THE MINERALS OF NEW SOUTH WALES.

INTRODUCTION.

The following account of the minerals of New South Wales originated in a paper which was read before the Royal Society of New South Wales in December 1874, and appeared in the Society’s Transactions for that year. A second and enlarged edition of it appeared in the “Mineral Products of New South Wales,” published by the Mining Department in 1882. In this, the third edition, an effort has been made to bring the matter up to date, in order that it may serve, as far as possible, as a record of the progress made in our knowledge of the mineralogy of New South Wales during the first hundred years of the colony’s history. Since 1874 every opportunity open to me has been taken advantage of to correct and add to it; special attention has been paid to the chemical composition of the minerals; but on account of the great length of time required to make complete analyses, and the difficulty of obtaining specimens sufficiently pure for the purpose, the number of minerals analysed is by no means equal to my wishes.

In addition to my own, I have incorporated the analyses of minerals made by others, and notably those made by Mr. W. A. Dixon, F.I.C., and by the Government Analyst for the Mining Department, and published in the Annual Reports of the Department of Mines, Sydney.

I may perhaps state that the descriptions of the minerals are given almost entirely from specimens which I have either collected myself or which have come under my own personal observation. It is much to be regretted that no systematic examination of the minerals and rocks of New South Wales has been undertaken similar to that performed in other colonies. The amount of exact information upon the chemical composition of the various minerals occurring in New South Wales which has yet been published is extremely small, and by no means equal to what might naturally be expected from a colony so rich and prosperous, and so well endowed with mineral wealth.

Great difficulty has been experienced in identifying certain of the
INTRODUCTION.

localities from the changes which the names of places have, in many cases, undergone—numbers of localities I have had to reject altogether on this account, and some uncertain ones probably still remain; but every effort has been made to eliminate errors of the kind as far as possible. Some mistakes have doubtless crept in, for in such a work as this it is almost impossible that some should not occur, although I have done my best to keep the number down to as few as possible. Too often it is the practice to intentionally mislead, especially if the collector fancies that the mineral is likely to be of commercial value; this is done, of course, with the object of preventing the information leaking out in any way, and the finder being forestalled in making application for a mineral lease or the right to work the deposit.

Some of the localities have been taken from papers published by the late Rev. W. B. Clarke, M.A., F.R.S., the late Mr. Stutchbury, who was for some time Government Geologist, from some of the reports of the earlier explorers, and from the publications of the Mining Department.

The Mineral Map, although based upon the one issued by the Department of Mines in 1885, is practically a new one, prepared afresh from the information gathered together in this volume.

At the end of the book I have reproduced some papers, which were out of print, since they may be of interest in connection with the mineralogy and geology of New South Wales.

I know that the work has many imperfections, but I feel that those who are aware of the difficulties met with in preparing a book of this kind will be ready to make allowance for its shortcomings. In order that it might appear in 1888, the centenary of the settlement of Australia, I have had it printed and published during my absence from the colony, and under conditions which rendered undivided attention to it impossible and access to books of reference difficult.

I have, however, received valuable help in the preparation for the press and in the correction of proofs from Mr. Felix Oswald, and I have much pleasure in acknowledging the assistance which he has rendered me.

A. LIVERSIDGE.

London, December 1887.
DIAGRAM SHOWING THE VALUE OF THE ANNUAL PRODUCTION OF GOLD, COAL, COPPER AND TIN IN NEW SOUTH WALES, FROM 1861 TO 1886 INCLUSIVE.

INDEX TO LINES.

Total Minerals Only
Gold
Coal
Copper
Tin

The vertical divisions indicate the years, and the horizontal divisions denote the value of the minerals.
PART I.

METALLIC MINERALS.

GOLD.

Only one true mineral species of gold has up to the present been found in New South Wales, and that is—

NATIVE GOLD.

