.

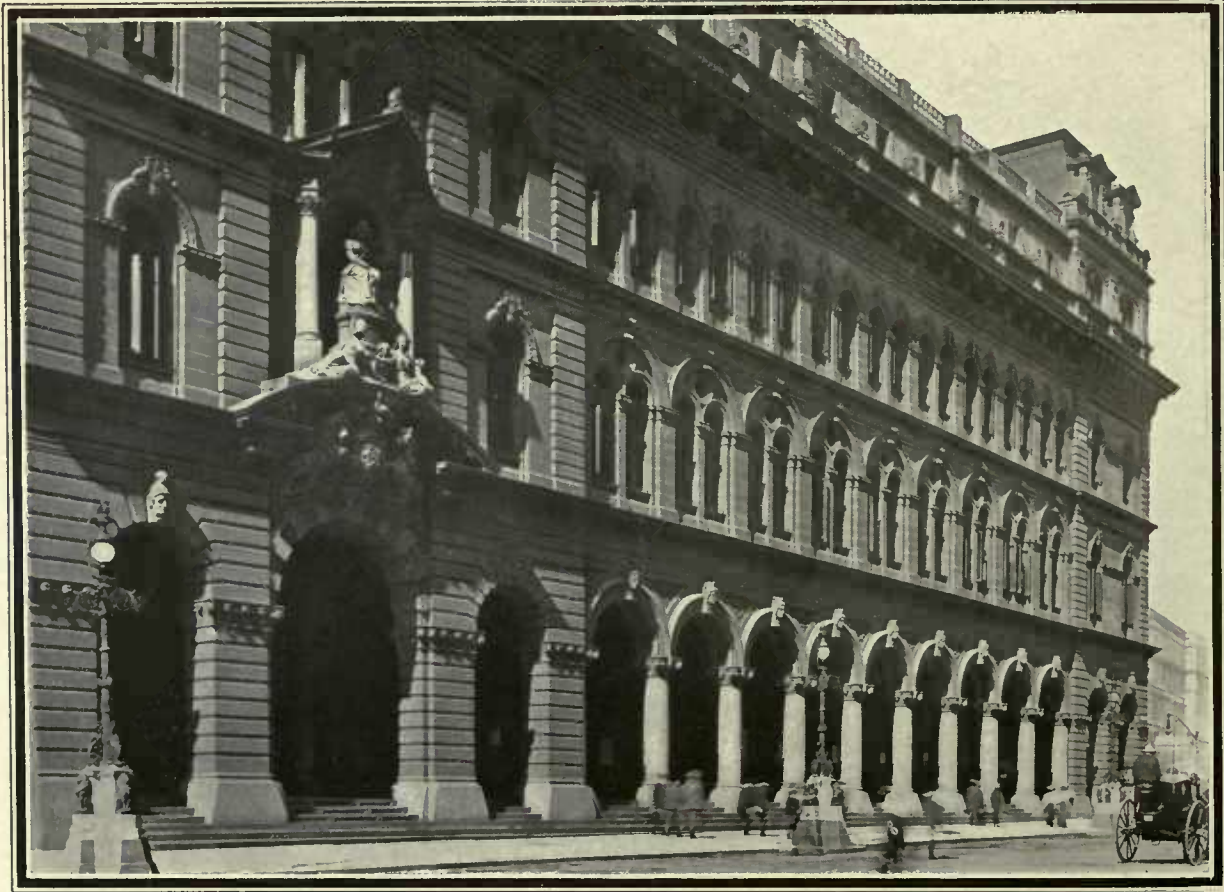
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MORUYA GRANITE AND SYDNEY SANDSTONE.
(THE CUSTOM HOUSE, SYDNEY, NEW SOUTH WALES.)



COLUMNS OF MORUYA AND MONTAGUE ISLAND GRANITE.
(COLONNADE, GENERAL POST OFFICE, SYDNEY.)

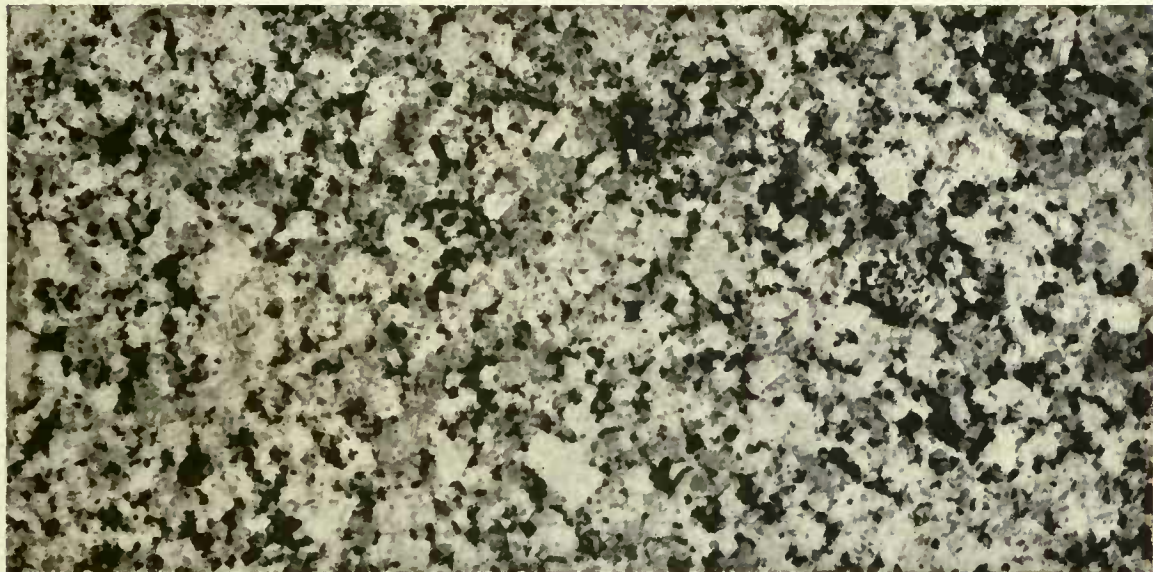


GREY GRANITE, YOUNG.

Nat. Size.



PLATE VIII.



MORUYA GRANITE.

Nat. Size.



MONTAGUE ISLAND.—This is rather of unusual structure, the large crystals of felspar (labradorite) being its chief characteristic.

It has been utilised in the Sydney General Post Office with pleasing effect. It takes a good polish, and is close-grained, compact, and hard in texture. This is one of the most elegant of our grey granites, and is less marked with dark basic segregations so characteristic of grey granites generally.

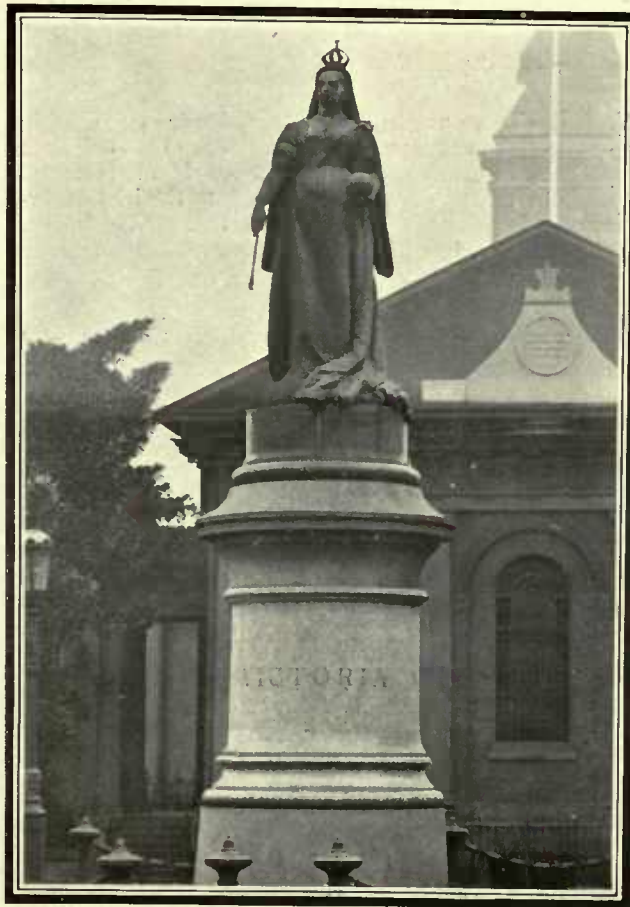
MORUYA.—A medium coarse-grained material, possessing a rather palish, yet pleasing colour. Its otherwise uniform texture is now and again broken by basic segregations, which rather adds to its architectural effects.

The large main columns of the colonnade of the General Post Office, Sydney, are constructed of this material, and their general effect is much admired. It has also been utilised in many other Sydney buildings.

OBERON.—This is a bright-coloured stone with a pinkish tinge, the black mica being specially pronounced by the lustre of its fractured surface, and contrasting well with the felspar.

TENTERFIELD.—A beautiful porphyritic stone, and unlike any recorded granite. The large flesh-coloured felspar crystals scattered throughout a grey-coloured ground, produce a very pleasing effect, and give the stone a most attractive appearance. It is a splendid combination, so to speak, of red and grey granite, and has great commercial possibilities.

TRIAL BAY.—The grey granite occurring here is quite equal to the best Peterhead, having a fresh, bright colour, or what is known in the trade as “life,”—the polished and chiselled surfaces contrasting well in decorative work.



MORUYA GRANITE PEDESTAL.
(QUEEN VICTORIA STATUE, SYDNEY).

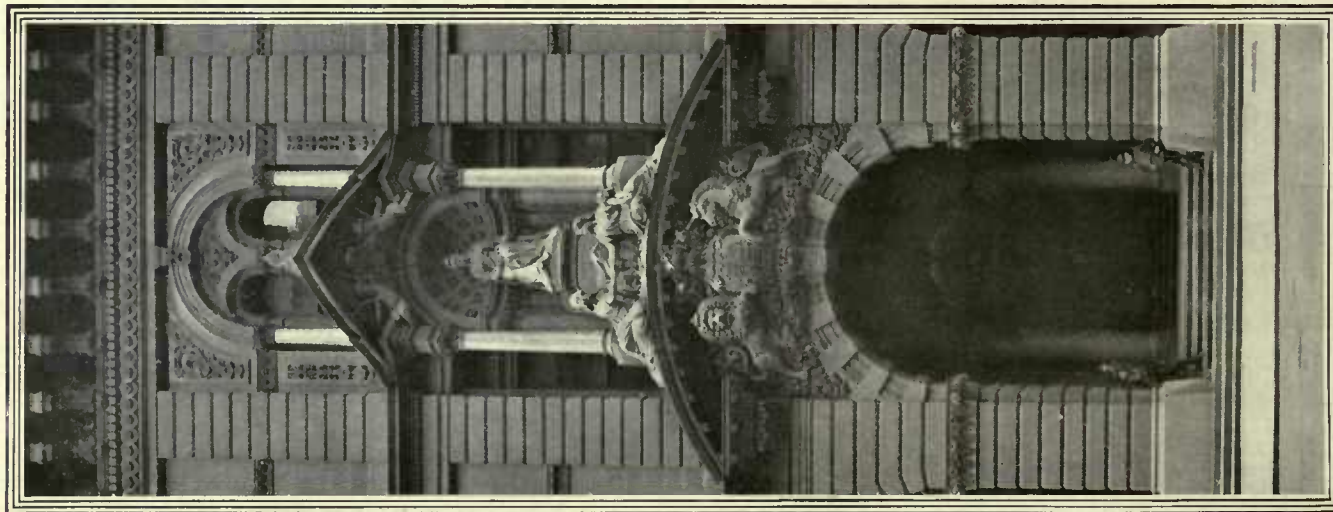
TUMUT—*Vide* Appendix.

URALLA.—A very attractive hornblende or dioritic granite is found here, and is one of the best-coloured yet seen in the State. It is a splendid monumental and ornamental stone, and superior to the best Peterhead. It has been likened to the famous Bessbrook, Co. Armagh, Ireland, and will be an esteemed stone when placed on the market.

YASS.—The granite area of this district is large, and runs generally north and south, intruding into slates,

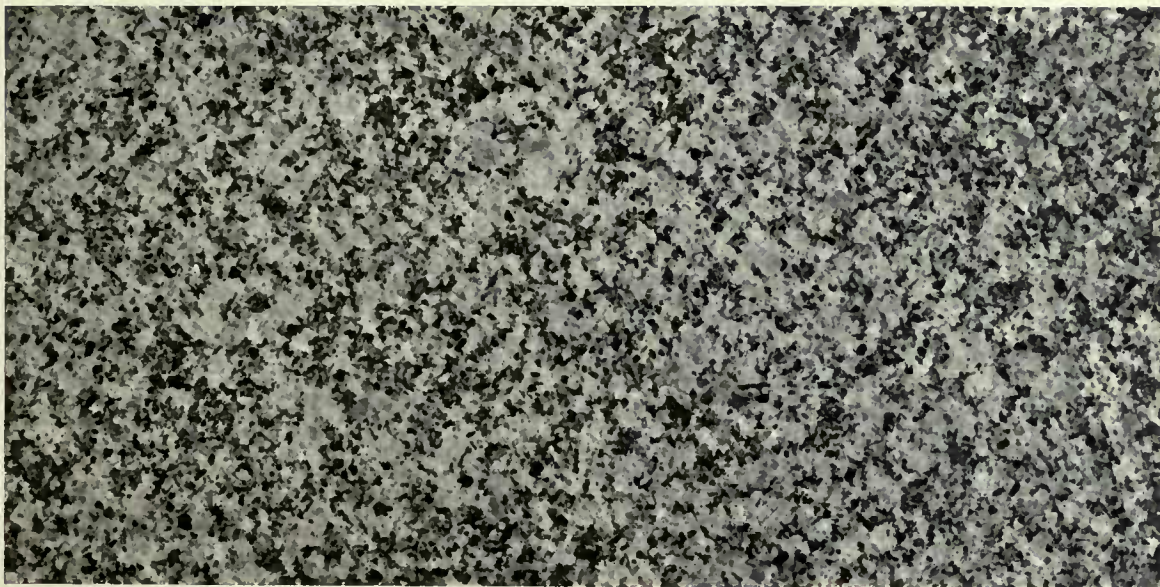
shales, and limestones. Between Murrumbateman and the Murrumbidgee there runs for several miles north and south a belt of unknown width of stratified granite. It is a splendid stone for building purposes, easily worked and easily quarried, because it is in large slabs, weighing from a few pounds to a few tons, standing on end.

YOUNG.—This rock covers a large area, extending from Harden within a short distance of Grenfell, with very little alteration in nature. Churches and private residences in Young are built of it, and the abundance of Biotite seems in no way to detract from its durability.



MORUYA COLUMNS. SYDNEY SANDSTONE.
(MAIN ENTRANCE TO GENERAL POST OFFICE, SYDNEY).

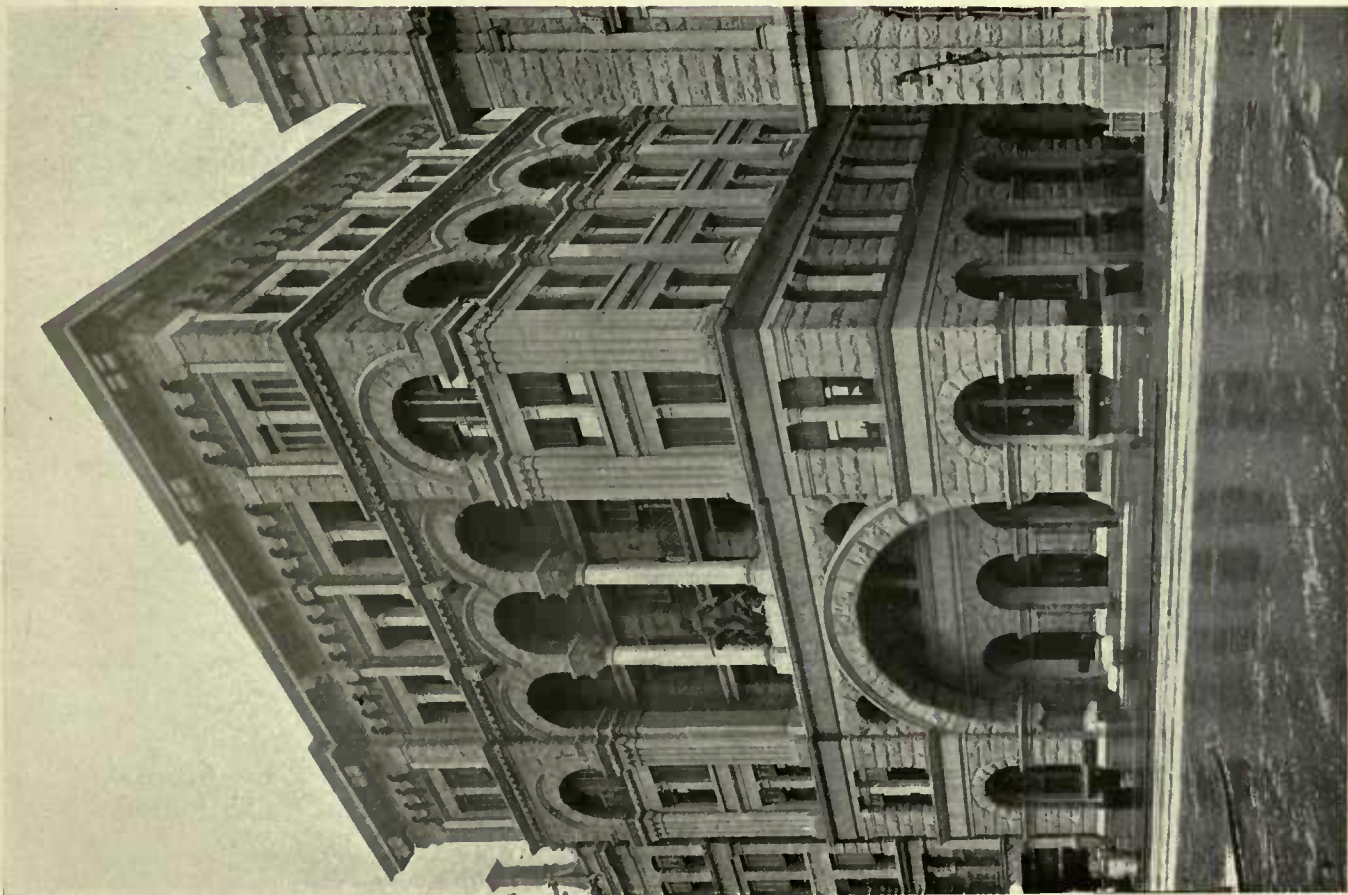
PLATE IX.



URALLA GRANITE.

Nat. Size



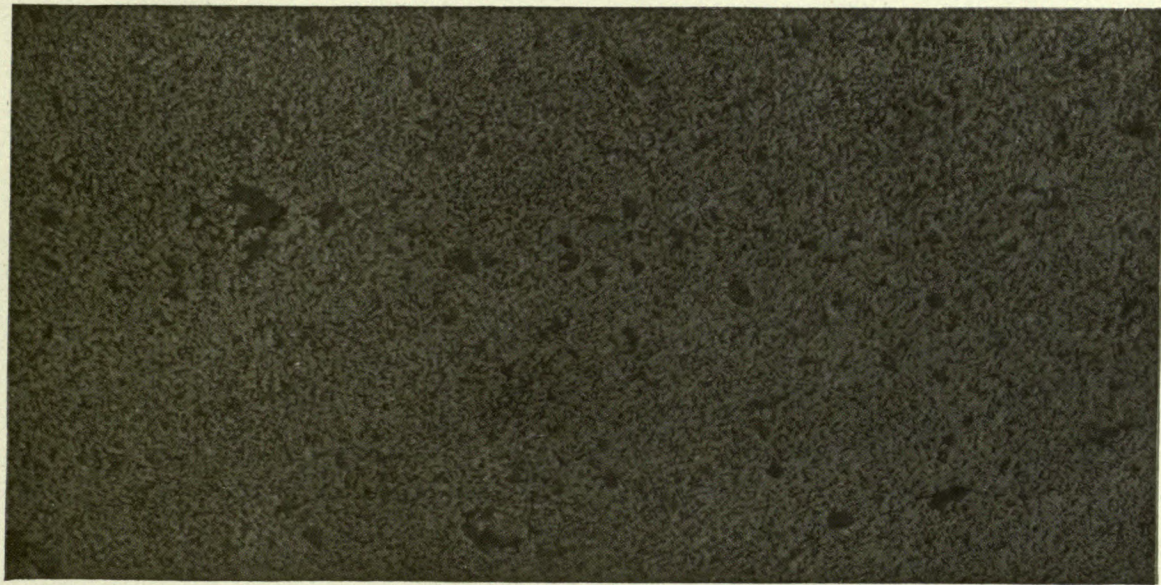


BOWRAL TRACHYTE.
(EQUITABLE BUILDING, SYDNEY).



