

important piece of work done at Reefton, in the estimation of the battery- and mine-managers, was the amalgamation of the copper plates at one operation in such a way that they preserve their silver-brightness for any length of time without any tendency to form the green scum known to the miners as verdigris. They were all taken by surprise at the simplicity with which it is done. The great mistake that they had all been committing previously was in using nitric acid for cleansing the plates, and, worse still, the using of nitric acid in rubbing in the mercury on the plate.

In our experiments at Reefton we discarded the use of nitric acid altogether in curing the plates, as it necessarily produces the green scum so justly complained of. Instead of the acid we used only sand and water for cleaning the plates in the first instance rubbing them thoroughly till the surface was perfectly clean and bright. If any spot resisted the rubbing, we used a little diluted muriatic acid (half acid, half water), and in this case we splashed four or five buckets of water over the plate so as to wash away rapidly every trace of acid from it. The next step was to rub rapidly all over with a solution of caustic soda—say, twenty inches of soda-stick dissolved in a quart of water—rubbing in the soda energetically over every part of the surface of the plate. This effectually destroys all traces of acids that may be about, and prepares the plate for the next operation. This consists in pouring some mercury in which a button of freshly-made sodium amalgam had been dissolved over the perfectly-bright copper surface, and spreading it rapidly all over the plate with the same cloth with which the soda solution had been rubbed in. The mercury bites instantly, taking full possession of the copper. The mercury is then to be rubbed into the plate till it is dry. More of the mercury containing the sodium amalgam is poured on the plate, and spread and rubbed in as before. This is repeated till the plate cannot take in any more mercury. It is then in a thoroughly amalgamated state, and will not develop the green scum so troublesome to the battery-manager.

The sodium amalgam was made by half filling a teacup with mercury, warming it gently till the finger cannot bear the heat of the mercury, then putting in by small thin slices at a time about two-thirds of its bulk of metallic sodium, and pressing each piece under the mercury till it explodes or combines with a hissing noise. When the sodium has been all added, the mixture is allowed to cool slightly, and is then, while still liquid, emptied on a flat board or on a cold shovel, in small portions of, say, a thimbleful. These portions soon harden into the buttons referred to above, and constitute sodium amalgam of good quality. The sodium amalgam, like sodium itself, must then be preserved under kerosene or naphtha, in properly-corked bottles, till required for use. The battery-managers were delighted at the unequivocal success of this simple method of curing the plates.

In the rare cases in which sodium amalgam had been used for any purpose, they had been paying an exorbitant price for it (as much as 7s. 6d. per ounce in one instance), and now they can make it for themselves as described above at a cost of 4s. per pound.

The success of these experiments with the copper plates at Reefton secured a warm reception for the lectures all over the coast. On the last night of my stay twenty-one of my students formed themselves into a club, subscribing £1 apiece, and styling themselves, I think, the Reefton Mining Institute, for the purpose of procuring the necessary chemicals and apparatus, and prosecuting these studies among themselves.

The great interest taken in the subject and the importance of the district induced me to prolong my stay at Reefton to ten days in all. In the intervals of teaching I visited and went through the Inglewood Mine and the Keep it Dark and other batteries in the neighbourhood. I then proceeded to Boatman's, where I delivered four lectures, and conducted testing-classes as before. Here I was joined by Mr. Alexander Montgomery, M.A., who had been my own best student and my assistant in Dunedin for several years, and who, during the remainder of my tour, was of the highest service to me, especially in conducting my testing-classes, as well as in delivering lectures on the subject of reefs in general, mineral veins, faults, &c., in which the miners took a very intelligent interest. Mr. Montgomery was the best student of the School of Mines here, and has proved himself an able teacher of geology and mineralogy.

At Boatman's I had a lecture-class of about sixty, and a testing-class of twenty-six earnest students. Here, as at Reefton, I paid special attention to sodium amalgam and its uses, the curing of copper plates, and the chemistry and assaying of metallic ores. I had great assistance from Mr. Caples, an experienced explorer and prospector, and altogether a very intelligent man. With him, Mr. Montgomery and I visited the Welcome Mine, the Specimen Hill, and every battery in the district. Before leaving Boatman's a public meeting was held, under the auspices of Messrs. Caples, Beach, Barr, Gardiner, Raithby, Russel, and Rooney, to pass resolutions and form a club, which they called "The Boatman's School of Mines," subscribing 10s. a head, I think, for procuring the necessary materials for following out the studies they had thus begun.

From Boatman's we proceeded to Lyell, where I delivered two lectures, and, with Mr. Montgomery, examined the Alpine Mine, and conducted a large testing-class for four hours before lecture. I regretted that I could not prolong my stay at Lyell, as I was told of many important things in the district that I could not visit. Here also resolutions were passed pointing to the great need of technical instruction in mining matters.

From Lyell we took the coach down the Buller to Westport, through a valley unsurpassed, I should think, in any land for the beauty of its scenery and the luxuriance of its variegated bush. At Westport I delivered a course of four lectures and conducted a testing-class, as at Boatman's. Here also resolutions were carried in a large public meeting in favour of a liberal scheme of mining instruction in the mineral districts of the colony.

While staying at Westport, Mr. Montgomery and I visited and examined the coal-mines at Denniston and Koranui, staying at Waimangaroa to lecture to about eighty of the miners for three hours and a half. At Waimangaroa, also, a club was formed under the leadership of Mr. Brown, the underground manager of the Westport Company's mine. During my stay in the Westport District I was greatly indebted to Mr. O'Connor, M.H.R., Mr. Munro, Mr. Hughes, the Rev. Messrs.