Crystallises in the cubical system. Well-developed crystals are very rare, and are never of large size, seldom exceeding \( \frac{1}{4} \) inch in diameter, and the faces are usually more or less cavernous; the most common form are the octahedron and rhombic dodecahedron; single and detached crystals are seldom found—they are usually attached end to end, forming strings, wires, and branching or arborescent forms. A beautiful branching tree-like group of large rhombic dodecahedral crystals, weighing some 20 oz., was formerly to be seen in the Australian Museum collection; but the specimen has been stolen, so that it is unfortunately lost to science, for no goniometrical measurements were made, and not even a cast or drawing seems to have been retained. Occasionally elongated crystals of rhombic dodecahedra are met with, arranged in columnar masses very similar to groups of basaltic columns. Some very perfect crystals were obtained in the early days of gold-mining from the Louisa Creek. As with other minerals, the smaller crystals are usually the most perfect.

A beautiful group of gold crystals is to be seen in the Museum of Science and Art at Edinburgh—perhaps one of the finest in existence. A model of this rare and very valuable nugget has been kindly made for me by the late Professor Archer, the Director of the Museum.

As will be seen from the woodcut, the crystals are for the most part imperfect octahedra and elongated cubes; some have imperfectly developed faces of the rhombic dodecahedron, joined end to end in an arborescent form.
THE MINERALS OF NEW SOUTH WALES.

Professor Archer was under the impression that the specimen came from New South Wales, but the exact locality is no longer known. This notice may, perhaps, draw attention to the specimen, and be the means of eliciting some information as to its history.

It is much to be regretted that more of such specimens have not been preserved. At the present day they are extremely scarce, and even in the early days of the gold discoveries they were never abundant. Unfortunately most of them very quickly find their way into the melting-pot, and of the few which have been preserved, probably even fewer are to be found in Australia than elsewhere.

Filiform, reticulated, and spongy shapes are common; but more so are irregular plates, scales, and strings, which interpenetrate the matrix in every direction. In one or two specimens from the “Uncle Tom Mine,” Lucknow, I have observed capillary crystals or filaments of gold resembling the artificial “moss gold,” or the better known “moss copper;” in this mine the gold occurs with mispickel and calcite, the matted or moss-like filaments being met with in small cavities in the former mineral.* Sometimes, as observed by Mr. C. S. Wilkinson at the Cowarbee Mine, about forty miles north-west of Wagga Wagga, the plates are so exceedingly thin that they form mere films like gold-leaf, and in this particular instance the films run both between and across the laminae of the red-coloured schistose rock in which they occur. Then, again, gold occurs in New South Wales, as elsewhere, so finely divided and equally diffused throughout the matrix as to be invisible even by the aid of a lens.

In alluvial deposits gold occurs in more or less rounded and water-worn flattened grains, scales, and pebbles or nuggets. The largest nuggets discovered in Australia have been found in Victoria; none at all to compare with them in size have been found in New South Wales.

METALLIC MINERALS.

EXAMPLES OF NEW SOUTH WALES GOLD MASSES AND NUGGETS.

No. 1. Found in July 1851 by a native boy, amongst a heap of quartz, at Mercoo Creek, or Louisa Creek, River Turon, fifty-three miles from Bathurst, and twenty-nine miles from Mudgee, New South Wales, where there is now a township known as Hargraves. It was in three pieces when discovered, though generally considered as one mass. The aboriginal who discovered these blocks “observed a speck of some glittering yellow substance upon the surface of a block of quartz, upon which he applied his tomahawk, and broke off a portion.” One of the pieces weighed 70 lbs. avoird., and gave 60 lbs. troy of gold; the gross weight of the other two about 60 lbs. each. These three pieces, weighing $1\frac{1}{4}$ cwt., contained 106 lbs. troy, of gold, and about 1 cwt. of quartz. In the same year another nugget, weight 30 lbs. 6 oz., was discovered in clay, twenty-four yards from the large pieces; and in the following year, near to No. 6, there were found two nuggets, weighing 157 oz. and 71 oz.

Gross weight (troy), 106 lbs., or 1272 oz.