A BOWRAL TRACHYTE QUARRY.

PLATE X.



BOWRAL TRACHYTE.

Nat. Size.



II.—Gneiss.

[See Appendix.]

III.—Trachyte.

Bowral.—The building and ornamental stone passing under this name is a favourite one with Sydney architects. There appears to be some doubt as to its true petrological classification, being regarded by some as a Syenite, but probably its systematic position will be found to lie between these two classes of stones.

It is known commercially as “Bowral trachyte,” and so that is the name retained for it here.

This igneous rock has been principally worked at a bold headland about 85 miles from Sydney on the Southern Line and known as the “Gib,” and is close to the town of Bowral.

This really beautiful stone of unique colour, which may be described as a dark olive green, or, perhaps dark grey, is occasionally streaked with narrow veins containing beautiful sanidine (glassy orthoclase), hornblende, and ægerine crystals.

It is very solid and takes a beautiful polish, cracks or flaws being quite absent, and blocks of almost any size can be obtained. Some of the finest architectural structures in Sydney are built of this rock.

As a paving stone it is highly valued, being equal to the famous Caithness, Arbroath, and Yorkshire flagging, and is also eminently useful for foundation work.

Its weight-carrying capacity is equal to most of the known granites.

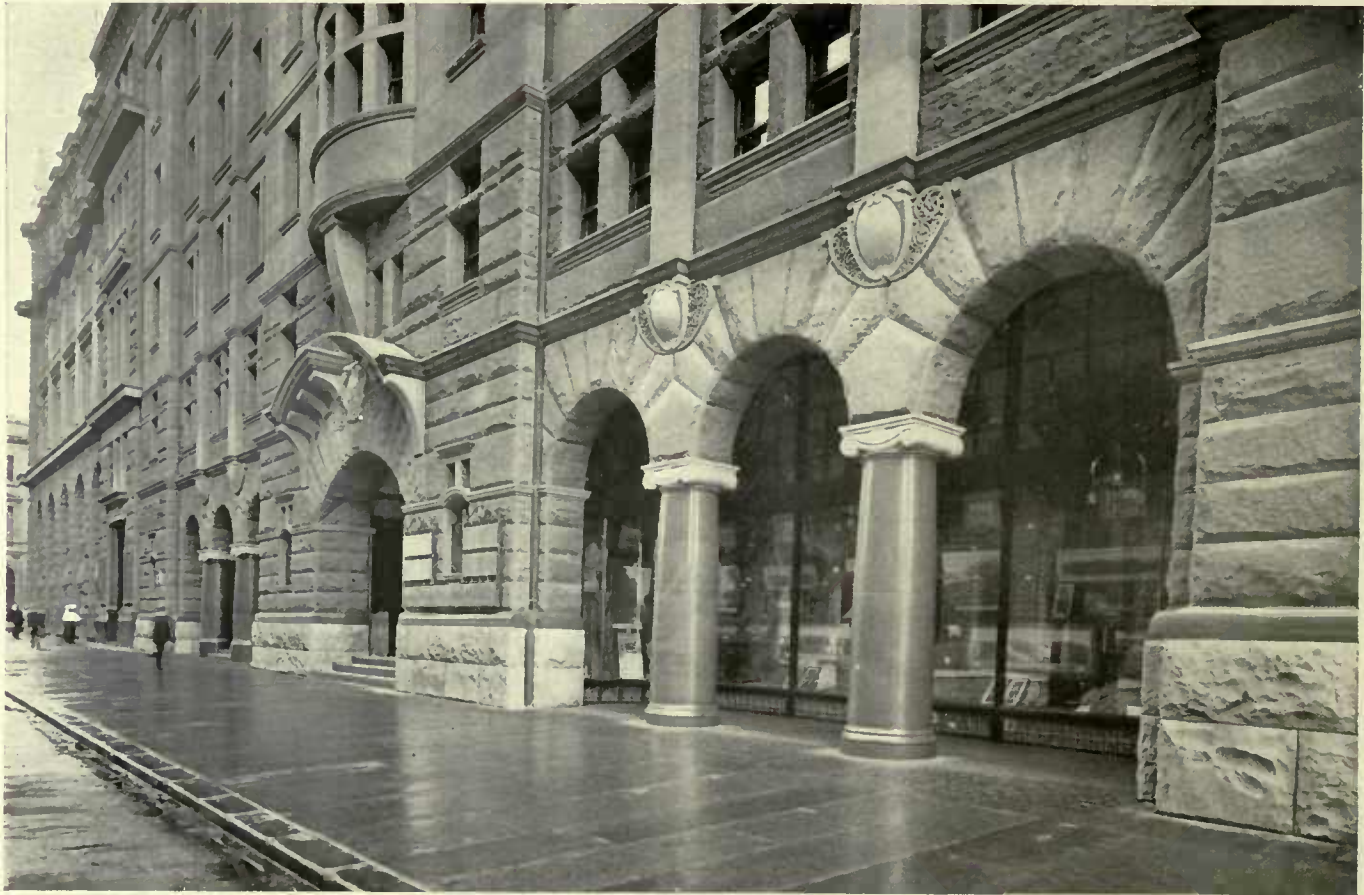
Amongst the most prominent edifices in Sydney constructed from this material are the Equitable Life of New York, Mutual Life of New York, Challis House, Technical College, Bank of Australasia, &c. It has also been used in the piers of the Hawkesbury Bridge, and in the foundations only of many of the largest buildings in Sydney.



SYDNEY SANDSTONE. STEPS OF BOWRAL TRACHYTE.
(NATIONAL ART GALLERY, SYDNEY.)

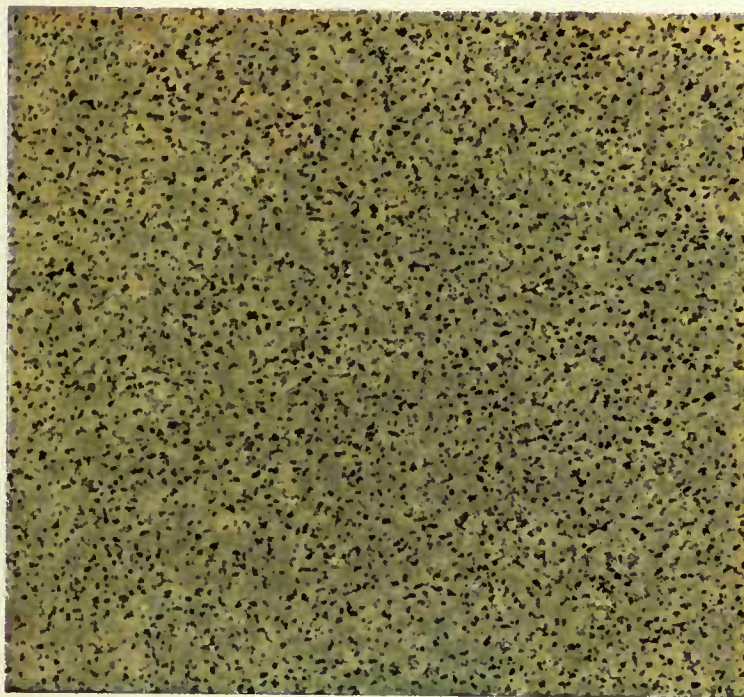


PIERS OF BOWRAL TRACHYTE.
(HAWKESBURY RIVER BRIDGE, N.S.W.)



COLUMNS, FLAGGING, AND BASE-COURSES OF BOWRAL TRACHYTE.
(INTELLIGENCE DEPARTMENT.)

PLATE XI.

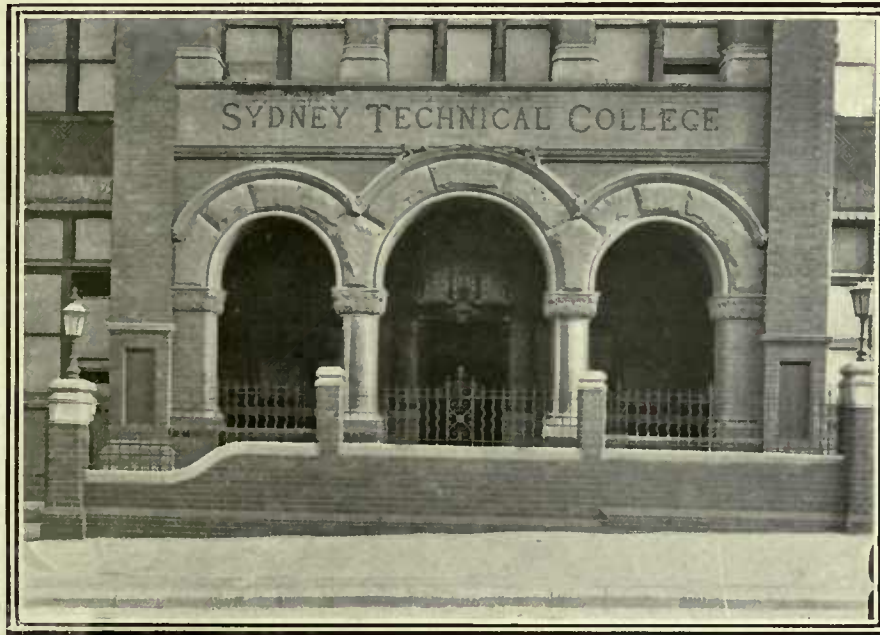


CANOBLAS TRACHYTE.

Nat. Size



In both the polished and unpolished condition it gives an appearance of solidity in buildings that is quite attractive and pleasing. I am indebted to Messrs. Loveridge and Hudson for the loan of the block illustrating their Bowral trachyte quarry.



BOWRAL TRACHYTE COLUMNS AND ARCHES.
(TECHNICAL COLLEGE, SYDNEY.)

Orange.—Near this town is a large series of true Trachyte, composing the bulk of the mountain known as the Canoblas.

As a building stone this Trachyte is in great repute amongst local builders, as it is very hard, durable, and polishes a soft grey or buff base colour, with small pink and black spots, producing a very nice figure, and is altogether a very neat-looking material.

It makes a good flagging stone, and is used as such in front of the most important buildings in Orange.

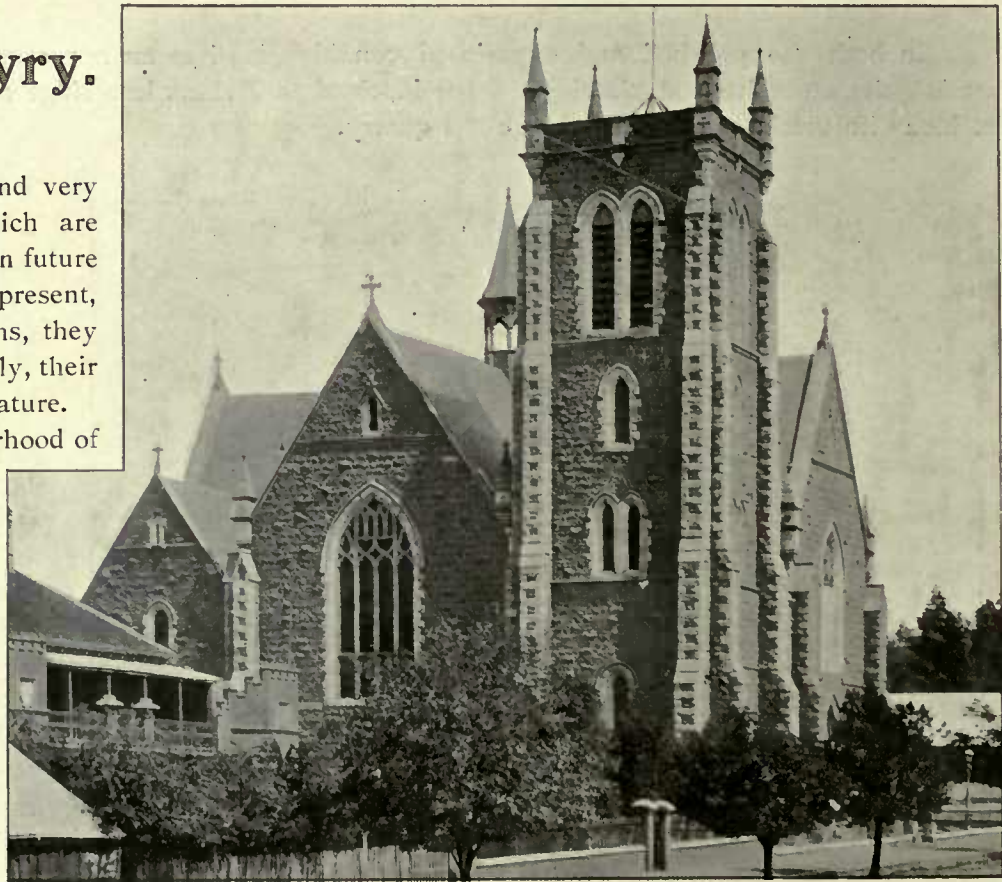
IV.—Porphyry.

[See also Appendix.]

THIS is a group of hard and very fine ornamental rocks, which are destined to be greatly used in future for internal decorations. At present, however, for obvious reasons, they have not been used extensively, their utilisation being of a local nature.

There is in the neighbourhood of Goulburn a large deposit of this rock.

It takes a beautiful olive-green polish, in fact is similar in colour to Serpentine, which stone it certainly should supersede in building construction, for whilst having all the beautiful effects of that material, yet possesses hardness



GOULBURN PORPHYRY.

(ST. PETER'S AND ST. PAUL'S CATHEDRAL, GOULBURN.)

PLATE XII.



GOULBURN GREEN PORPHYRY.

Nat. Size.

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UNIVERSITY
OF
CALIFORNIA

and durability far beyond that ornate stone. It looks well either polished or unpolished in buildings of any pretensions, and its qualities are well brought out in St. Peter's and St. Paul's Cathedral at Goulburn, which edifice is entirely constructed of this material.

It is almost identical in colour and marking with a Diorite used in building construction in Minnesota, U.S.A., and occurring at Addison Point in that State. [*Vide* also Appendix.]

BREDBO.—*Vide* Appendix.

BURROWA.—*Vide* Appendix.

CANBERRA.—*Vide* Appendix.

COWRA.—It occurs here over a large area; this material having a dark-green base, with white or coloured crystals of felspar scattered throughout. (E. F. Pittman.)

CURRAWONG.—*Vide* Appendix.

GOULBURN.—A handsome dark-green rock, which may be systematically classed as a Porphyrite, has been worked in the vicinity, and used extensively for the construction of buildings within the town.

HALL.—*Vide* Appendix.

MICHELAGO.—*Vide* Appendix.

MURRUMBATEMAN.—*Vide* Appendix.

URRIARA.—*Vide* Appendix.

YASS.—*Vide* Appendix.

V.—Diorite.

[*See also* Appendix.]

BUMBALDRY.—An even-grained, bright-coloured diorite outcrops in large quantities about 3 miles eastward from Bumbaldry. In appearance this rock is very similar to some of the better classes of grey granite.

GOULBURN.—*Vide* Appendix.

JERANGLE.—*Vide* Appendix.

TARAGO.—*Vide* Appendix.

TUMUT.—*Vide* Appendix.

WEE JASPER.—*Vide* Appendix.

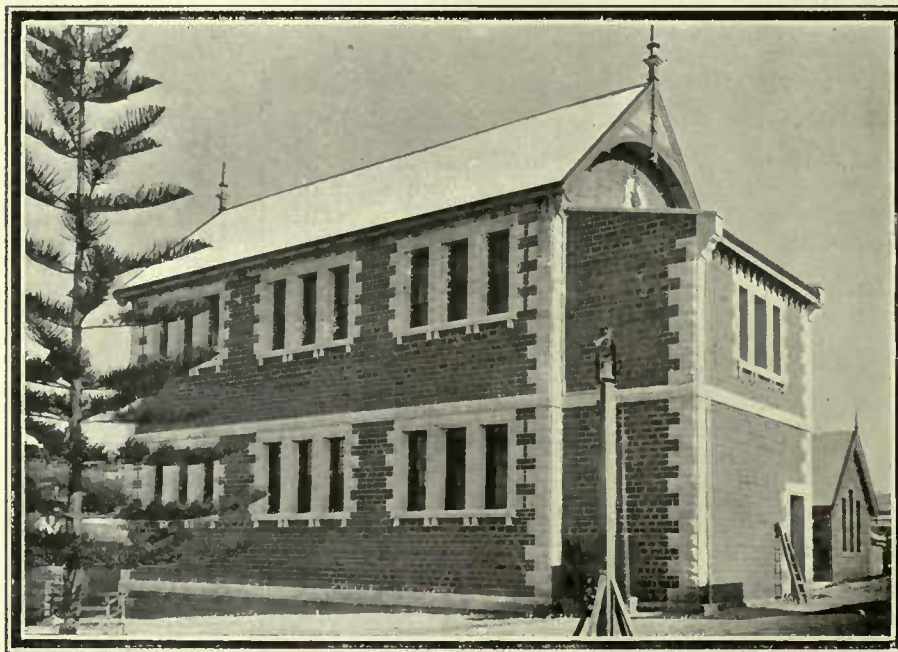
VI.—Basalt.

[See also Appendix]

THIS material is at present extensively used for road-making and ballast for railways, as well as for building purposes. It is hard, heavy, breaking comparatively easily, and very durable, and is known commercially as "blue metal."

It is found as a volcanic outcrop in many places on the Main Dividing Range and Coast, and has been extensively quarried at Kiama and Dundas.

There is also an extensive deposit at Orange of a fine-grained material, which splits readily into well-formed



KIAMA BASALT.
(PUBLIC SCHOOL, KIAMA)

blocks. It is very hard and takes an excellent polish, which gives it a dark shade of green.

At Sterling, 9 miles from Inverell, a columnar basalt is quarried and used in the construction of business houses at the latter town.

Extensive ancient lava flows of this material cover the granite of the New England tableland in many places. At Uralla they have been quarried for road metal, and the deposits at Sterling, Armidale, and many other localities are of this nature.



INVERELL BASALT.
(STORE INVERELL.)

VII.—Dolerite.

There is a large intrusive mass, probably a laccolith, of this material at Prospect, near Sydney. It has been extensively quarried for use in the construction of the Prospect dam. Its rank as a building stone is unknown, although it is most durable in the form of steps, as it does not wear smooth nor take a high polish.



BASALT QUARRY, ORANGE, NEW SOUTH WALES.



BASALT QUARRY, KIAMA, NEW SOUTH WALES.

VIII.—Marbles.

[See also Appendix.]

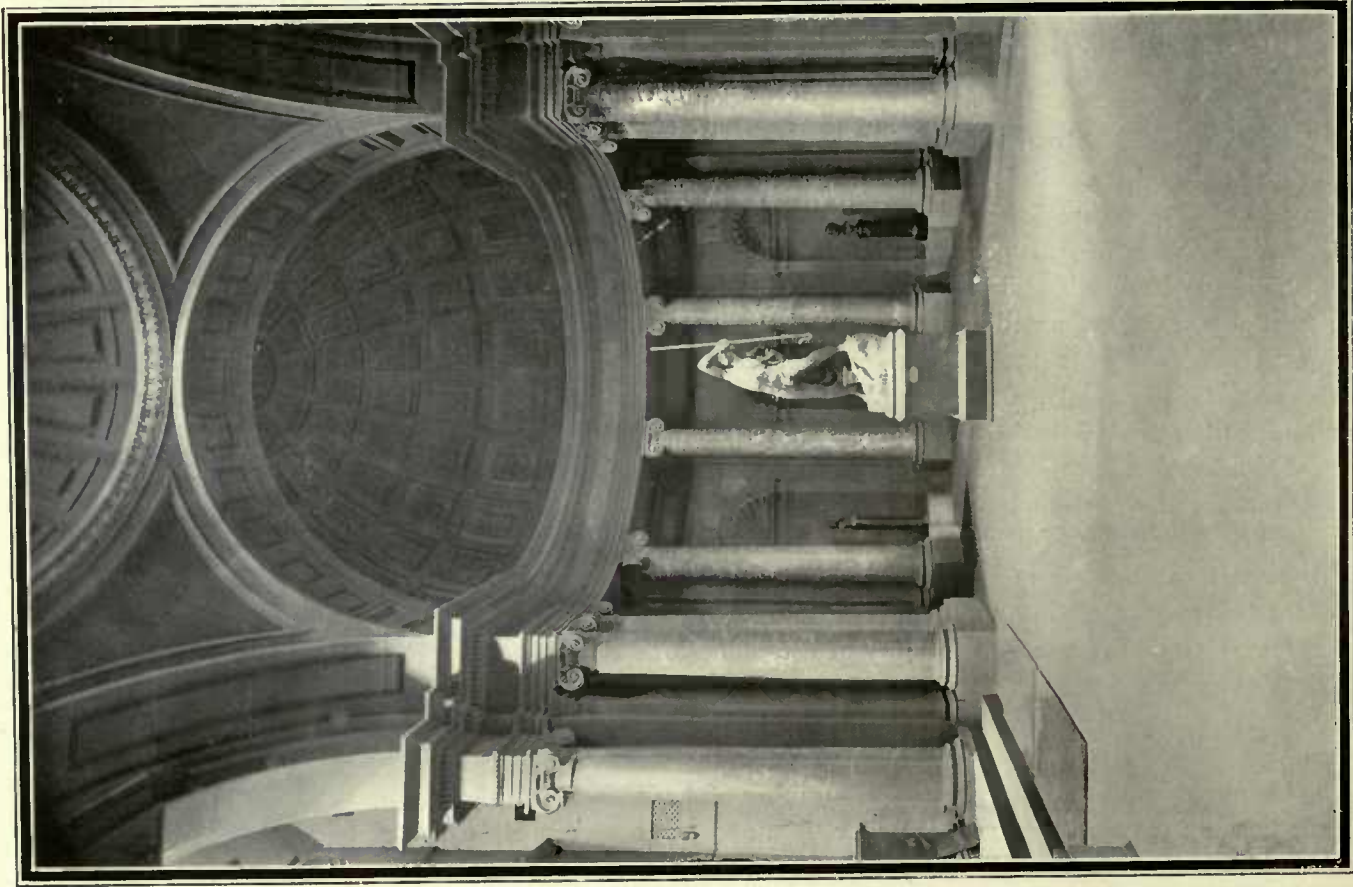
THE New South Wales marbles are inexhaustible ; they are of varied and beautiful colours, and in addition possess all the other qualities that pertain to first-class marbles, and so are of great commercial value.

