

WORK OF ALUMNI

By MR. H. R. BATCHELLER.

There is no engineering profession that so absolutely requires such a diversity of scientific attainment as does that of Mining Engineering and its associate and inseparable companion of Metallurgical Engineering. A perusal of the articles in this issue of *The Tech* will give the prospective Mining Engineer a clear outline of the essentials of his profession, and if his courage is good or his convictions positive enough to choose it, he will be amply rewarded in a profession combining within itself all the mathematical and natural sciences in an infinite variety of application and adaptations.

Not all the Alumni of the Department are called upon to commercially perfect, or industrially apply, more than a few of the several sciences included in the scope of Mining Engineering, but it is very necessary, for the full understanding of any specific detail of an operation, that the engineer have a broad general knowledge of the other problems involved that the complete sequence of operations from mining of the ore to the marketing of the metal may be kept in good and true proportion.

In the early days of the Department many, if not most of the Alumni went into the iron and steel industry in the United States, as that was the first industry to call for trained men. Today other metal and mineral industries have felt the need, and now our men are in all parts of the world. From South Africa to Alaska, from China to the Philippines, come reports of our men who are identified with the industries in those countries.

A good rule to follow is to do the work of your position thoroughly, and at the same time study the work of the position ahead of you. The failure to do the first will obviously cause a severance of your connection with that job and nothing is more unreasonable than to expect promotion which must be followed by instruction in the rudiments of the new position.

An opportunity to make one's self useful about a mine or mill or smelter at a living wage for six months should be welcomed by any graduate of any institution, and I do not think Institute men as a rule require so long a time.

Some schools turn out finished assayers, smelter chemists, chemists, surveyor's helpers, etc., and these men at the start usually command as much or greater salaries and more comfortable positions than our men; but when measured up after an interval, Tech alumni will be found in the lead. The broad scope of the professional training obtained at Tech counts in the long run.

Some of our alumni who have gone out looking for a chance have been contented with day labor at \$3.00 to \$3.50 per shift, at hard work with "muck stick," or as helpers in various positions underground or on the surface. Men going into "staff" positions as assistant to the assayer, chemist, or surveyor or elsewhere, can usually expect \$75.00 per month to commence on. At these wages a man can more than keep himself, even in high-priced camps like Butte or Phoenix and in the smaller and more remote camps he can live as well as he needs to or as well as the district will allow.

It is an open question which start is the preferable. An assayer must round out his experience by contact with other portions of the operations, and a "muck stick" starter should lay his trail through the assay office. Some graduates are in favor of one, some favor the other; both have been tried with successful final results.

Subsequent salaries, as far as I can learn, have been satisfactory, and after a few years our men have been holding responsible and well-paid positions with the end "not yet in sight."

The men who go to large companies have, as a rule, rather a hard time of it at the start. They are herded into all sorts of routine work and are in keen competition for each promotion. The positions, however, are usually so well within their capabilities that they have considerable time both on shift and off, which, with the run of the plant that is given them, the have magnificent opportunities to see and study large scale operations and have the latest and best of practice.

Those men who go to small companies usually as assayer or chemist have in very many cases a fine chance to study negative results, i. e., to see how things should not be done if money were not lacking or if ore bodies did not occasionally disappear or fluctuate violently in value. Their ingenuity will be taxed to the utmost to keep things in approximately proper operation with nothing but a scrap heap to draw on. All sorts of conditions arise that are simple of solution if funds are not lacking but which become very annoying when improvement of practice, effecting even the operation of the whole plant, must be made with no cost for new material or machines.

Some of the experiences of young graduates are very amusing when looked at afterwards but may prove to be very trying at the time. One man of my acquaintance who was holding his first position after graduation with a small but well equipped proposition, was very much disconcerted when directed by his "Old Man" to change the revolution of the electric light engine. The engineer-fireman did not know how and neither did the "O. M." The "assayer" had to make good on this and did so well that later he was called on to reset the valves on the mill engine.

One of our men who was working as a helper underground was changed to the assay office of a sixty stamp mill and concentrator on a moment's notice and was expected to keep things moving along without interruption. Another time he was called upon to assist at the clean-up and to prepare the bullion for shipment.

Another assayer on his first job was much distressed to find that his predecessor had been fired because he could not obtain check results when weighing gold assay buttons on analytical balances and was much disgusted when he at last obtained the desired new balances to find them the most expensive and most delicate that could be obtained and that the "O. M." declined to go to the further expense of a suitable room and foundations for them. The assayer continued to measure the buttons with a Plattner scale and finally lost his job because there was an accumulated discrepancy between the assay extraction and the mill extraction.

An engineer reporting on a mill process found that the bullion shipments were invariably excess of the extraction based on assay by a considerable amount. When this condition of affairs was corrected the directors strenuously objected to the change as involving explanations to the stockholders and the engineer was instructed to return to the original system of sampling.