The following account of the discovery of the above “hundred-weight of gold,” as it was termed, is quoted in Stirling’s “Gold Discoveries of 1862,” from the Sydney Morning Herald of 18th July 1851:—

“Bathurst is mad again. The delirium of golden fever has returned with increased intensity. Men meet together, stare stupidly at each other, talk incoherent nonsense, and wonder what will happen next. Everybody has a hundred times seen a hundredweight of flour; a hundredweight of sugar or potatoes is an everyday fact; but a hundredweight of gold is a phrase scarcely known in the English language. It is beyond the range of our ordinary ideas—a sort of physical incomprehensibility; but that it is a material existence our own eyes bore witness on Monday last.

“Mr. Suttor, a few days previously, threw out a few misty hints about the possibility of a single individual digging four thousand pounds’ worth of gold in one day, but no one believed him serious. It was thought that he was doing a little harmless puffing for his own district and the Turon Diggings. On Sunday it began to be whispered about town that Dr Kerr (Mr Suttor's brother-in-law) had found a hundredweight of gold. Some few believed it; but the townspeople generally, and amongst the rest the writer of this article, treated the story as a piece of ridiculous exaggeration and the bearer of it as a jester, who gave the Bathurstonians unlimited credit for gullibility. The following day, however, set the matter at rest. About two o’clock in the afternoon two greys, in tandem, driven by W. H. Suttor, Esq.,
THE MINERALS OF NEW SOUTH WALES.

M.C., made their appearance at the bottom of William Street. In a few seconds they were pulled up opposite the Free Press Office, and the first indication of the astounding fact which met the view was two massive pieces of the precious metal, glittering in virgin purity as they leaped from the solid rock. An intimation that the valuable prize was to reach the town on that day having been pretty generally circulated in the early part of the morning, the townspeople were on the qui vive, and in almost as little time as it has taken to write it 150 people had collected around the gig conveying the time’s wonder, eager to catch a glimpse of the monster lump said to form a portion of it. The two pieces spoken of were freely handed about amongst the assembled throng for some twenty minutes. Astonishment, wonder, incredulity, admiration, and the other kindred sentiments of the human heart were depicted upon the features of all present in a most remarkable manner, and they were by no means diminished in intensity when a square tin box in the body of the vehicle was pointed to as the repository of the remainder of the hundredweight of gold. Having, good-naturedly, gratified the curiosity of the people, Mr. Sutter invited us to accompany his party to the Union Bank of Australia to witness the interesting process of weighing. We complied with alacrity, and the next moment the greys dashed off at a gallant pace, followed by a hearty cheer from the multitude.

“In a few moments the tin box and its contents were placed on the table of the board-room of the bank. In the presence of the manager, David Kennedy, W. H. Sutter, I. J. Hawkins, Esqs., and the fortunate proprietor (Dr. Kerr) the weighing commenced, Dr. Machattie officiating, and Mr. Ferrand acting as clerk. The first two pieces already alluded to weighed severally 6 lbs. 4 oz. 1 dwt. and 6 lbs. 13 dwts., besides which were sixteen drafts of 5 lbs. 4 oz. each, making in all 102 lbs. 0 oz. 5 dwts. From Dr. Kerr we learned that he had retained upwards of 3 lbs. as specimens, so that the total weight found would be 106 lbs. (one hundred and six pounds), all disembowelled from the earth at one time. And now for the particulars of this extraordinary gathering, which has set the town and district in a whirl of excitement.

“A few days ago an educated aboriginal, formerly attached to the Wellington Mission, and who had been in the service of W. J. Kerr, Esq., of Wallawa, about seven years, returned home to his employer with the intelligence that he had discovered a large mass of gold amongst a heap of quartz upon the run whilst tending his sheep. Gold being the universal topic of conversation, the curiosity of this sable son of the forest was excited, and, provided with a tomahawk, he had amused himself by exploring the country adjacent to his employer’s land, and had thus made the discovery. His attention was first called
METALLIC MINERALS.