“The value at the quarries of the marble raised during the year is estimated at £2,200, as compared with £1,518 for the year 1906. The marble was principally obtained from the deposits at Borenore in the Orange District, and Caloola in the Rockley Division. Much difficulty was experienced in securing a constant market for the output, and work at the mines was consequently somewhat intermittent. However, each year sees the marbles from the extensive deposits in this State being brought into more general and effective use, and in view of the excellent quality of the stone for interior decorative purposes, it is reasonable to anticipate that this industry will attain large proportions in the near future.” (Mines Department Report, 1907.)

For obvious reasons only a limited number of quarries are being worked, but an increased demand will alter this, and as these are close to the surface, there is little difficulty in procuring the material.

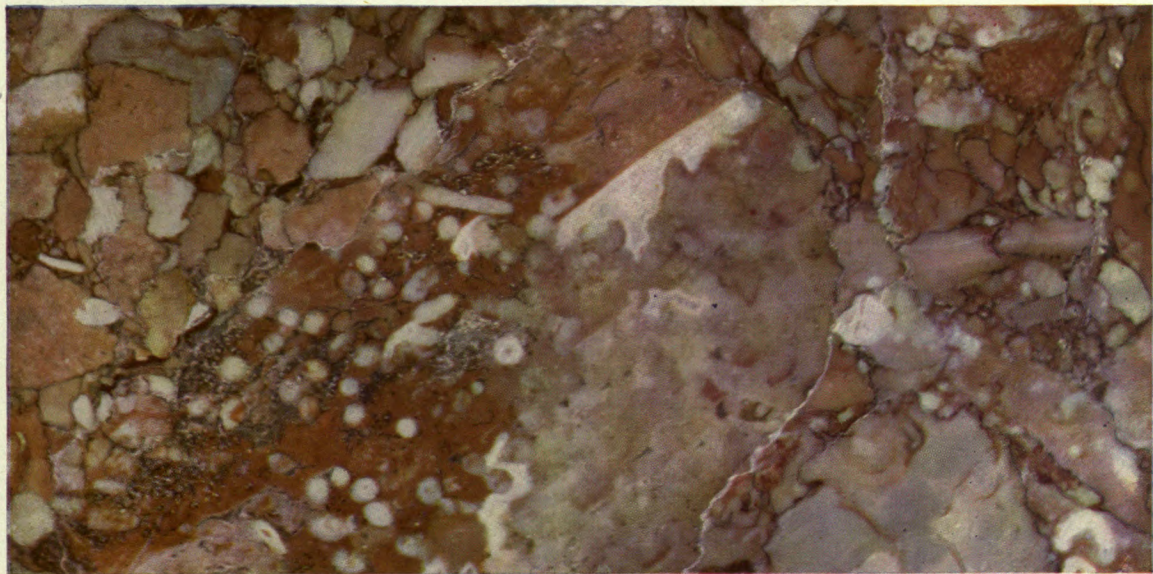


DRILLING.
(CALOOLA)



DOMES OF SYDNEY SANDSTONE. COLUMNS OF KEMPSEY MARBLE
(THE VESTIBULE, NATIONAL ART GALLERY, SYDNEY.)

PLATE XIII.



BORENORE MARBLE (RED).

Nat. Size



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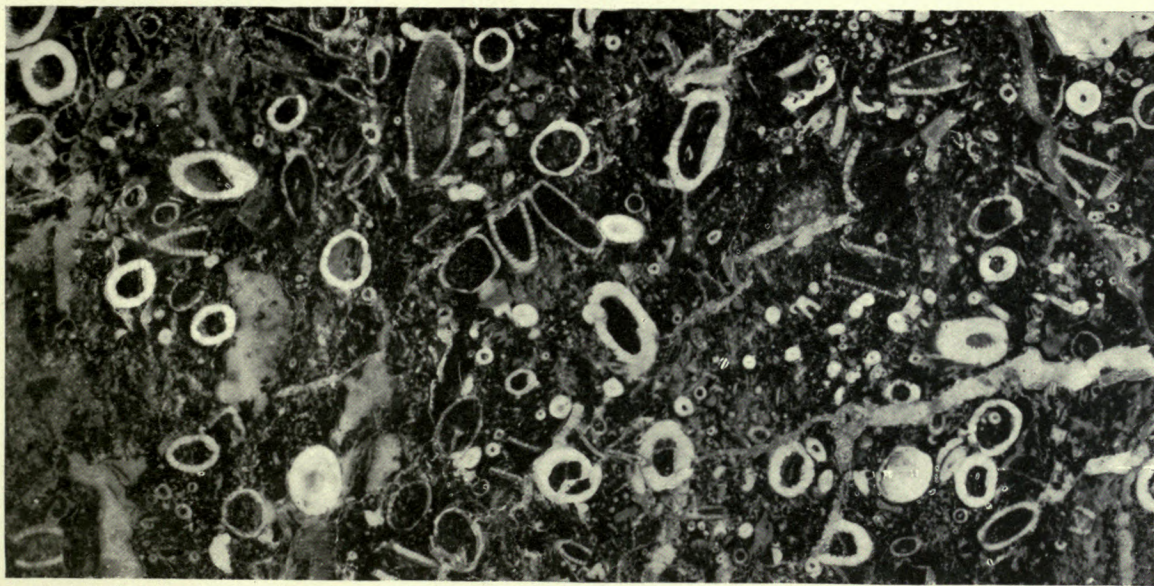


BORENORE MARBLE (BLUE).

Nat. Size.



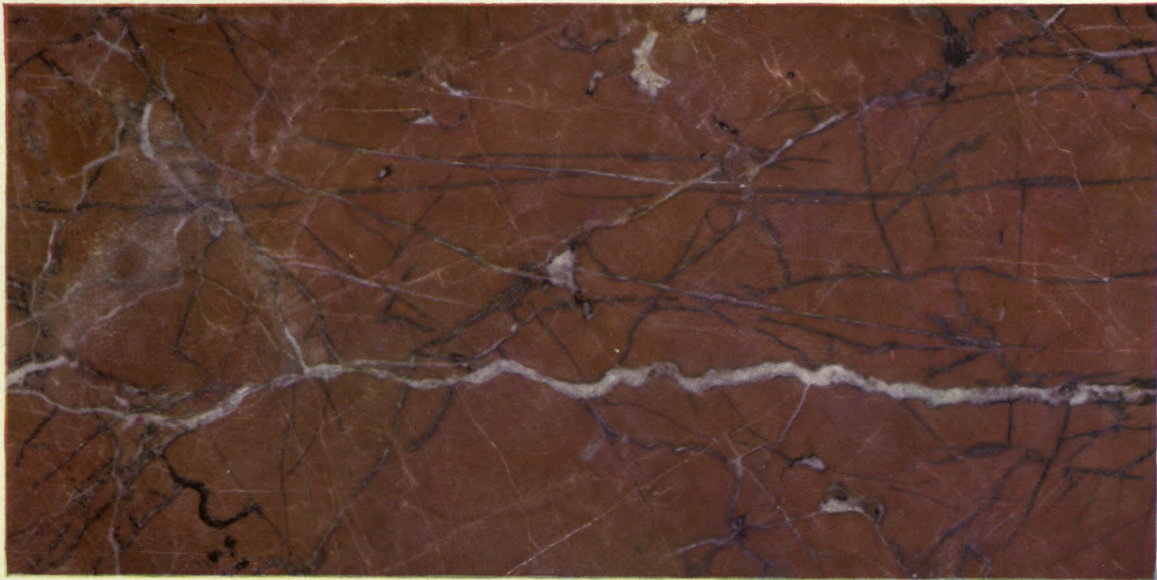
PLATE XV.



ROCKLEY MARBLE, BATHURST.

Nat. Size.





BATHURST MARBLE.

Half Nat. Size.





NEWEL SHAFTS OF ROCKLEY MARBLE. RAIL OF FERNBROOK MARBLE. STEPS OF BORENORE
MARBLE. BALUSTERS, MOLONG MARBLE.
(STAIRS, NATIONAL ART GALLERY, SYDNEY.)



(a) FINE. (b) COARSE.
ATTUNGA BRECCIATED MARBLE COLUMNS.

Necessarily, working on what is practically surface stone, the best has yet to be quarried, for the deeper the quarries are opened out the better the material will become, being less fractured and of purer quality, as obtains in some of the old Italian, Greek, and Egyptian quarries which have been worked now for hundreds of years.

Although practically the industry is only at its inception, yet specimens now exhibited at London and this Museum demonstrate conclusively that a great commercial future is before it.

The varied colours of these marbles are found to blend, harmonise, or contrast in the specimens from the different localities, in a manner that gives each a distinctive character in its beautiful figures and general effect.

With such results, obtained from only a few years prospecting, it is not unreasonable to expect that still greater returns await further development of these remarkable marbles.

The specimens exhibited at the Franco-British Exhibition were from Borenore, Caloola, Fernbrook, Kempsey, Narrabri, Springhill, and Tamworth quarries, these being the more important ones worked at that time.

PLATE XVII.

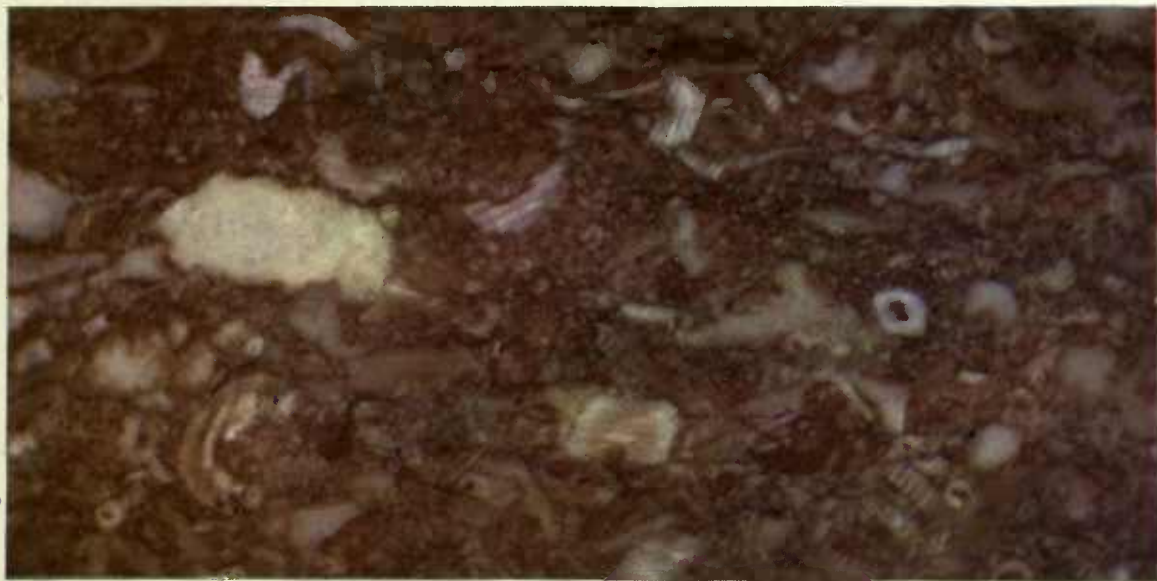


BATHURST MARBLE.

Half Nat. Size.



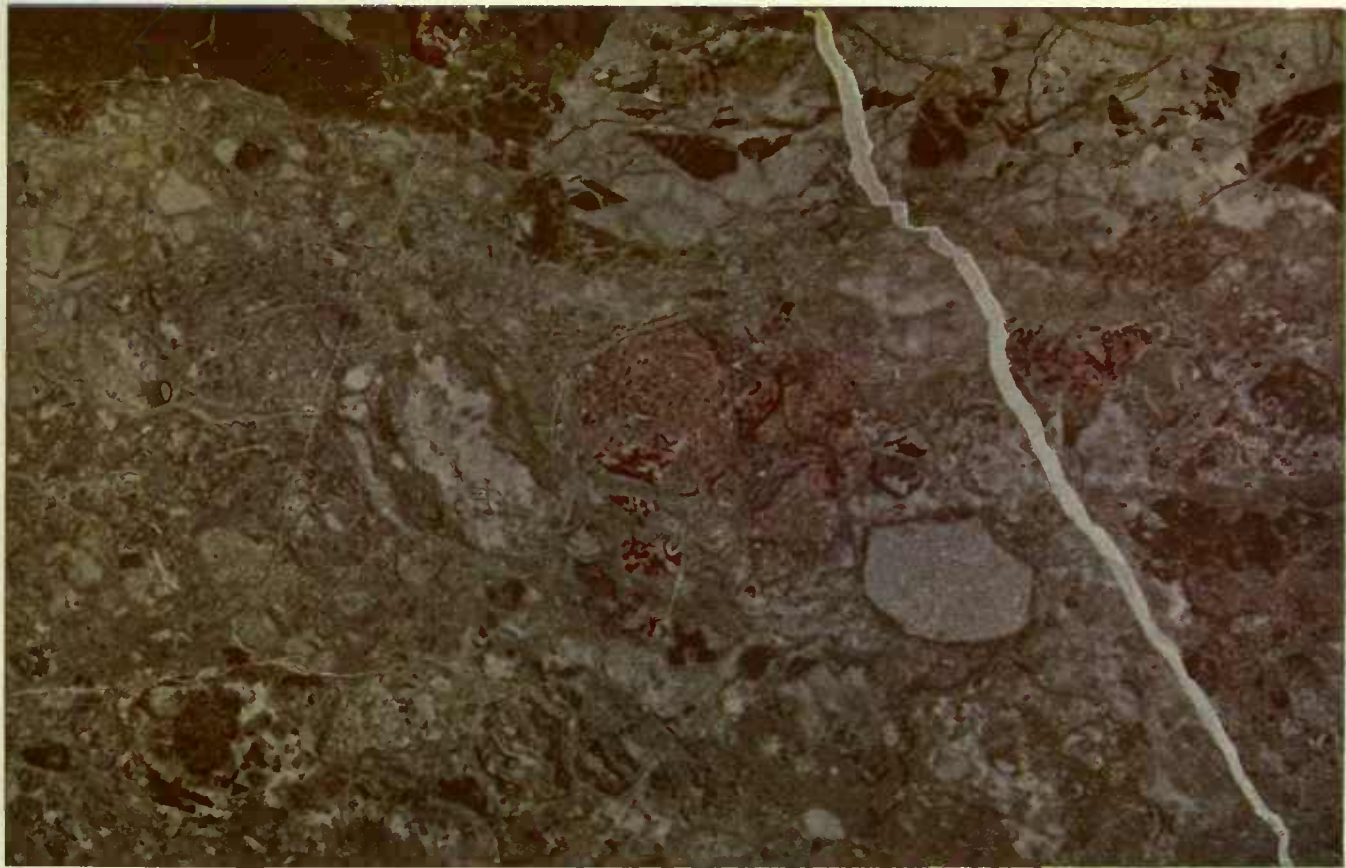
PLATE XVIII.



NEMINGHA MARBLE.

Nat. Size.





FERNBROOK MARBLE.

Nat. Size.





FERNBROOK MARBLE.

Half Nat. Stee.





CALOOLA MARBLE FLOOR
(VESTIBULE PRINCE ALFRED HOSPITAL SYDNEY)

The following are known localities for marbles of excellent quality :—

ABERCROMBIE CAVES.—A very pale-coloured marble, almost pure white except for a few brownish-red markings.

ADELONG.—An attractive white stone, mixed with a moderately dark green colour. It should look handsome in columns and in decorations.

ATTUNGA.—This is one of our most handsome marbles, being composed of large pale-coloured fragments embedded in a red-ground mass. It varies much in texture, the coarser varieties frequently consisting of fragments up to 1 foot or more in diameter, with well-defined edges. It looks magnificent when polished on a large scale, and is so illustrated by columns in this Museum. As a brecciated marble it probably has no superior anywhere.

BATHURST. *Vide* LIMEKILNS.

BIBBENLUKE.—A crinoidal black and white marble.

BINALONG.—*Vide* Appendix.

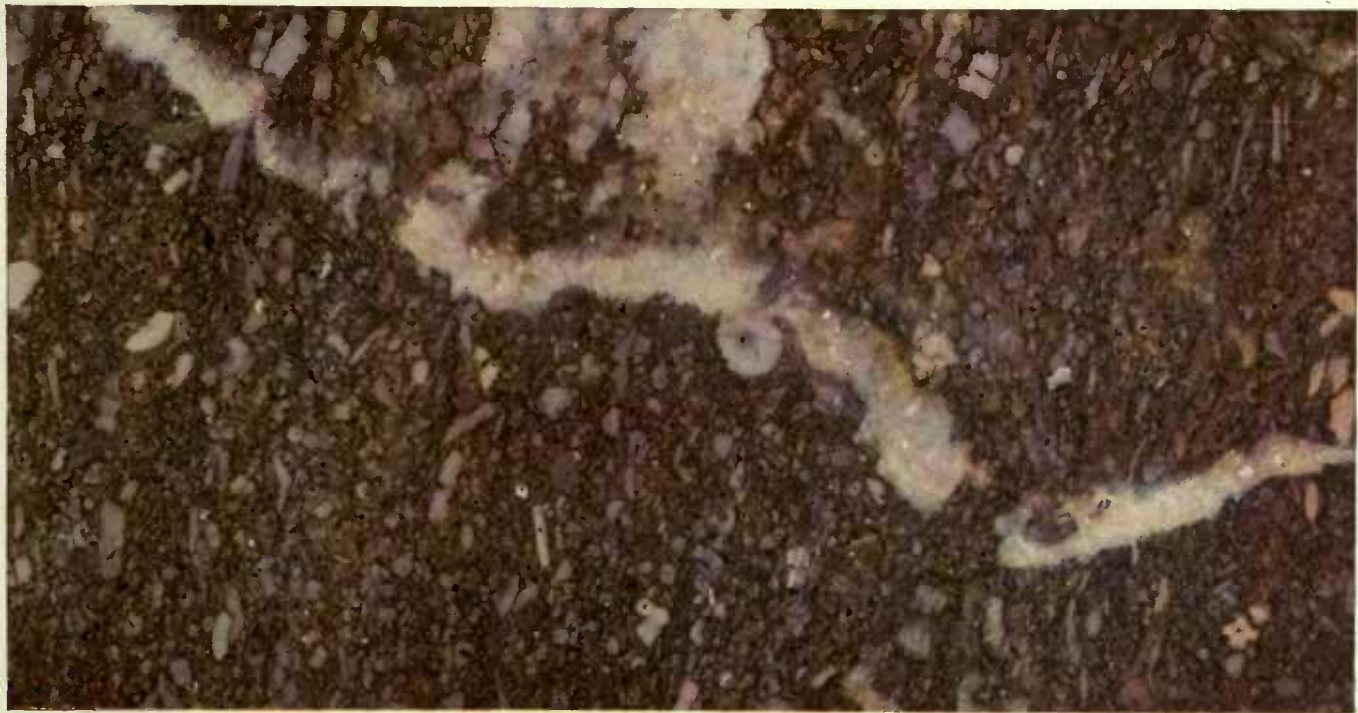
BINGERA.—This is a continuation of the Warialda deposit, and is as yet unworked. Several varieties of variegated and brecciated marbles occur here. The outcrop of this belt of marble continues to the southwards, being in evidence at intervals between Warialda, Bingera, Barraba, Manilla, and Tamworth; whilst Attunga is also upon this line of outcrop.