to the lucky spot by observing a speck of some glittering yellow sub-
stance upon the surface of a block of quartz, upon which he applied
his tomahawk and broke off a portion—at that moment the splendid
prize stood revealed to his sight. His first care was to start off home
and disclose his discovery to his master, to whom he presented what-
ever gold might be procured from it. As might be supposed, little
time was lost by the worthy doctor. Quick as horseflesh would carry
him, he was on the ground, and in a very short period the three blocks
of quartz, containing the hundredweight of gold, were released from
the bed, where, charged with unknown wealth, they had rested perhaps
for thousands of years, awaiting the hand of civilised man to disturb
them. The largest of the blocks was about a foot in diameter, and
weighed 75 lbs. gross. Out of this piece 60 lbs. of pure gold was
taken. Before separation it was beautifully encased in quartz. The
other two were something smaller. The auriferous mass weighed as
nearly as could be guessed from 2 to 3 cwt. Not being able to move
it conveniently, Dr. Kerr broke the pieces into small fragments, and
therein committed a very grand error—as specimens the glittering
blocks would have been invaluable. Nothing yet known of would
have borne comparison, or, if any, the comparison would have been in
our favour. From the description given by him, as seen in their
original state, the world has seen nothing like them yet.

"The heaviest of the two large pieces presented an appearance not
unlike a honeycomb or sponge, and consisted of particles of a crystal-
line form, as did nearly the whole of the gold. The second larger
piece was smoother, and the particles more condensed, and seemed as
if it had been acted upon by water. The remainder was broken into
lumps of from 2 to 3 lbs. and downwards, and were remarkably free from
quartz or earthy matter. When heaped together on the table they pre-
sented a splendid appearance, and shone with an effulgence calculated
to dazzle the brain of any man not armed with the coldness of stoicism.

"The spot where this mass of treasure was found will be celebrated
in the golden annals of these districts, and we shall therefore describe
it as minutely as our means of information will allow. In the first
place, the quartz blocks formed an isolated heap, and were distant
about 100 yards from a quartz-vein, which stretches up the ridge from
the Murroo Creek. The locality is the commencement of an undulating
tableland, very fertile, and is contiguous to a never-failing supply of
water in the above-named creek. It is distant about fifty-three miles
from Bathurst, eighteen from Mudgee, thirty from Wellington, and
eighteen from the nearest point of the Macquarie River, and is within
about eight miles of Dr. Kerr's head station. The neighbouring
country has been pretty well explored since the discovery, but, with
the exception of dust, no further indications have been found.
THE MINERALS OF NEW SOUTH WALES.

"These particulars were kindly furnished by Mr. Suttor and Dr. Kerr, and may therefore be relied on as correct."

No. 2. A model of what is said to be the first large nugget found in New South Wales is to be seen in the Australian Museum, Sydney. Found in Ophir Creek.

Several other large nuggets appear to have been found in this creek, but none of them approaching to the above in size and value.

No. 3. A nugget weighing 26 oz. was found at Bingera in 1852.

No. 4. Found by a party of four, on 1st November 1858, at Burrandong, near Orange, New South Wales, at a depth of 35 feet, when pounded with a hammer it yielded 120 lbs. of gold, for which £5000 were offered. Melted at the Sydney Mint, when it weighed 1286 oz. 8 dwt.; after refining, 1182 oz. 7 dwt.; loss, 8 per cent.; fineness, 87·4 per cent.; the standard weight of gold being 1127 oz. 6 dwt. Value, £4839, 8s. 10d. The gold was mixed with quartz and sulphide of iron (mudic). Assay, 87·40 per cent. gold = 20 car. 3½ car. grs.

Gross weight (troy), 107 lbs. 2 oz. 8 dwt.; or, 1286 oz. 8 dwt.

No. 5. Found at Kiandra, Snowy River, New South Wales, October 1860.

Gross weight (troy), 33 lbs. 4 oz.; or, 400 oz.

No. 6. "The Brenan Nugget." Found in Meroo Creek, Turon River, New South Wales, embedded in clay; measures 21 inches in circumference. It was found twenty-four yards from No. 1. Sold in Sydney, 1851, for £1156.