BORENORE.—Many varieties are produced from this quarry, which is within easy distance of the railway. The deposit is extensive and so is capable of yielding large quantities of stone. The two varieties at present being utilised are a red and a blue. The former, which is a breccia of red and buff coloration, is gaining great favour in Sydney and has been employed for mural decoration in the New Central Railway Station and many other Sydney buildings; it makes up well for mantelpieces, church columns, &c., and is, therefore, a first-class decorative stone. The blue is a breccia, with this colour predominating, and the fossil corals being well brought out in the polishing, give a very rich effect to this stone. It is one of the most beautiful marbles yet discovered in New South Wales. For mantelpieces it is particularly effective, but would be equally so in other directions of ornamentation.

BRUNDLE CREEK.—*Vide* Appendix.

BUCKEROO.—Many coloured marbles can be obtained from this locality. They range from yellowish-brown to yellowish-grey or red in colour, and the indications from surface specimens are that a good white might be found when opened up.

BUMBALDRY.—A very extensive area of marble outcrops near the main road, about 1 mile west of the township. The rock is of a richly-variegated red

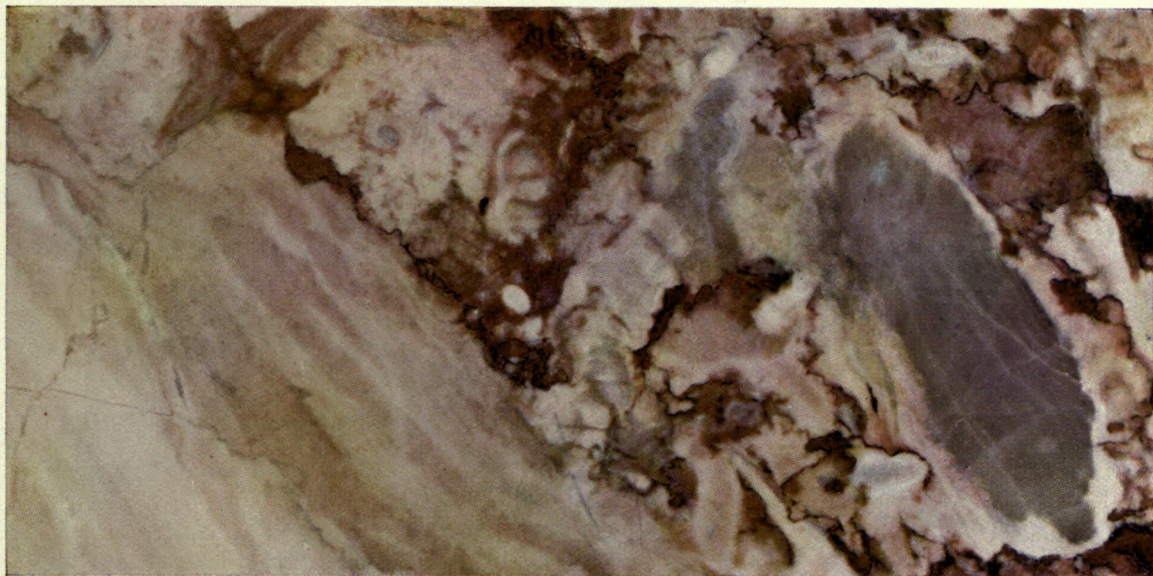


KEMPSEY MARBLE.

Nat Size



PLATE XXII.



MUDGEE MARBLE.

Half Nat. Size.

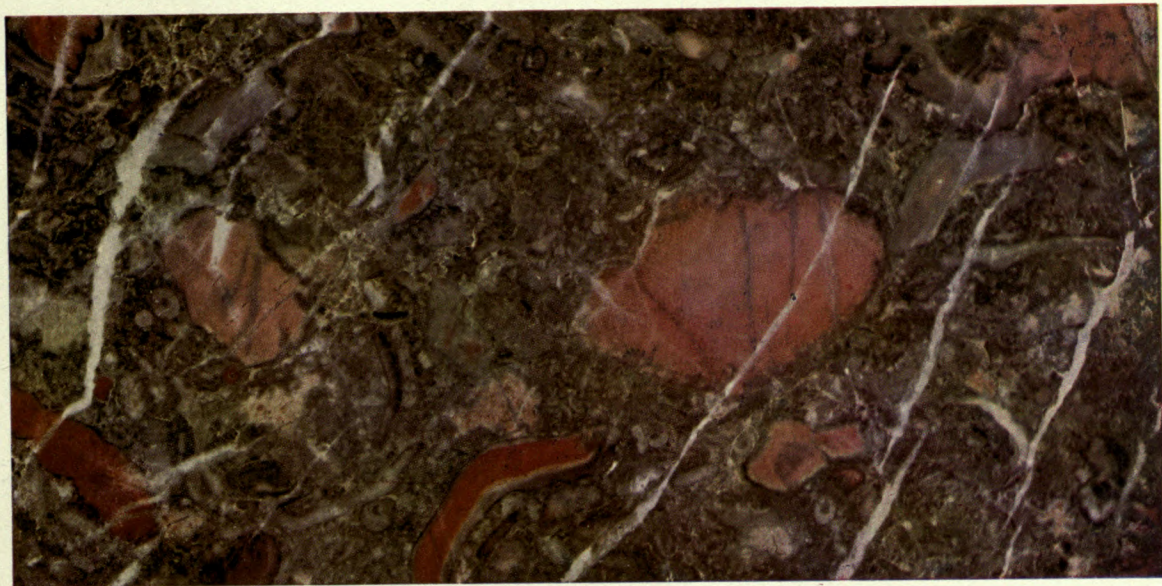




FERNBROOK MARBLE.

Nat. Size





FERNBROOK MARBLE

Half Nat. Size.





ONE OF THE CUTTINGS AT THE CALOOLA WHITE MARBLE QUARRY.

colour, with some varieties merging into a deep brick red. As there are unlimited quantities available, this should be a useful addition to our list of first-class marbles.

BUNGENDORE.—*Vide* Appendix.

BUNGNIA.—A buff-coloured marble.

BURROWA.—*Vide* Appendix.

CALEULA.—This marble occurs some distance (16 miles) from Orange. The deposit is large and so is capable of extensive development.

The predominant variety is a beautiful white and red-streaked stone, approaching somewhat in colour some of the Borenore specimens. It is a very attractive stone, and has been used exclusively in the interior decoration of St. James' Church and Dixon Buildings, Sydney.

There is also a very prettily-marked mottled variety with green streaks that will come into demand when better known.

CALOOLA.—This newly-opened and latest machinery-worked quarry is situated between the Newbridge and Bathurst railway stations. It is a whitish, coarse-grained marble, occasionally decorated with very faint bluish clouds, but pure white-coloured material will no doubt be encountered as the depth worked is increased. It is a very fine marble, and is quickly coming into favour in the Commonwealth, for it is now to be seen in some form or other in the

newest architectural structures of Sydney, such as the vestibule of Challis House, Martin Place, and Prince Alfred Hospital. Also Queen Victoria Statue, Melbourne, &c. Its utilisation qualities are too numerous to mention here, but for indoor work of all kinds it is an excellent marble. The plates illustrating this marble were kindly lent by the Commonwealth Marble Co.

CARROL.—Variegated marbles occur near here (D. A. Porter).

COOLALIE.—*Vide* Yass and Appendix.

COOMA.—*Vide* Appendix.

COW FLAT.—Here is found a whitish marble, but yet not much worked.

COWRA.—Dark-coloured limestone occurs as a bold outcrop, striking north and south, and cutting across the Burrowa-road about 8 miles from Cowra.

CUDAL.—This is a bluish-black stone, but not much known.

FERNBROOK.—The varieties produced from this district are too numerous to particularise here, as they range in colour through almost the whole spectroscope.

There are great commercial possibilities for these beautifully coloured and wonderfully figured marbles, and many of them will no doubt be found superior to the European and American article. The coloured plates lent by the Commonwealth Marble Co., and shown here, will give some idea of the varieties obtainable.



GAMBOOLA MARBLE (MOLONG).

Half Nat. Size.



PLATE XXVI.

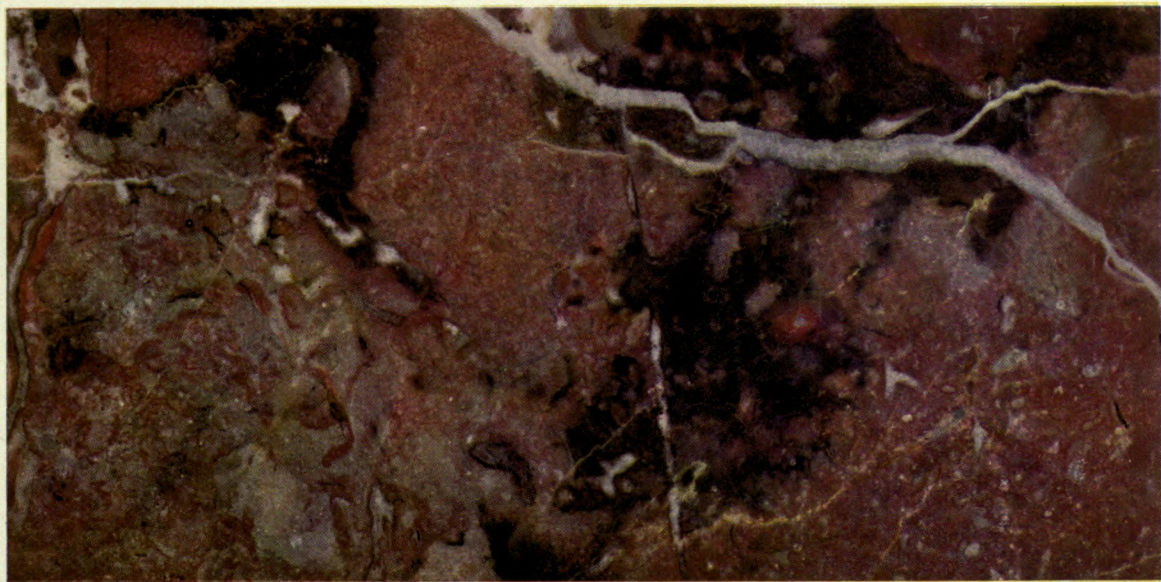


LIME KILNS MARBLE, BATHURST.

Half Nat. Size.



PLATE XXVII.



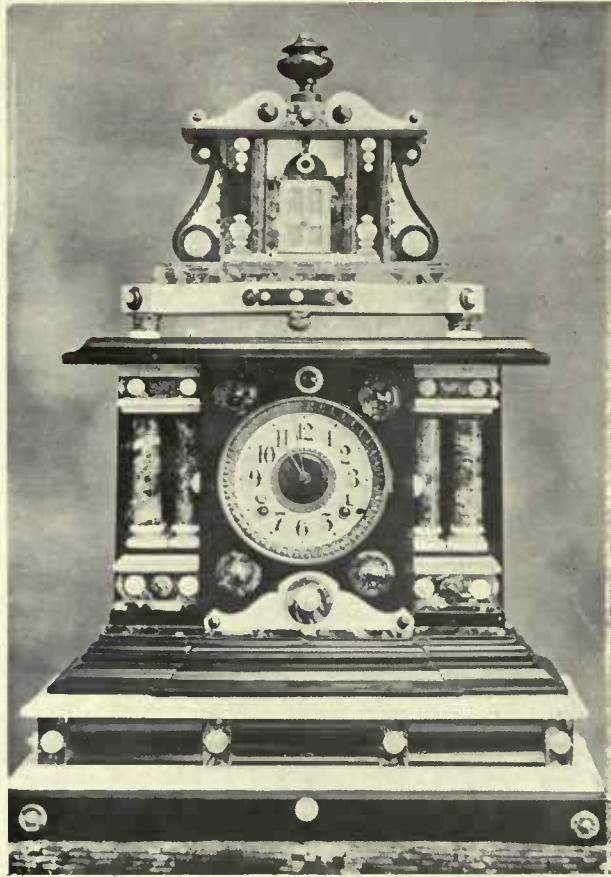
LIME KILNS MARBLE, BATHURST.

Half Nat. Size.





FERNBROOK MARBLE STAIRS. CALOOLA PAVEMENT.
(VESTIBULE HER MAJESTY'S THEATRE, SYDNEY.)



MADE OF NEW SOUTH WALES MARBLES BY F. RUSCONI.

GILMORE.—*Vide* Appendix.

GRESFORD.—Gresford, near Maitland (Mr. Thos. Browne). A dark-coloured crinoidal marble which takes a fair polish. Used for lime-burning.

GUNDAGAI.—This marble is not much known, and is unworked.

HAVILAH.—According to Mr. C. F. Summers, this is a variety of white marble, and one that gives promise of yielding one of the finest white varieties yet found in the State. This authority also states the supply is unlimited.

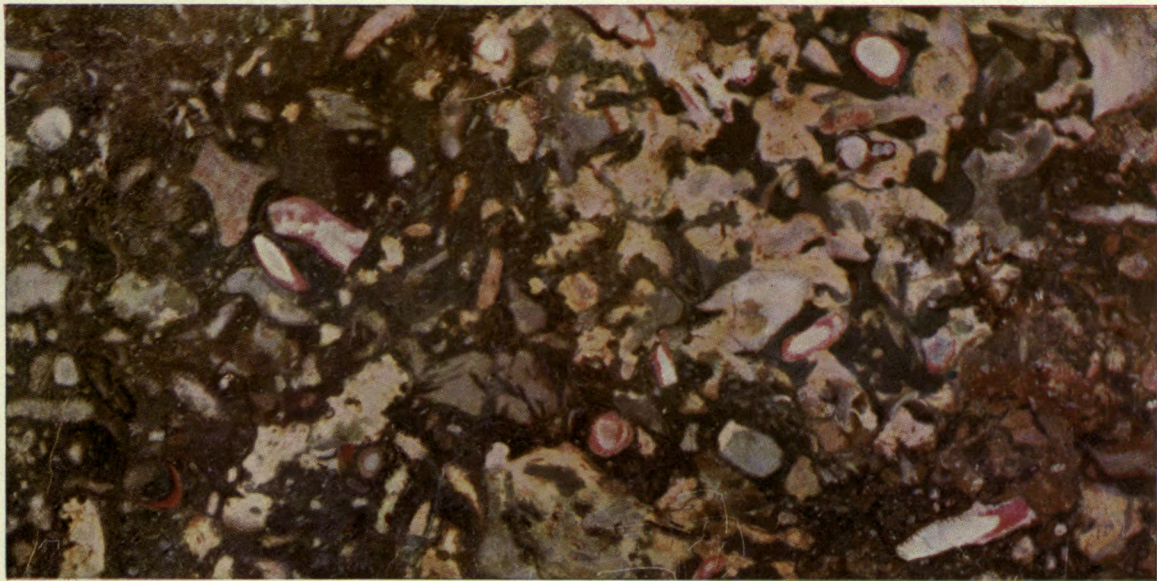
JEIR.—*Vide* Appendix.

JENOLAN.—An unworked marble.

KEMPSEY.—A very ornamental and quite uncommon marble. The matrix, which has a warm, chocolate colour, is studded with small white crinoids, and through the whole run veins of white limestone. When polished it presents a very attractive and beautiful figure, and shows to special advantage in column form. The large columns of the National Art Gallery, Sydney, are made of this material, and are much admired.

LIMEKILNS.—Some very prettily-marked specimens can be obtained from this extensive marble locality, which, from want of demand, is not now being worked.

PLATE XXVIII.



LIME KILNS MARBLE, BATHURST.

Half Nat. Size.



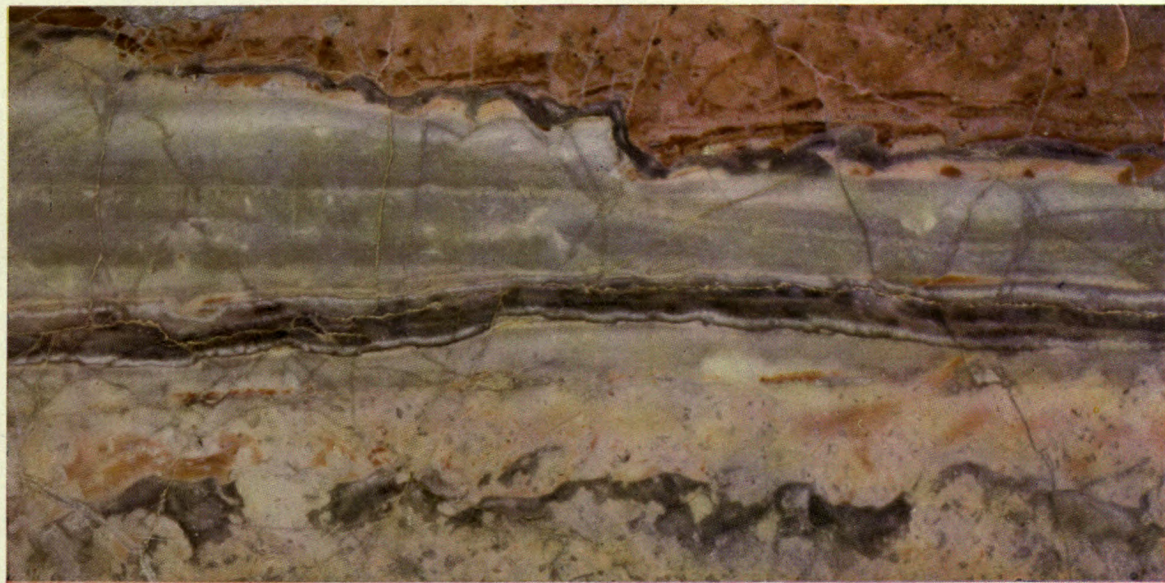


RYLSTONE MARBLE.

Nat. Size.



PLATE XXX.



FERNBROOK MARBLE

Half Nat. Size.





NEW SOUTH WALES MARBLE EXHIBITS.
(TECHNOLOGICAL MUSEUM.)

MARULAN.—The colours of this marble are too numerous to particularise here. It has not been much used for building and ornamental purposes, although it is one of the oldest quarries of the State. The output has been mostly used for lime-making. The first marble obtained from here was used in Victoria House, Pitt-street, Sydney.

MICHELAGO.—(*Vide* Appendix.)

MOLONG.—This is one of the most extensive areas of Marble in the State, but samples are not placed at present on the Sydney market, although largely used locally for the many purposes for which this stone can be utilised.

A great future awaits this field, for, according to Mr. C. F. Summers, the varieties obtainable are equal to anything produced from ancient and modern European quarries.

MOONBI.—An extensive field, but undeveloped.

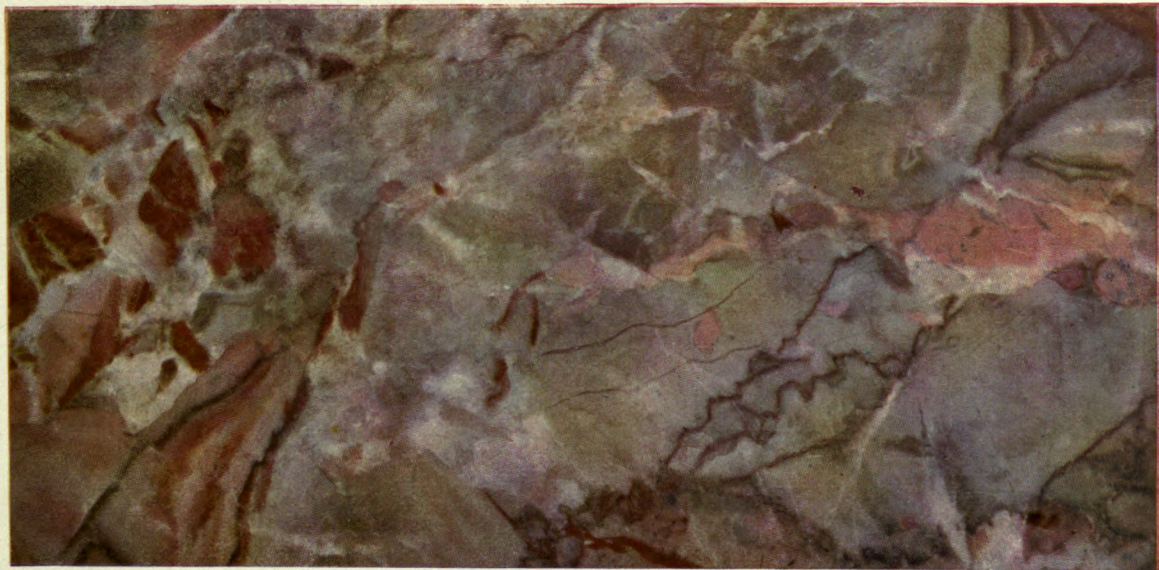
MORUYA.—This is the only sample of onyx marble that has come under my observation. It has a white ground, and, when polished, appears to have a transparent surface.

MUDGE.—Varied coloured marbles are found at Buckeroo, Flirtation Hill, and Sawpit Gully, and many other parts of the district, but undeveloped at present.



CALoola MARBLE.
(QUEEN VICTORIA STATUE, MELBOURNE)

PLATE XXXI.



FERNBROOK MARBLE.

Half Nat. Size.



PLATE XXXII.



WARIALDA MARBLE.

Half Nat. Size.

LIBRARY STAMP





WARIALDA MARBLE

Half Nat. Size.





CALEULA MARBLE DADO.
(DIXSON BUILDINGS, SYDNEY.)

NEMINGHA (TAMWORTH).—One of the finest and most ornate marbles yet unearthed in New South Wales. It is a crinoidal stone of a rich red ground, studded with large crinoids, sectioned at all angles. It looks magnificent in columns. Mr. C. F. Laseron has discovered indications of a green variety.

NORONGO.—*Vide* Appendix.

ORANGE.—At Douglas occurs a black marble, with white streaks.

PARKES.—A variegated and white statuary marble is found at Ashburnham, 4 miles north of Parkes. (Prof. A. Liversidge.)

PORTLAND.—Some very fine reddish-coloured marbles are obtained both north and south from this locality.

QUEANBEYAN.—*Vide* Appendix.

ROCKLEY.—A beautifully sound, black and white crinoidal marble, but has not been developed commercially to any extent. Some samples of it can be seen in the staircase of the Sydney Art Gallery. It is superior to the imported St. Anne's marble.

RYLSTONE.—This is a rich black and white marble, and similar to the St. Anne's marble of Belgium.

SAWPIT.—See Mudgee.

SPRINGHILL.—This is a beautiful black marble, with well-marked fossil corals. It takes a beautiful polish, which gives a depth of reflection quite characteristic, although passing commercially under this name, it really comes from Waldegrave.

TARAGO.—The matrix in this material is black with white yellow sinuous narrow veins.

TARRABANDRA.—*Vide* Appendix.

TUMUT.—A richly variegated variety of marble.

WALLI.—A little-known material.

WARIALDA.—Although this is quite a new field, it promises to be a great centre in producing ornamental and building marbles of good quality. A white ground marble with black lines, and a red and white stone are the two principal kinds yet developed. These are very ornamental. Mr. M. W. Hardy, of Narrabri, kindly supplied the material for the coloured plates.

WEE JASPER.—*Vide* Appendix.

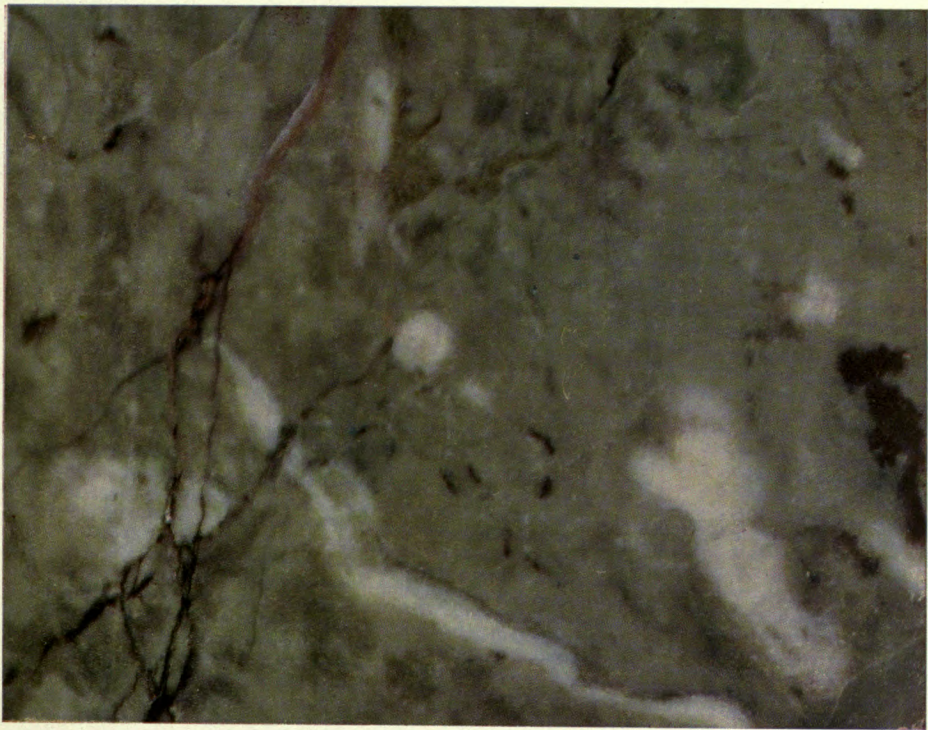
WINDELLAMA.—A black or dark bluish-grey marble, but not much developed. (*Vide* also Appendix.)

WOMBAYAN CAVES.—A white saccharoidal marble occurs here in enormous quantities, but is as a rule somewhat coarse.

YARRANGOBILLY.—A little-known marble.

YASS.—A quarry of white and variegated marble is worked at Coolalie by Mr. James. (*Vide* also Appendix.)

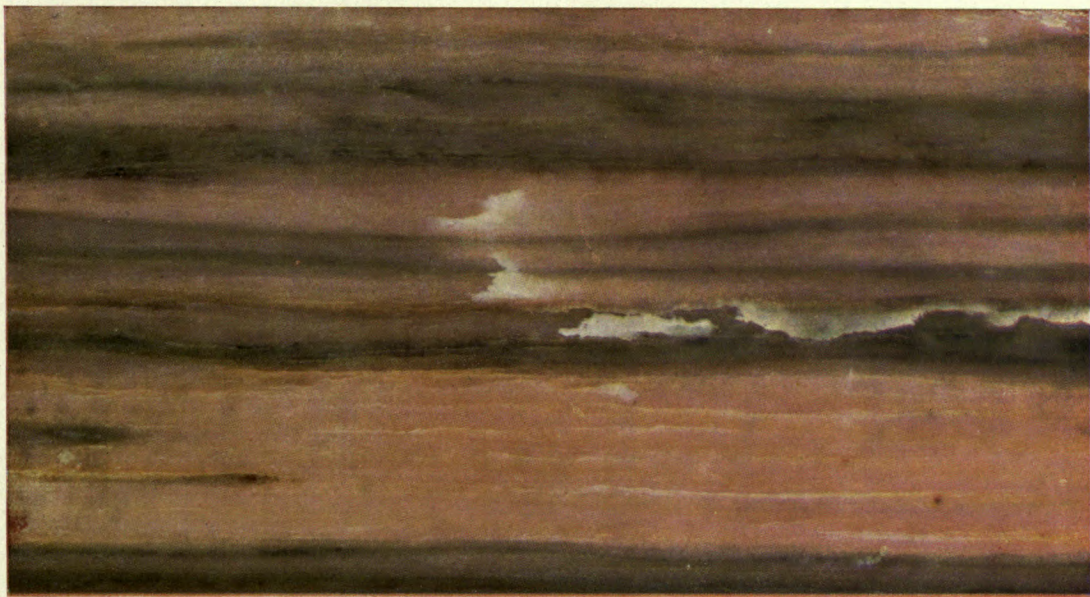
PLATE XXXIV.



BINALONG GREEN MARBLE.

Nat. Stoe



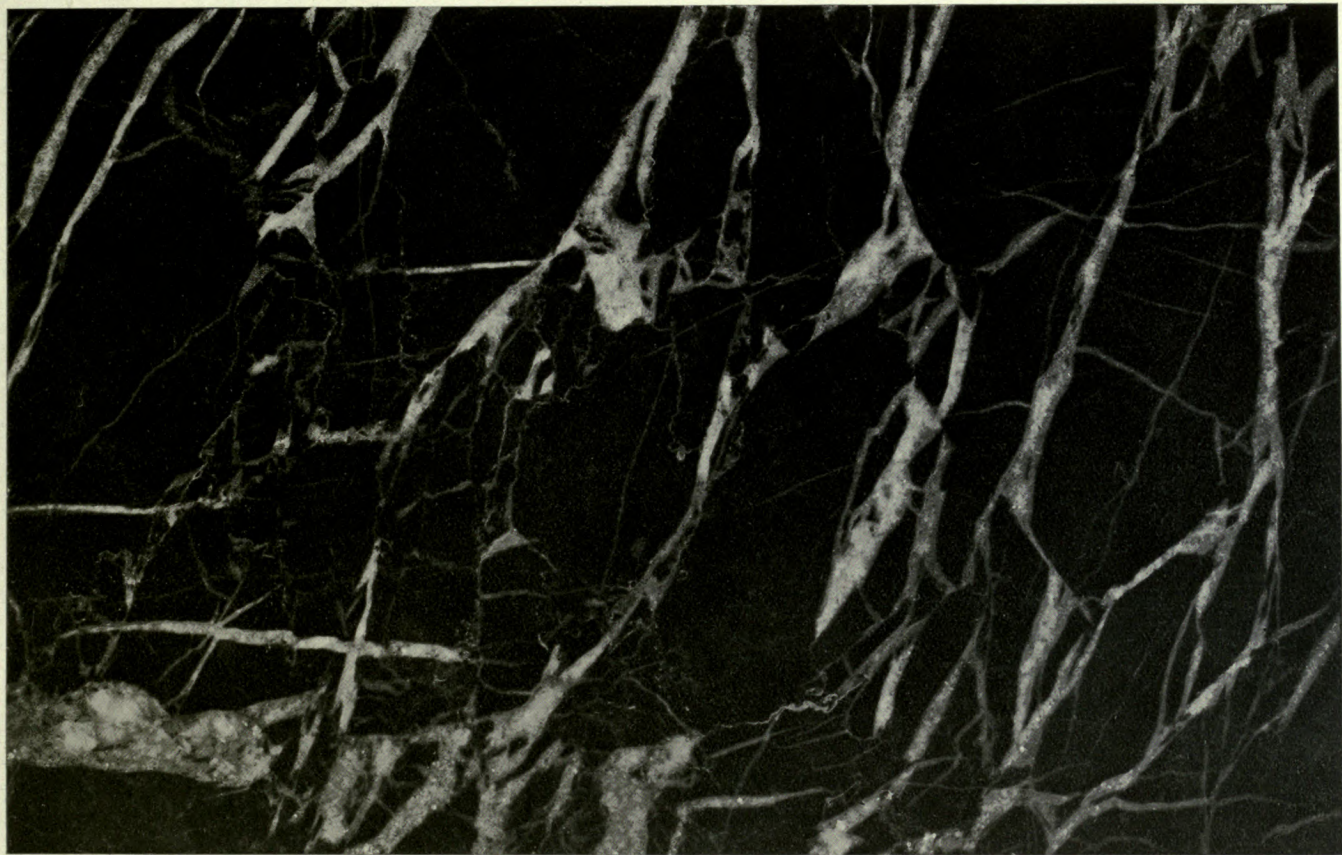


GILMORE BANDED MARBLE.

Nat. Size.



UNIVERSITY OF CALIFORNIA

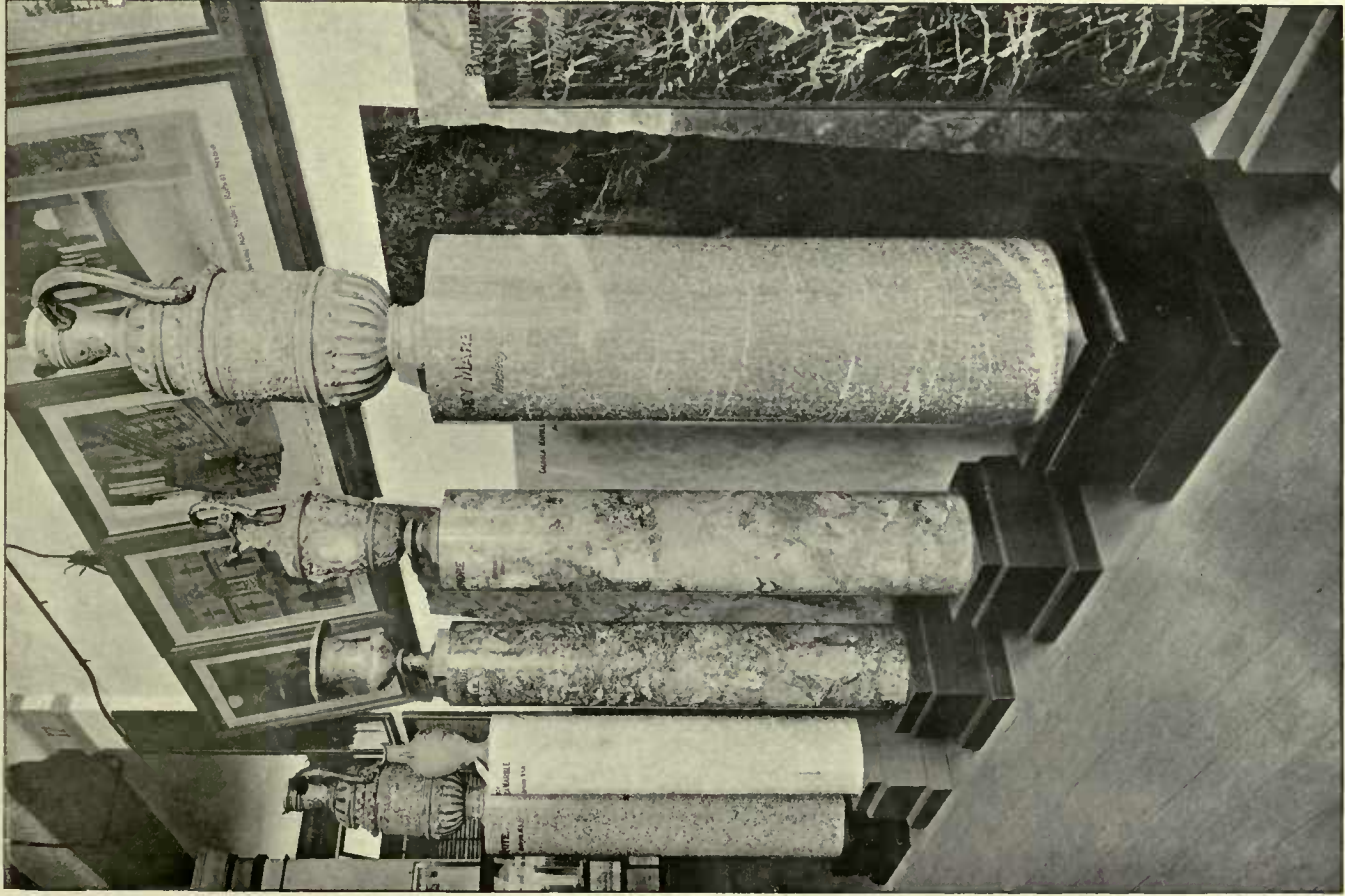


SPRING HILL MARBLE.

Nat. Size.



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SPECIMENS OF NEW SOUTH WALES BUILDING STONES.
(TECHNOLOGICAL MUSEUM.)

IX.—Slate.

(See Appenaix.)

X.—Serpentine.

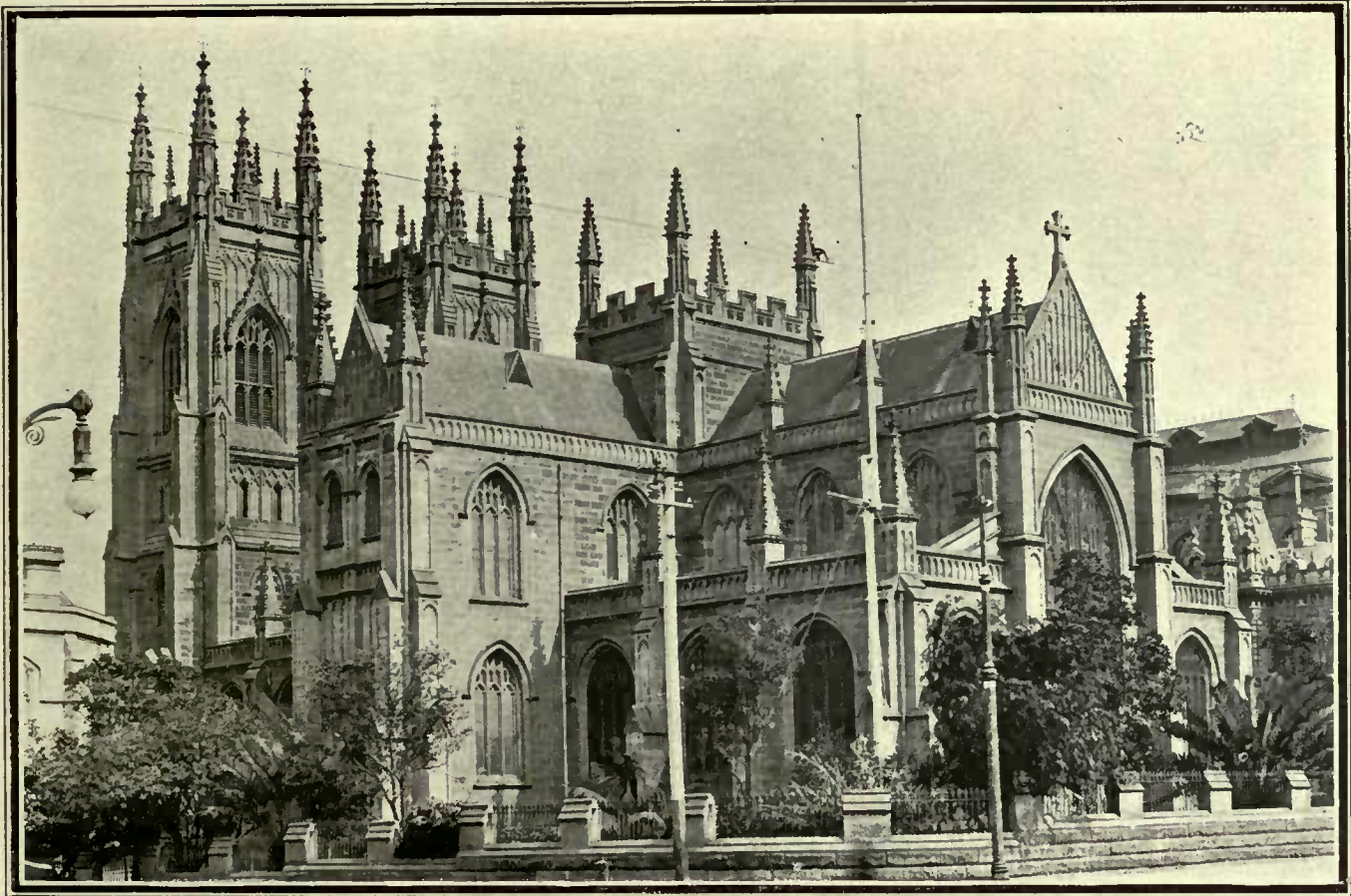
(See Appendix.)

Bingara, Cowra, and Carcoar are the best known districts from where this material can be obtained, but not much attention has been given to its development.

The material from the different localities is of an ornamental character, various shades of green being the predominating colour. New South Wa'es Serpentine will no doubt be used in our architecture of the future as a decorative stone.

XI.—Quartzite.

(See Appendix.)



SYDNEY SANDSTONE.
(ST. ANDREW'S CATHEDRAL, SYDNEY.)



SYDNEY SANDSTONE.
(ST. MARY'S CATHEDRAL, SYDNEY.)



SYDNEY SANDSTONE.
(MEDICAL SCHOOL, SYDNEY UNIVERSITY.)

XII.—Sandstone.

(See also Appendix.)

SYDNEY, in particular, is well served in the matter of sandstone, for it has at its very door, so to speak, an inexhaustible supply; and it must have been a source of satisfaction to Governor Phillip, when founding the city, that such an area of building material was so close at hand.

Sydney proper is practically built on a sandstone formation, known geologically as the "Hawkesbury Sandstone," called after the river of that name, and which in the greater part of its course runs through this formation.

From the foundation of the city to the present day this sandstone has been extensively used in buildings, being specially well adapted for architectural and ornamental work, as it can be sawn and carved with ease, and after being freshly cut, tones down to a light straw colour, which it retains for an indefinite period. It is composed of small particles of waterworn quartz, with a cementing medium of varying constituents.



SYDNEY SANDSTONE.
(JEWISH SYNAGOGUE, SYDNEY.)

Much might be written on the adaptability of this stone for building purposes, and which has contributed so largely to the architectural beauty of Sydney,—the first city of Australia.