Gross weight (troy), 30 lb. 6 oz.; or, 364 oz. 11 dwt.

No. 7. Found at New Chum Hill, Kiandra, Snowy River, New South Wales, July 1861.

Gross weight (troy), 16 lbs. 8 oz.; or, 200 oz.

No. 8. Found at Kiandra, Snowy River, New South Wales, March 1860.

Gross weight (troy), 13 lbs. 4 oz.; or, 160 oz.

No. 9. Found, in 1852, at Meroo Creek, Turon River, New South Wales, close to No. 1. This was called "The King of the Water-worn Nuggets."

Gross weight (troy), 13 lbs. 1 oz.; or, 157 oz.

No. 10. Found in 1860, at the Tooloom Diggings, New South Wales; nearly solid gold.

Gross weight (troy), 11 lbs. 8 oz.; or, 140 oz.

No. 11. Found at Kiandra, Snowy River, New South Wales, March 1860.

Gross weight (troy), 7 lbs. 9 oz. 18 dwt.; or 93 oz. 18 dwt.

No. 12. Found in 1852, at Louisa Creek, New South Wales; a solid lump of gold.
METALLIC MINERALS.

Gross weight (troy), 6 lbs. 10 oz.; or 82 oz.
No. 13. Found by two boys, in July 1861, at Gundagai (new diggings), New South Wales.
Gross weight (troy), 5 lbs. 4 oz. 7 dwt.; or 64 oz. 7 dwt.
No. 14. Found in 1857, at Louisa Creek, New South Wales; gold and crystallised quartz.
Gross weight (troy), 4 lbs. 2 oz.; or 50 oz.
No. 15. Found at New Chum Hill, Kiandra, New South Wales, in July 1861.
Gross weight (troy), 3 lbs. 6 oz.; or 42 oz.
No. 16. Found at Summer Hill Creek, New South Wales. The earliest nugget found in New South Wales after the gold discovery there by Hargraves. 18th May 1851.
Gross weight (troy), 1 lb. 1 oz.; or 13 oz.
In the Annual Reports of the Mines Department the discovery of the following nuggets are reported:—
Nos. 17 to 23. A nugget weighing 22 oz. 18 dwt. 12 grs. was found in 1874 on “McGuigan’s Lead,” about nine miles from Parkes; the metal was of dark colour and free from gangue; also one of 134 oz., and other smaller ones of 7 oz., 25 oz., 35 oz., 37 oz.; and in 1876 one of 36 oz.
No. 24. In 1874 a nugget of 65 oz. was found on Woods’ Flat, about twelve miles from Cowra.
No. 25. At the same place, and in the same year, another of 50 oz. is reported.
No. 26. One weighing 64 oz. 3 dwt. was unearthed in the Canadian Lead, near Guigong, November 1876, at a depth of 140 feet; it was stated to have been so completely invested with a coating of iron oxide as to be superficially unrecognisable as gold.
Nos. 27 to 29. A nugget weighing 19 oz. 12 dwt. was found early in 1876 at the “Wapping Butcher Mine,” the Terrace, near Parkes; also others of 16 oz. 10 dwt. and 18 oz., together with a large number of smaller nuggets.
Nos. 30 and 31. A nugget of 43 oz., together with one of 23 oz., was discovered on the Nundie Gold-field in 1879.
No. 32. One of 32 oz. 15 dwt. was found in October 1879, in Broad Gully, in the Braidwood District, together with several smaller ones in the same year.
No. 33. A nugget weighing 28 lbs. was found on the Whipstick Flat, Kiandra; recorded by Mr. Lamont Young, F.G.S., in the Annual Report of the Mines Department for 1880, but no date is given.
Nos. 34 to 45. At Temora the following were found during 1880:—99 oz., 84 oz., 76 oz., 72 oz., 68 oz., 64 oz., 63 oz., and one of 59 oz. 1 dwt.—this measured 7 inches by 2 2/3 inches wide, with a thickness of