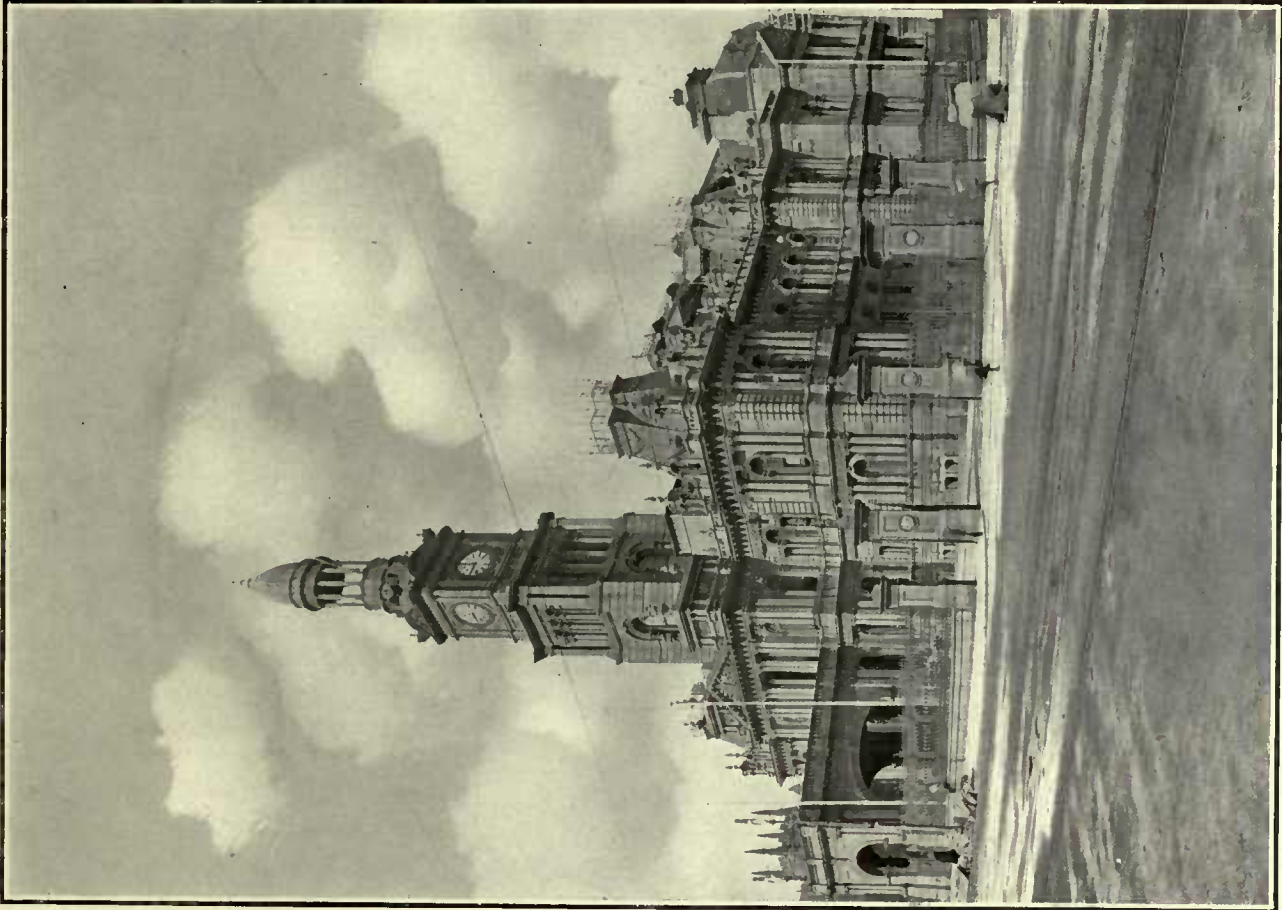
The following are some of the more important edifices constructed from this stone:—

Sydney Town Hall ;
General Post Office ;
Sydney University ;
Fisher Library ;
Mitchell Library ;
Public Library ;
Art Gallery ;

And many large business and private buildings, as well as Cathedrals and Churches.

To the north of Sydney is the coalopolis of the State—*i.e.*, Newcastle ; and here the Coal Measures are capped by a sandstone known geologically as the Newcastle Sandstone.

To all intents and purposes this is identical commercially with that found in the neighbourhood of Sydney, and is of equal merit as a building stone.



SYDNEY SANDSTONE.
(TOWN HALL, SYDNEY.)

In the far interior of the State occurs another deposit of sandstone, known geologically as the "Desert Sandstone,"—an unfortunate term, in my opinion, as it is likely to convey the impression that that part of the State is a "blistering Sahara," when such is not the case.

The term "Milparinka Sandstone" is now suggested for it. At Wilcannia a good sandstone occurs, and has been used in a number of local buildings, including the Prison of the town. (*J. Turner.*)

At Albury, at Tabletop, there is an excellent hard red sandstone intermixed with water-worn pebbles.

At Frogshole, near Goulburn, there is a sandstone which is quite soft when cut out, but hardens considerably on exposure, and specimens used as base courses in Goulburn show no signs of weathering after forty years.

The sandstones of the Coal Measures themselves, though as a rule unworked, are frequently of a nature adaptable for building purposes.

To the same great Permo-Carboniferous formation that the Coal Measures are part of, belong marine sandstones, which differ in composition from the Sydney sandstones, and these are amongst the best in the State. Such is the "Ravensfield Sandstone" worked at Ravensfield, near Maitland.

Professor David speaking of this quarry says:—

The sandstone is from 10 to 12 feet in thickness, of a warm sepia-brown appearance; it is fine grained, a good freestone, easily worked, and is one of the best building stones of its kind as yet found in New South Wales.*

There is also a handsome variety of a fine bluish tint.

Many of the leading buildings in West Maitland are constructed of this stone, which is excellent for carving purposes. It is very little affected by weathering, and the edges of fine carving are still sharp after many years' exposure. The absence of joints makes it possible to obtain blocks of almost any length, and in addition to the building qualities, all these sandstones make good grindstones.

* Geology of the Hunter River Coal Measures. Memoir No. 4, Geological Survey of New South Wales, p. 122.

SYDNEY
SANDSTONE
OBELISK.



(SHOWS PRACTICALLY NO SIGNS OF WEATHERING AFTER NEARLY 100 YEARS' EXPOSURE.)

[Photo, by F. H. Taylor.]



SYDNEY: SANDSTONE AND BOWRAL TRACHYTE.
VICTORIA BUILDINGS, SYDNEY.



WARATAH CAPITAL OF SYDNEY
SANDSTONE.
(NEWINGTON.)

THE "Waratah" (*Telopea speciosissima*, R.Br.) is the national flower of New South Wales.

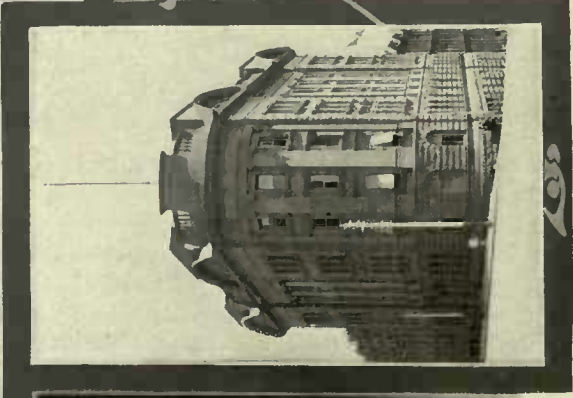
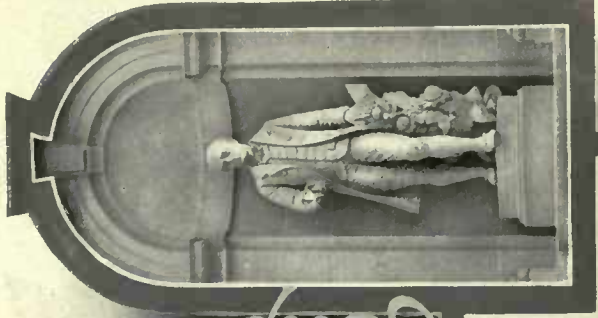
It is probably the most gorgeous amongst the native flora, and its generic name "*Telopea*" (seen from afar) is most happily chosen.

What the Lotus was to the Egyptian, and the Acanthus to the Greek, in architectural decoration,—the Waratah promises to be to the Welshian.

In the above capital, carved many years ago, the sculptor has cleverly shown its suitability for decorative purposes.



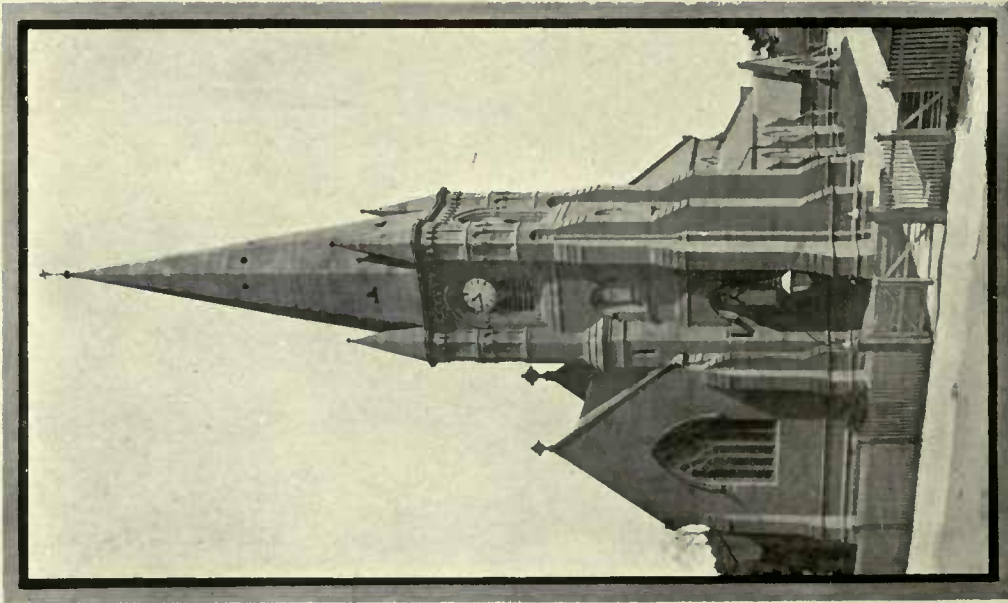
SYDNEY SANDSTONE.
(THE COLONNADE, NEWINGTON COLLEGE, SYDNEY.)



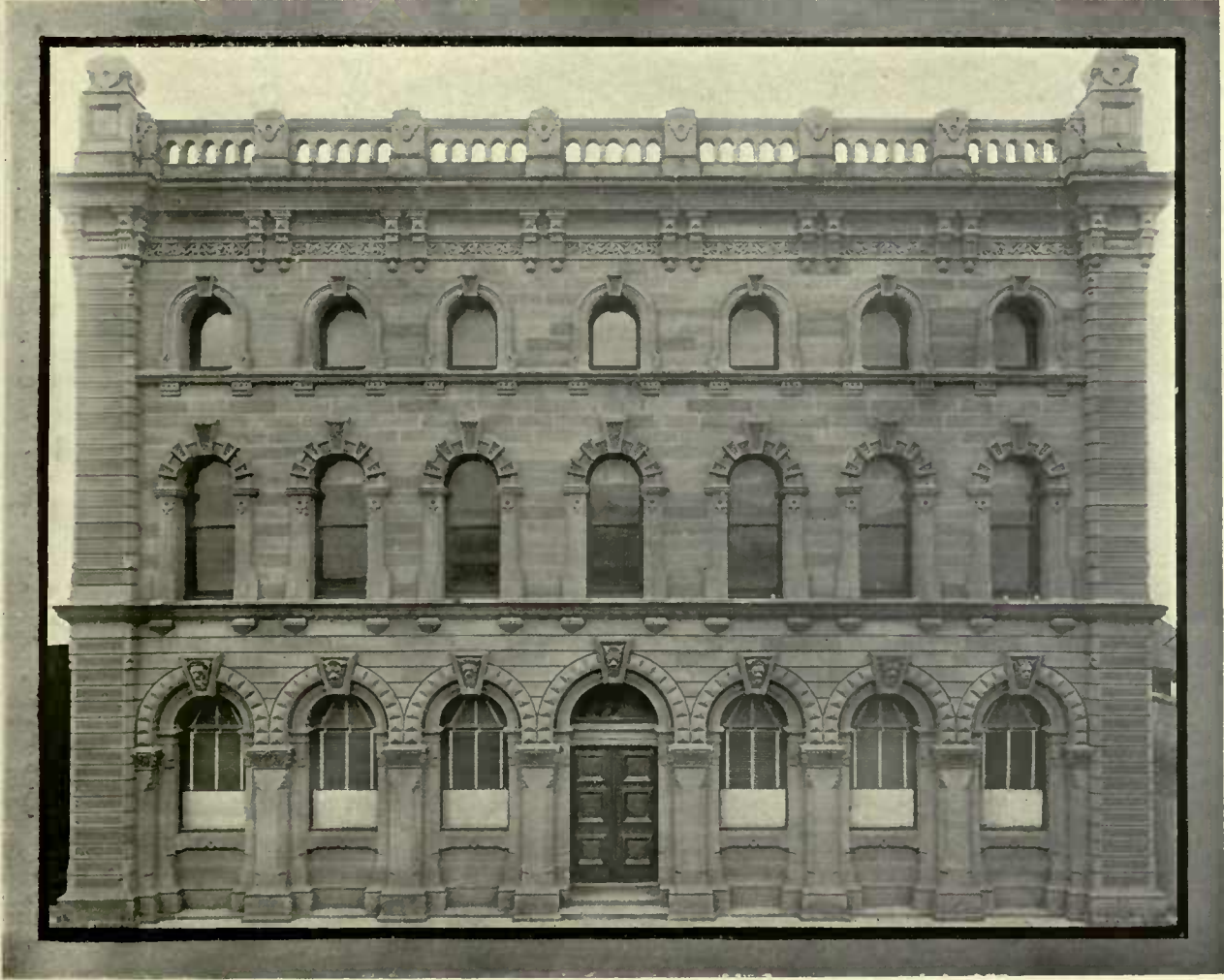
SYDNEY SANDSTONE.
(STATUE ALLAN CUNNINGHAM.) (SYDNEY UNIVERSITY.)
(COLONIAL SUGAR CO.'S OFFICE.)



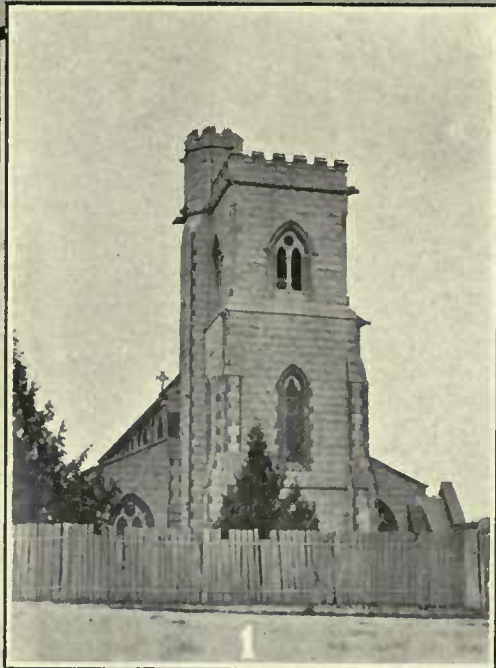
RAVENSFIELD SANDSTONE QUARRY.



RAVENSFIELD SANDSTONE.
(ST. MARY'S WEST MAITLAND.)



RAVENSFIELD SANDSTONE.
STRUCTURE WEST MAITLAND.



1. GRANITE.
(CHURCH OF ENGLAND, BRAIDWOOD.)



2. GRANITE.
(ROMAN CATHOLIC CHURCH BRAIDWOOD.)



3. GRANITE.
(CHURCH OF ENGLAND, GUNNING.)

APPENDIX.

The Southern Tableland.

As the final selection of a Commonwealth Capital Site will probably be made in the Southern Tableland of this State, a special flying lithic survey was made in order to collect information regarding the resources of this district in building and ornamental stones.

The results were beyond expectations, and prove conclusively that in this particular architectural material it is especially rich, as shown by the data given below.

If such results could be obtained in so short a time working over one area of this State, it certainly demonstrates that in others where indications are already known, that in the matter of building and ornamental stones, New South Wales must be remarkably wealthy.

Red Granite.

BARREN JACK.—(see page 19.)

BRAIDWOOD.—This is a red variety, similar in character, but rather lighter in appearance to that of Gabo Island, and is found in abundance at the south end of the town.

It is composed almost entirely of quartz and orthoclase, and very little hornblende and biotite. The felspar is a fine pink colour, and the texture being fairly coarse it should prove a valuable building stone, as it polishes well.

BUNGENDORE.—A fine-grained red aplitic granite, outcrops about 8 miles to the north of Bungendore.

BUNGONIA.—There is red granite in this locality, but specimens have not come under the notice of the author.

COOMA.—A fine-grained red granite, outcrops on the Berridale-road, 17 miles south-west from Cooma (*A. E. Zeigler*).

Red Granite—continued.

JERANGLE.—

- (a) This is an even-grained rock, containing equal proportions of red orthoclase and quartz. It is very similar in appearance to the Braidwood red granite.
- (b) Porphyritic red granite. This is a coarse-grained rock, containing numerous large crystals of red-coloured orthoclase up to one inch in diameter. Should take a very handsome polish.

MAFFRA.—This locality is 25 miles south of Cooma. The rock is a pink, somewhat pale-coloured granite, fine in grain, and takes a good polish.

MULLOON CREEK.—A red, coarse, handsome granite occurs in unlimited quantities at this locality, which is situated 10 miles east of Bungendore. The colour is variegated, produced by the presence of a pink orthoclase and a pale-green vitreous plagioclase, whilst porphyritic quartz crystals also occur, along with hornblende and biotite.

MURRUMBATEMAN.—Mr. W. Fairley states that a red granite occurs west of this town.

TARAGO.—Extensive deposits of a flesh-coloured, coarse-grained granite occur about 6 miles south of Tarago, on the Braidwood Road.

Quartz and felspar (orthoclase) make up the bulk of the rock. It has not been worked yet.

Grey Granite.

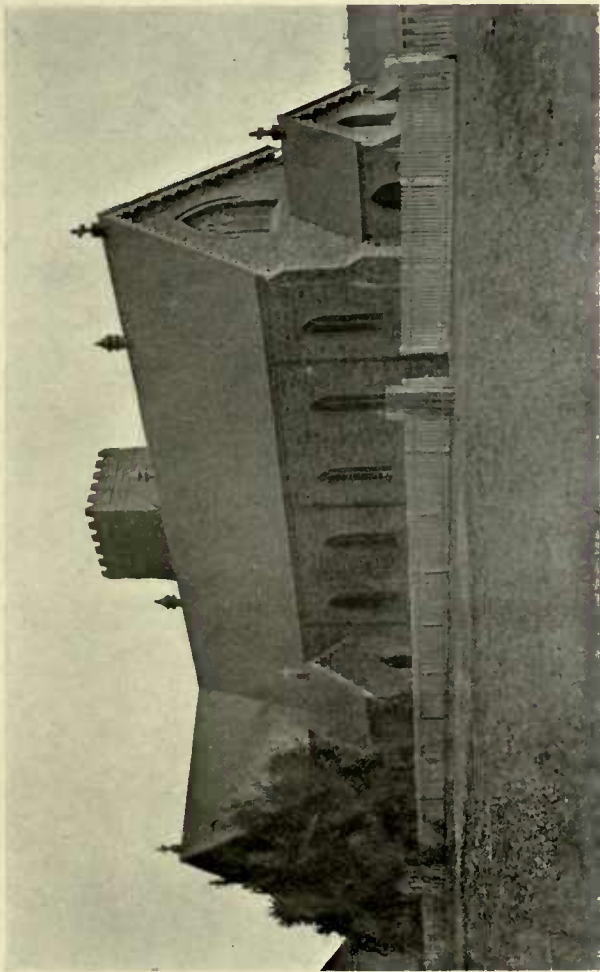
ADELONG.—The grey granite of this locality has been quarried near the town, and used for paving the streets of Tumut, and on the authority of Mr. J. Turner, of Goulburn, it is an excellent commercial stone.

ARNPRIOR (Larbert).—A grey granite, similar to that at Braidwood, is the chief rock in this locality.

BRAIDWOOD.—Extending almost from Tarago right into Braidwood, a distance of 18 or 19 miles, is a coarse-grained variegated hornblendic granite, somewhat resembling that of Table Mountain, Albury.

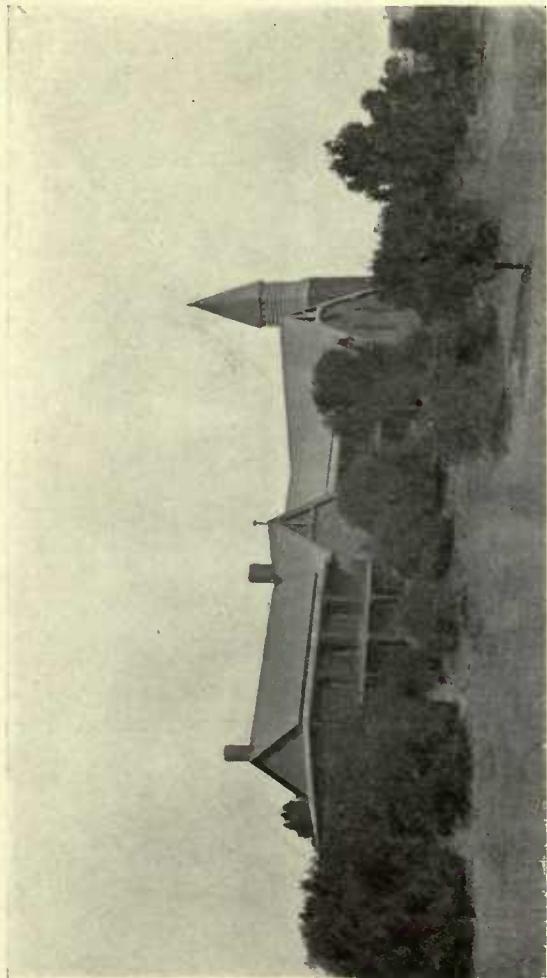
There are two species of felspar present, the larger portion consisting of pale-coloured plagioclase with a faint greenish tinge. There is also some pink orthoclase, and clear glassy quartz in abundance.

It is an excellent ornamental building material, and the Anglican and Roman Catholic churches are constructed of it, besides many of the business houses and residences in the town; and being in unlimited quantities it should be a very valuable building stone in the future.



C.F.L. Photo.

GREY GRANITE.
(ROMAN CATHOLIC CHURCH AT YOUNG.)



C.F.L. Photo.

GREY GRANITE.
(COWRA CONVENT.)

Grey Granite—continued.

2.—This variety is a fine-grained material, and occurs at the south end of Braidwood. It is, however, pale in colour, and the exposed blocks examined were too much weathered for one to give an opinion as to its fitness for building purposes. It requires, therefore, further investigation.

BREDBO.—A hard, fairly coarse granite, outcrops about 7 miles to the east of this township. It is similar in appearance to the Jerangle grey granite, but is lighter in colour.

BREADALBANE.—The Gunning granite extends eastwards within 3 or 4 miles of Breadalbane, and within 8 miles of Goulburn. (*J. Turner.*)

BUNGENDORE.—A very hard, tough, grey granite, outcrops between 4 and 5 miles north of this township on the Tarago-road. The rock is coarse in texture and outcrops in large boulders, which could be easily quarried.

COLLINGWOOD, NEAR GUNNING.—Here a quarry has been opened out. (*J. Turner.*)

COOMA.—On the Berridale-road, about 9 miles from Cooma, a fine-grained dark-coloured granite outcrops.

GUNNING.—A first-class granite outcrops about 6 miles west of Gunning, and in fact, constitutes the whole surface of the countryside between that spot and the town, but at present is not much worked, although the Anglican Church and several private houses are built of it.

It is a fine-grained hornblende granite, hard, tough, and dark in colour. The abundance of hornblende gives the stone sufficient colour for commercial purposes. Looks very well polished.

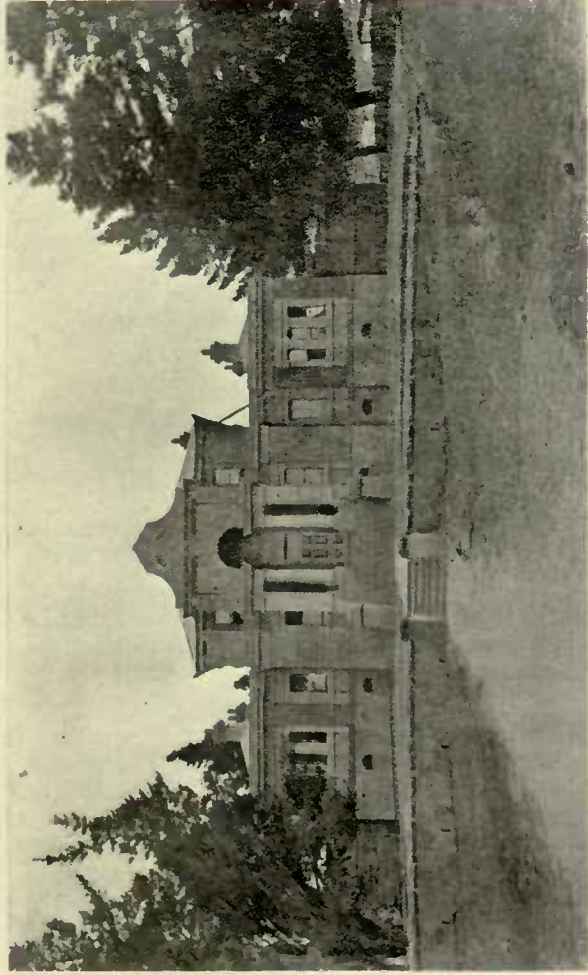
HARDEN.—Large outcrops of grey granite occur throughout the district. The rock is bright in colour, fresh-looking, and fairly tough.

JERANGLE.—

(a) Hornblende granite. This is a fairly coarse rock, with abundance of clear glassy quartz and large crystals of hornblende. It outcrops in the mountains to the east of Jerangle, in the form of large tables or floors, and so is easily quarried.

(b) Porphyritic grey granite. The base of this rock is of a very fine aplitic nature, and dark-grey in colour. Large porphyritic crystals of white felspar are abundant, while those of quartz are less common. Should polish very well.

TUMUT.—A deposit of this stone occurs near the serpentine belt, 16 miles N.E. of Tumut.



C. F. L. Photo.

GNEISS.
(COURT HOUSE, COOMA.)



C. F. L. Photo.

GNEISS.
(POST OFFICE AT COOMA.)

Gneiss.

BUNGENDORE.—There are unlimited quantities of this material available for building purposes. It is known locally as granite, and has been used in many buildings in Bungendore.

The matrix is a buff or yellowish colour with streaks of black, and is not unpleasant when polished, in fact looks like some kinds of marble.

COOMA.—Gneiss is the chief rock in the Cooma District, and has been largely used in the construction of

buildings within the town. The rock at first appearance is not unlike granite, and is dark-grey in colour, consisting chiefly of quartz, felspar, and abundant black mica (biotite). The schistose structure is not as a rule visible in small specimens and imparts but a slight grain to the stone, which is easily quarried and worked. There is an unlimited quantity available.

POMEROY, NEAR GOULBURN.—A grey material of this character occurs in the locality.

Porphyry.

Rocks of this nature are exceedingly well developed in the south-eastern plateau of New South Wales, and of necessity only a few of the many and distinct types can be tabulated.

BREDBO.—A light-coloured quartz porphyry with a pale bluish-grey base, outcrops immediately to the east of Bredbo. It should take a good polish.

BURROWA.—Dark quartz porphyries, similar to those at Yass, are abundant near the town, and are used in the construction of churches and other buildings.

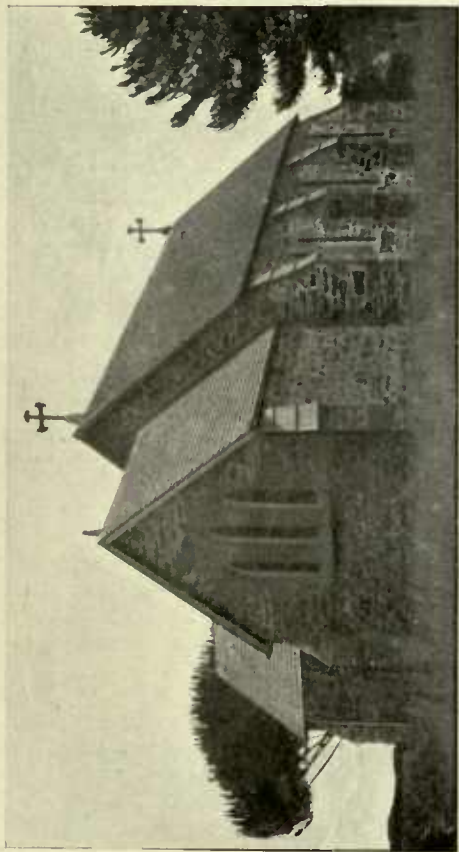
CANBERRA.—There is a rather plentiful supply of this dark, almost black rock, which splits easily with a slightly flinty fracture.

It has been used in part in the Canberra Church.

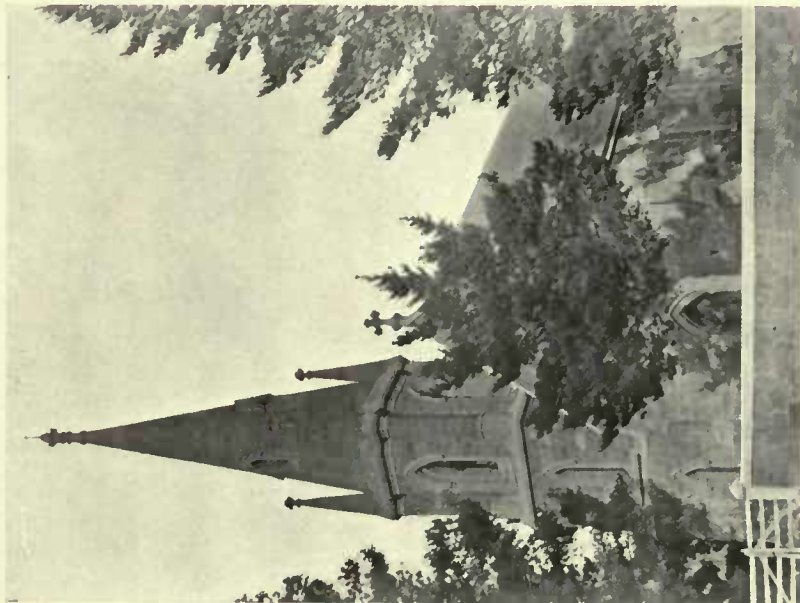
CURRAWANG.—Here occurs a small outcrop of felspar porphyry.

HALL.—Quartz porphyry occurs here, similar to that at Canberra. The church is built of this rock. It outcrops at intervals right throughout the district.

MICHELAGO.—Quartz felspar porphyry outcrops in the range of hills lying between the township and the Murrumbidgee River. The rock has a grey base, with abundance of white felspar, and sometimes approaches very near a granite in texture. Another variety occurs on the opposite side of this range. It is fine-grained, with abundant small crystals of pink orthoclase.



GNEISS.
(CHURCH OF ENGLAND, BUNGENDORE.)



GNEISS.
(CHURCH OF ENGLAND COOMA.)
C.F.L. Photo.

Porphyry—continued.

MURRUMBATEMAN.—To the west of the town is found a stone which has been called “stratified granite” but is in reality a quartz porphyry, similar to the other rocks of that type in the district. (*Vide* “Grey Granite,” Yass.)

URIARRA.—A very fine-grained quartz felspar porphyry is found near the Post Office. The base is dark, and there is an abundance of fine pink orthoclase.

A rock with a chocolate base, in which are embedded numerous white felspar and quartz crystals, outcrops on the Murrumbidgee River, below its junction with the Uriarra to Queanbeyan road.

YASS.—The hills surrounding this town are composed of this material, so that the supply is equal to all demands for a long time.

The base is a dark olive green, in which are numerous white, well-defined felspar crystals along with abundant clear glassy quartz, speckled with larger masses of green hornblende.

So far it is unworked, owing perhaps to its hardness—a quality that would be compensated by its durability.

Diorite.

GOULBURN.—A fine-grained, dark-coloured diorite is extensively developed in this district. The rock, which takes a good polish, has been largely used in the construction of local buildings.

JERANGLE.—A fine-grained dark diorite, very hard and tough, occurs as belts or dykes, up to 20 yards across, cutting through the granite of the locality.

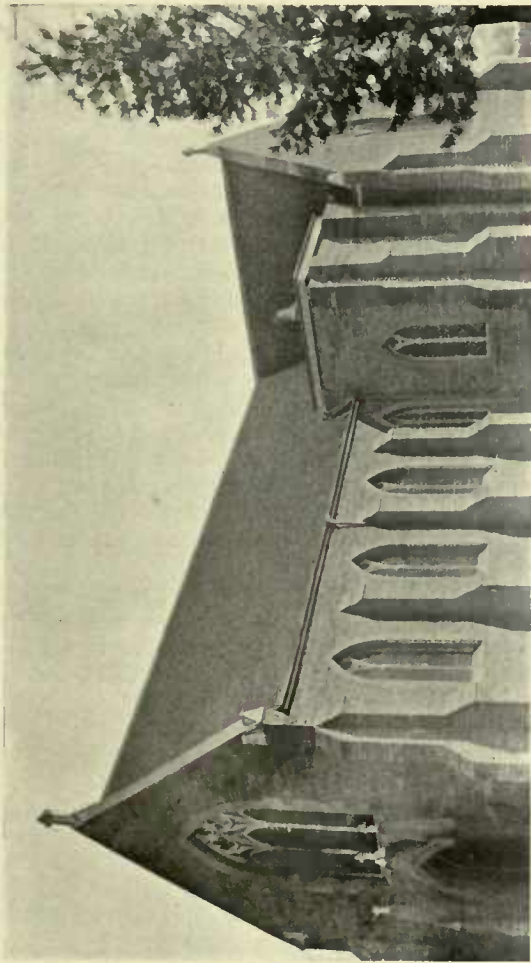
TARAGO.—A fine-grained green diorite occurs about 14 miles beyond this town in the direction of Braidwood. The predominant minerals are black hornblende, and a pale-green felspar (plagioclase) which being in about the same quantities, produce an even texture.

TUMUT.—This material occurs in abundance in the hill immediately to the south of the town. It is a peculiar rock, dark in colour but very uneven in texture; coarse patches occur at intervals through the matrix, consisting of lath-shaped white felspar crystals. It is very tough, and hard to work, and may be classified systematically as intermediate between a true diorite and porphyrite. It takes a good polish.

WEE JASPER.—The tops of the ranges south of Wee Jasper on the Tumut-road are composed of this hard, tough material.

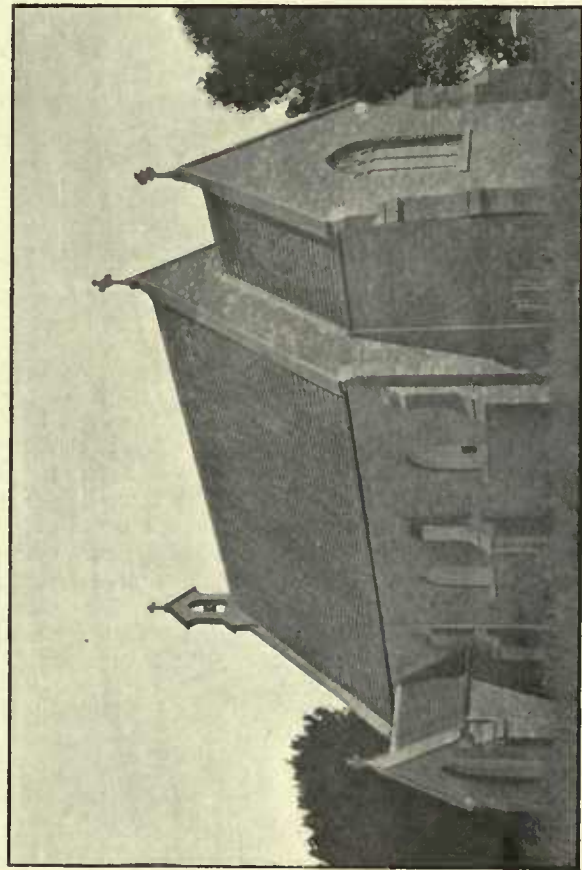
Basalt.

JERANGLE.—This rock is abundant near here, and is known locally as Whinstone.



C.F.L. Photo.

QUARTZ PORPHYRY.
(ROMAN CATHOLIC CHURCH, BURROWA.)



SLATE.
(CHURCH OF ENGLAND BREADALBANE)

Marble.

BINALONG.—A deposit outcrops near the railway line west of the Binalong railway station. A sage-green colour characterises the whole mass, though there is a paler-coloured variety with brown and green tinges throughout.

Our attention was drawn to this green-coloured marble by Mr. F. Rusconi, of Gundagai.

BRUNDLE CREEK.—A white marble obtrudes here, almost identical with that of the Tarrabandra stone.

BUNGENDORE.—A limestone of a dark grey colour is found about 6 to 8 miles east of this township.

BURROWA.—A rather handsome marble with large red markings occurs near Burrowa. (*F. Rusconi.*)

COOLALIE.—A deposit of marble occurs in this locality, about 1 mile north of the station, in a level, accessible situation. It outcrops in the form of large boulders over several acres of country, and at a short distance below the surface merges into solid rock. Like most marble deposits the texture shows several varieties. The surface specimens have a yellow stain, but this would most probably disappear, as the solid material is reached, which from indications should be snow-white.

The samples examined may be classed in colour as white, reddish tinge, and brown.

COOMA.—White marble is found at Tollbar, 5 miles N.E. of Cooma.

GOULBURN.—At Shea's Creek, 6 miles east of the town, a red marble outcrops.

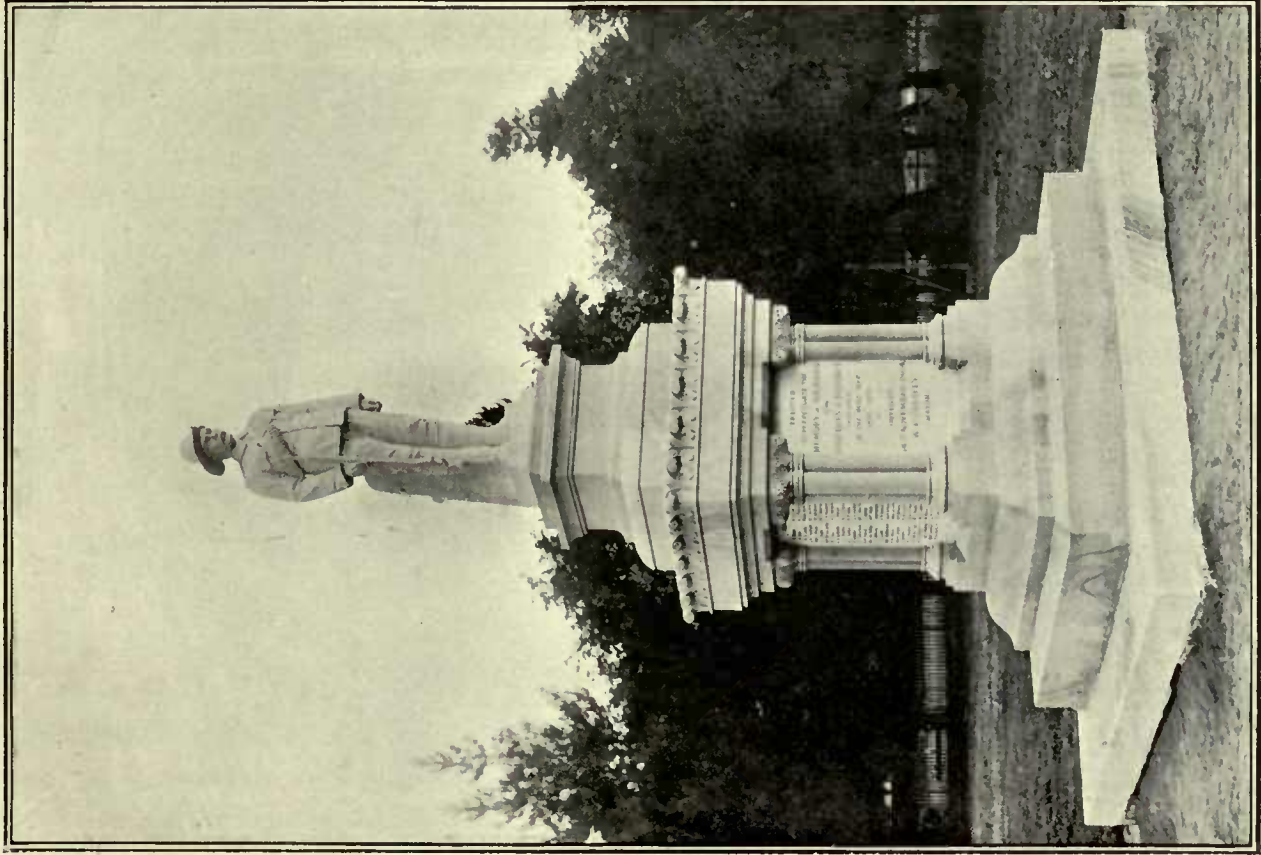
GILMORE.—Here occurs what is probably the finest white or statuary marble yet unearthed in N.S.W.

It outcrops at the side of the mountain at Upper Gilmore, 15 miles S.W. of Tumut. The belt strikes N.W. and S.E., and is approximately about 120 feet in thickness, with an almost vertical stratification giving it a well defined grain. It thus splits readily into slabs, sometimes very thin, although some large pure-white blocks have been obtained, the prevailing colour being pink, banded with dark green laminæ. It is fine-grained, even in texture, pure white, having a translucency near the edges, or in thin slices. At greater depths larger blocks would be most probably found. The quarry is worked by Mr. Back, of Gilmore, for lime.

JEIR.—One mile south of Jeir on the main road an outcrop of marble occurs. It is unworked. The colour varies from a light to a deep chocolate and often shows a pretty mottling.

MICHELAGO.—A very large deposit of marble outcrops on the Murrumbidgee River, 2 miles west from the township. There are many varieties, which include white, yellow, brown, blue, and pink coloured marbles. A purple, crinoidal variety is very handsome and similar in appearance to the Kempsey stone. This locality is unfortunately at present somewhat difficult of access.

NORONGO.—An outcrop of marble varying in colour from nearly white to dark-blue occurs at this locality, which is about 10 miles from Captain's Flat. The rock is characterised by its remarkable contortion; and, on polishing, this character should give it a peculiar and rare appearance.



BASE AND PEDESTAL OF BUNDANOON SANDSTONE.
SOLDIERS' MEMORIAL, COULBURN.

Marble—continued.

QUEANBEYAN.—The outcrop is in the form of high bluffs, which flank the Queanbeyan River about 3 miles S. of the town. Unlike most rocks of this nature it is finely laminated, and splits with a well-defined grain parallel to the lamination. The laminae are very thin and vary in colour, producing varying combinations. White, blue, pale-pink, brownish, and light-green varieties are all common. In places the rock is contorted in an extraordinary manner. Cut at right angles to the lamination, this would make a handsome and rare ornamental stone, and the quantity available is inexhaustible.

TARRABANDRA.—This belt occurs about 12 miles north of Tumut, and appears to be similar in character to the Gilmore deposit, to which formation it runs parallel, and like that material looks well polished. It was worked by a Melbourne company thirty-six years ago, but after a short time work was discontinued.

WEE JASPER.—There is an extensive deposit of a dark-coloured limestone in this locality, but a large portion

of it will be covered by the waters of the Barren Jack reservoir.

A much better marble occurs about 4 miles south from this, on the banks of the Little River. It is fine and even in grain, but has not been worked ; so no further data can be given.

WINDELLAMA.—A large deposit of dense black marble outcrops on Windellama Creek, 2 miles from the post office. There is an unlimited quantity available, and it is the best black marble yet found in New South Wales. It is easily quarried into slabs which are very sound.

YASS.—The district is well favoured in its limestones. There is a handsome black variety on the hill to the west of the town, which appears suitable for building.

A fossiliferous variety outcrops at Hatton's Corner, 2 miles from Yass. It is entirely constructed of corals and other organisms. Polished, the coral has a very ornamental character, and it should do well for mantelpieces and mural decorations.

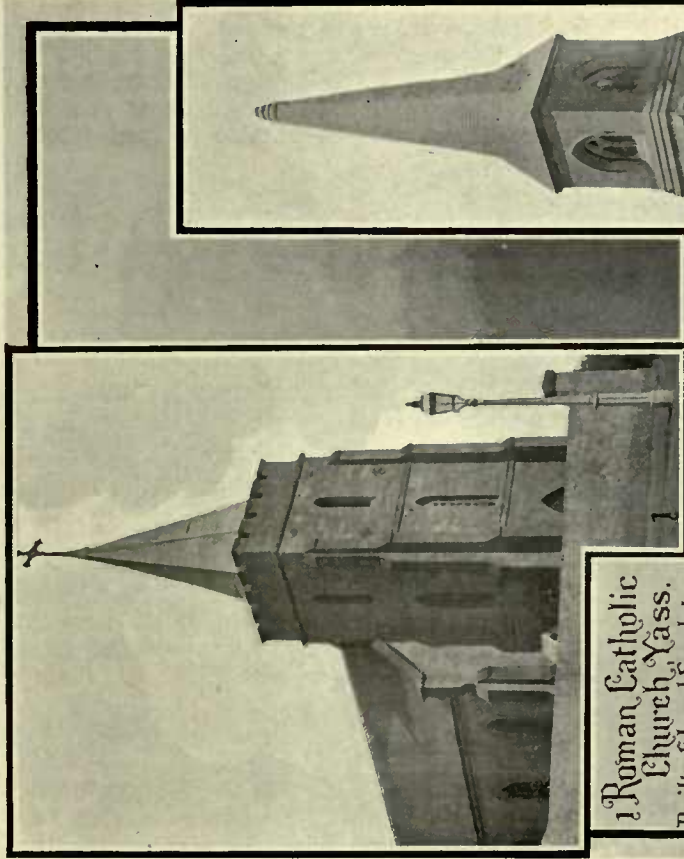
Slate.

This material occurs in a great many localities throughout the whole southern district, but so far only inferior qualities have been quarried.

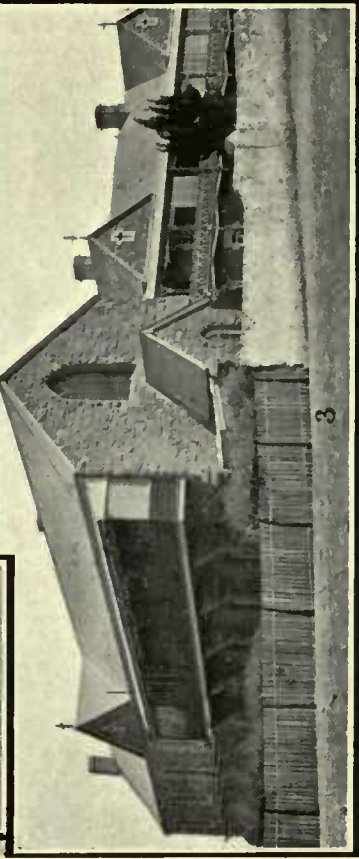
BUNGENDORE.—It has been reported that a slate in a form capable of being split into large slabs occurs about 5 miles south-east of Bungendore on the Captain's Flat Road. It is also stated, however,

that it is somewhat soft and might be useful for flagging, but requires investigating regarding its economics.

COOMA.—A large deposit of roofing slates outcrop near the Adaminaby-road. 11 miles W. of Cooma. The rock is blue in colour, hard, and splits readily into slabs $\frac{1}{8}$ of an inch in thickness.



1 Roman Catholic Church, Yass.
 Built of Local Sandstone
2 Church of England, Canberra.
 Built of Sandstone and Quartz Porphyry.
3 Roman Catholic Convent, Yass.
 Built of Blue Calcareous Sandstone.



VARIOUS NEW SOUTH WALES BUILDING MATERIAL.

Slate—continued.

GUNDAGAI.—A slate quarry has been opened near this township, and there is any quantity of material available. The rock is hard with a good surface, but the cleavage is hardly fine and regular enough in the material examined. Better results may yet be obtained when investigated on a more extensive scale.

JERRAWA.—There is a fairly extensive slate deposit about 3 miles east of this town. It is difficult to give an opinion on its qualities as only surface material is procurable, which, however, is fissile, splitting easily into very thin leaves.

The indications are that at a lower depth it might prove a satisfactory slate.

QUEANBEYAN.—From 4 to 5 miles from the township on the Cooma-road, slates, splitting readily into thin slabs with good lustrous surfaces, outcrop. The weathered nature of the specimens examined renders it impossible to estimate its quality below the surface.

TARALGA.—At Currawang Creek there is a deposit of blue slate suitable for flagging and roofs, especially the latter, for in colour it equals the best blue Welsh. (*J. Turner.*)

TOWRANG.—A slate quarry was opened here many years ago, but has not since been worked.

Serpentine.

GUNDAGAI.—A material similar to that of Tarrabandra is abundant in and around Gundagai, but requires further exploiting. When polished takes a deep green colour, and looks very well.

TARRABANDRA.—A dark olive-green coloured, mottled serpentine is found here running in a north-west and south-east direction. Only surface material

was available for examination, but the indications point to the presence of good serpentine.

TUMUT.—A belt of blue and green serpentine crosses the main road some 16 miles north-east of Tumut, and is probably a continuation of the Gundagai belt, running as it does in a north-west and south-east direction.

Quartzite.

BURROWA.—An outcrop of quartzite is found about 9 miles from Burrowa, on the Young-road. The rock is fissile, splits readily into slabs, and is used for flagging in the township.

QUEANBEYAN.—This is an abundant stone in this neighbourhood, the white varieties having been used in commercial buildings and ecclesiastical edifices in the town.



MARULAN SANDSTONE.
(ST. SAVIOUR'S ANGLICAN CATHEDRAL, GOULBURN.)

Quartzite—continued.

TARAGO.—The most common rock at this locality is a hard, pure white quartzite. It has, however, not yet been worked, but being available in any quantity might be useful in the future.

TARRABANDRA.—There is a peculiar form of foliated quartzite at this place, but so jointed at the surface

that only small specimens are available. Mr. Harlow's house is built of this material.

URIARRA.—A large outcrop of massive, dark-red quartzite, outcrops on the Murrumbidgee River at its junction with the Uriarra to Queanbeyan road.

Sandstone.

BARBER'S CREEK.—The sandstone of this locality is of good quality, although occurring in narrow layers separated by intervening pebble beds. (*J. Turner.*)

BRAIDWOOD.—At Nerriga there is a fine-grained sandstone.

BUNDANOON.—This is one of the best sandstones in New South Wales for big buildings. It has been used in the Goulburn Court-house, and generally in all buildings of any pretensions in the Southern District. Varies in colour from white to pink. It forms the base and pedestal of the Soldiers' Memorial at Goulburn, the photograph of which was kindly lent by Mr. J. Turner, Goulburn.

CANBERRA.—Several quarries have been opened out in this material, but with hardly satisfactory results, although it has been used in some of the local public buildings. It is stated that the red variety makes a handsome building stone in conjunction with other white stones, such as Canberra and Bundanoon.

The Canberra church is built of the white Canberra stone.

GALONG.—At this locality is a hard, buff-coloured sandstone, which is excellent for flagging and steps. It has been used for flagging on the platform of the Binalong Railway Station. (*J. Turner.*)

GRONG GRONG.—There is a quarry here of hard, red flagging, somewhat resembling that of Galong. It has been used for flagging and kerbstones in the Wagga District. (*J. Turner.*)

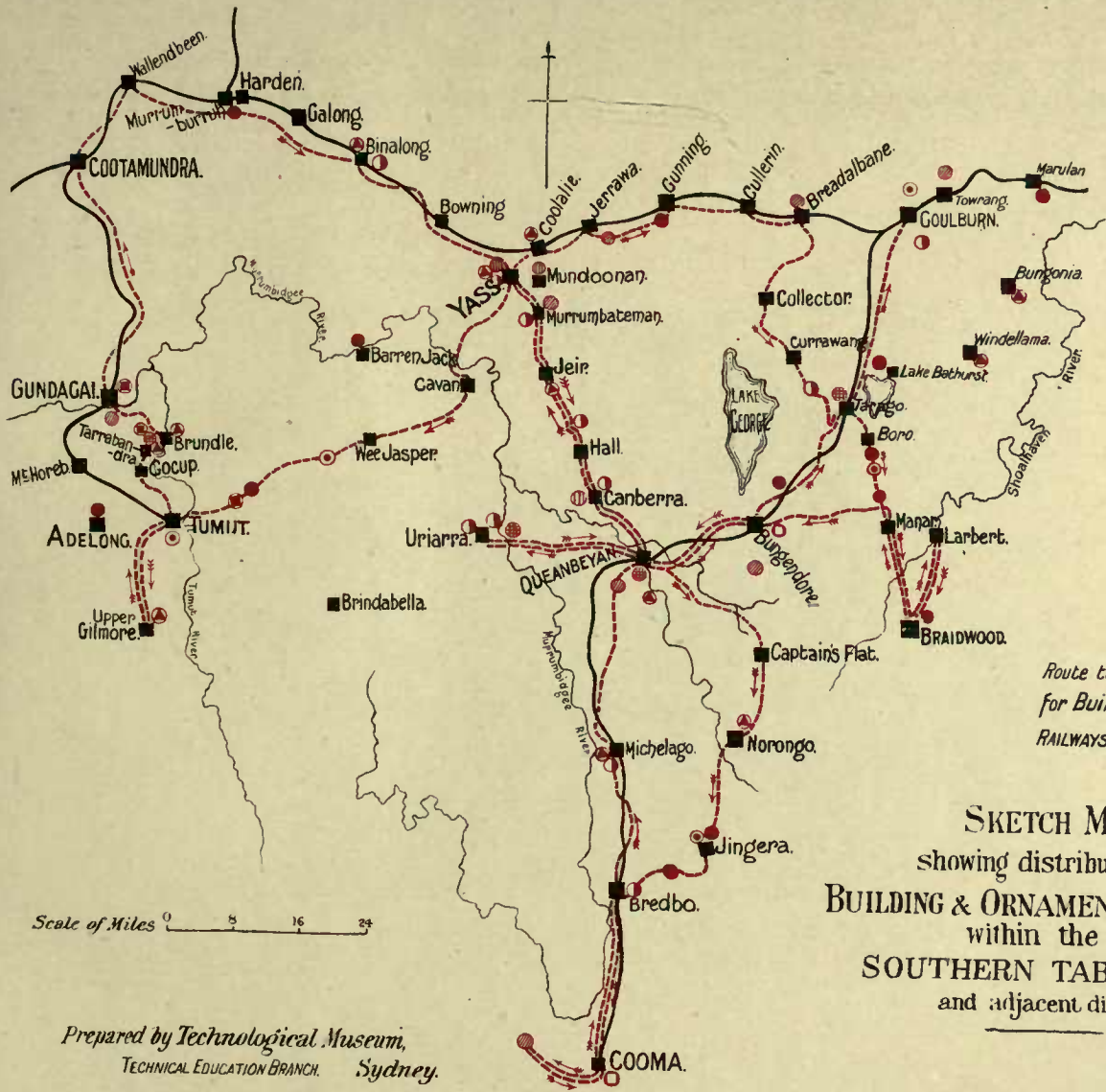
MARULAN.—There is a good building sandstone at Marulan, which has long been used in buildings in some of the Southern cities.

MUNDOONAN.—There is a sandstone here that is used in local building construction, and is of a very fair quality.

YASS.—At the Gap and Barber's Mill Quarry a sandstone has been quarried and used in some quantity in locally constructed edifices, such as churches, &c.

It is grey in colour, and has a fairly even texture, but there is no data so far available concerning its durability.

A blue-coloured calcareous sandstone is employed locally in large buildings, and so far appears to give satisfaction. A bed occurs near the banks of the Yass River, and is easily quarried and dressed, and so is a good freestone.



- GRANITE.
- PORPHYRIES.
- DIORITE.
- GNEISS.
- MARBLE.
- SLATE.
- SERPENTINE.
- SANDSTONE.
- QUARTZITE.

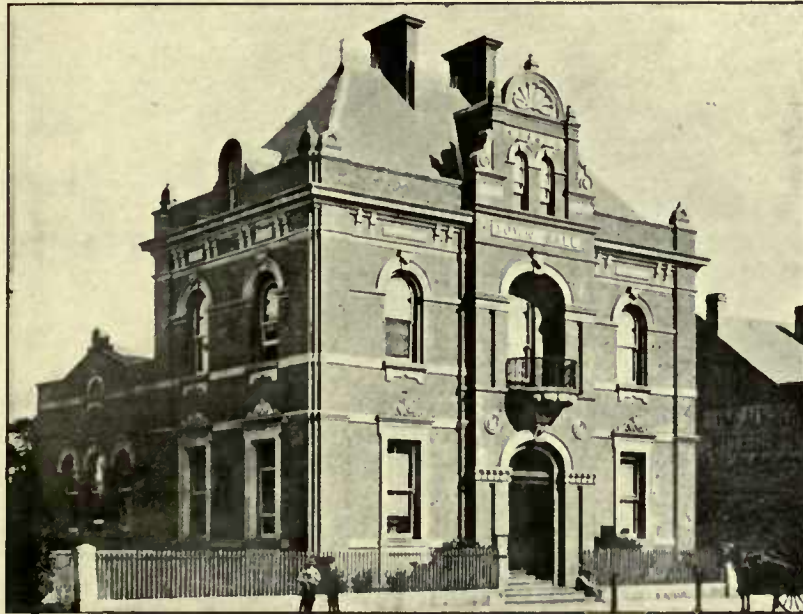
Route taken in a flying survey
for Building Stones *--- --*
RAILWAYS shown thus *—*

SKETCH MAP
showing distribution of
BUILDING & ORNAMENTAL STONES
within the
SOUTHERN TABLELAND
and adjacent districts.

Scale of Miles 0 5 16 24

Prepared by *Technological Museum,*
TECHNICAL EDUCATION BRANCH, Sydney.

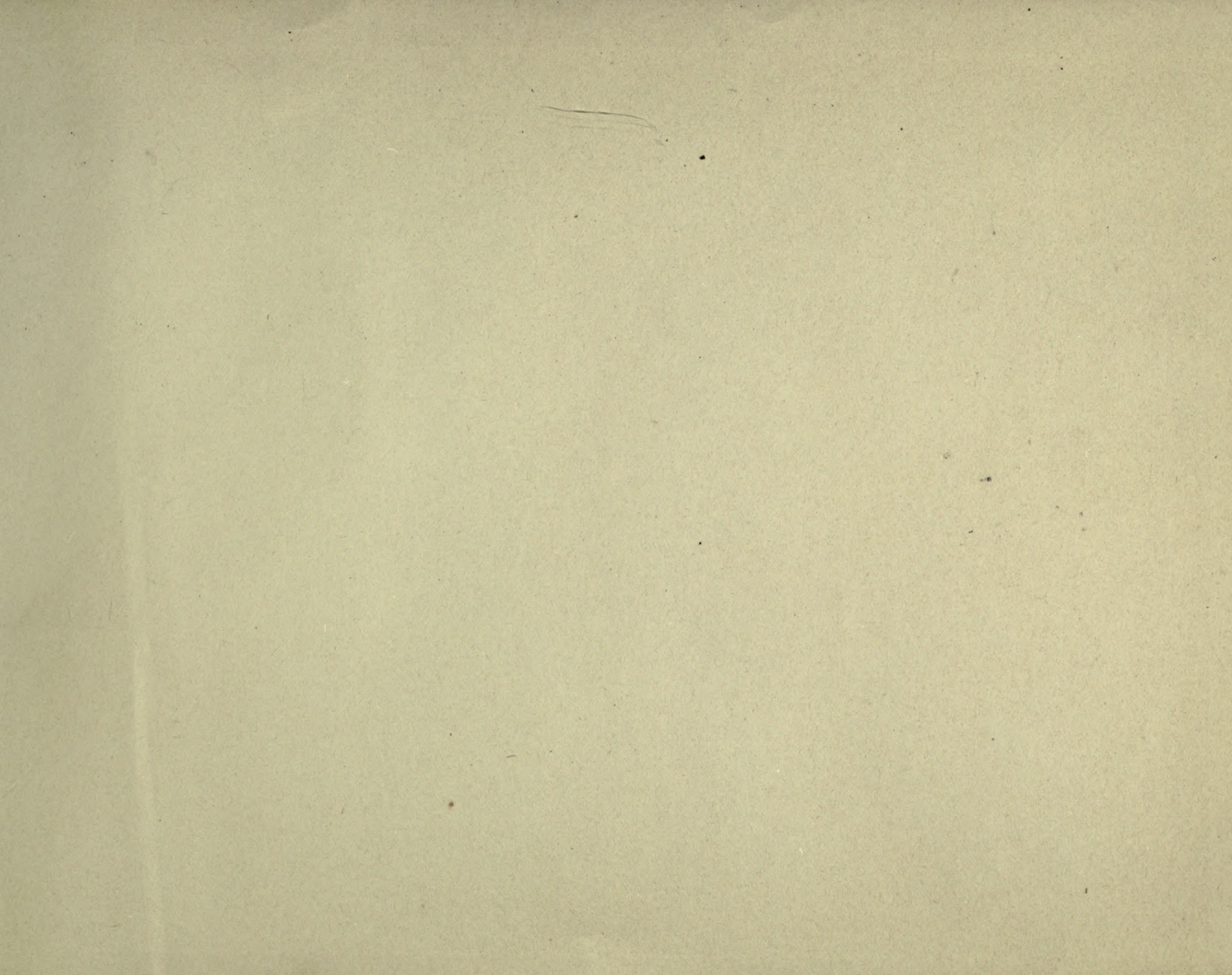




BUNDANOON SANDSTONE DRESSINGS.
(GOULBURN TOWN HALL.)

SYDNEY :
W. A. GULLICK, GOVERNMENT PRINTER.
—
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