A very interesting piece of work was done in connection with a cyanide plant in Mexico where it was found that the value of the stamp mill tailings to be treated was materially improved by the removal of the "slime" which interfered with the percolation. It was found that in order to report a maximum tonnage crushed any discrepancy in the quantity of ore mined was made up with what was known to be barren country rock. When this practice was stopped there was quite a reduction in operation costs and a material improvement in the values recovered.

It would be a very large volume that would contain all the experiences of all our men. The foregoing will serve to illustrate the variety of the demands made on the engineer and indicate the interesting situations and problems that continually arise.

THE MINING COURSE.

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chemistry and gas analysis and finally a thesis.

The course has recently been rearranged and is believed to be in better shape than ever before. There is a prospective change which will come whenever the corporation sees its way clear to transfer the instruction in surveying from the second year to the summer. This will give a better course in this subject and at the same time free some hours in the second year for other subjects. There is, moreover, a demand from some of the graduates for instruction in Spanish, which is the national language of the majority of American countries south of the United States. Formerly a course in Spanish was offered as one of the general studies of the third year, but last year it was stricken from the list.

GEOLOGICAL RESEARCH.

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Investigation as distinguished from mere geological information. The large corporations have found this out and are now drawing away from national geological surveys many of the men who, after years of research, have attained this masterly gift of directing expenditures with understanding. Taking little for granted, these men attack every ore-body as a new subject, and their scientific method is showing fruition in dollars and cents.

The Institute has always stood for this principle. Its first president, before he took office, was already famous for his studies on the structure of the Appalachian Mountains, and he always used his powerful influence in developing organized schemes for similar structural and dynamical studies. Artesian wells, mineral springs, subterranean temperature, earthquakes, igneous earths, rock-weathering, coal deposits, and iron deposits in turn received his attention. His researches took him to West Virginia, Maryland, Pennsylvania, Ohio, Massachusetts, Rhode Island, New Hampshire, Maine, New Brunswick, and Ontario; and much of his thought was devoted to helping his brother, H. D. Rogers, to plan and execute the first



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surveys of Pennsylvania and New Jersey. Besides numerous separate papers Professor T. Sterry Hunt described his geological investigations in two thick volumes, the one on "Chemical and Geological Essays," published in 1874 at Salem, the other on "Mineral Physiology and Physiography," in 1886 at Boston. Similarly, Professors Niles and Barton stimulated their own thinking and enriched their lectures at the Institute by original work in the field. Professor Crosby's "Contribution to the Geology of Eastern Massachusetts," published in 1880, is a most remarkable book, which is still the only existing comprehensive treatise on our local geology. In his long years of work, Professor Crosby has shown a true genius for able observation and careful reasoning, and his place is among the soundest geologists this country has ever produced. His "Geology of the Boston Basin," in four volumes (called "parts"), the last of which is about to go to press, is a storehouse of information practically unrivaled for any area of similar size in Eastern North America. The accuracy and completeness of his field observations are little less than astounding to anyone who carries into the field one of these volumes as a guide. His energetic spirit has led him to study field problems in all of the other New England States, in New York, North Carolina, Eastern Canada, Colorado, South Dakota, Arizona, Alaska, Cuba, the Island of Trinidad, and other regions. Many important papers on theoretical geology have also come from his pen, and in them all one notes the same clearness of judgment. It is just because he has thus broadened and deepened his knowledge of geological principles that Professor Crosby is so valued an adviser to metropolitan water boards and to mining companies. A still more important result is that he has long been an inspiration to his colleagues and pupils who are engaged in the hard but repaying work of making earth-science of practical service to man.

Without other illustrations from the record, it appears that the Institute's tradition has strong sanction. For the future a high aim should be ours, that every student, bachelor as well as master or doctor, leave the Institute an investigator for life. The spirit of research will be a greater asset to him than the mere acquisition of knowledge; it will carry him through many a difficult place which instructors cannot foresee, and in the end will reap a large reward.

SUMMER WORK

By EDWARD T. ALMY, JR.

On account of its situation in a city, and in a part of the country where no mining is done, Technology is unable to give any practical underground mining to the students in that course. The student can, if he wishes, devote the whole or part of his summer vacations to practical work, thereby increasing his knowledge of mines and mining methods to a great extent.

If a student is going to do summer work he should go into it with the idea of doing his best work, thereby helping to uphold the Institute's good reputation, and should not expect a manager's position the first summer. The positions which a man can fill after his third year in the course are not very high up the ladder, and are such positions as mucker, machine helper, machine man, assistant assayer or assistant surveyor, trammer, etc. These positions all require hard work; for example, a mucker has to pick and shovel ore from eight to ten hours per day, depending on the length of the shift at that particular place. If he does this well and seems to want to learn, after a month or more he is made machine helper. In this capacity he brings sharp drill steels to the machine man, carries out dull ones, puts in and takes out bits in the drill, and makes himself generally useful. If he is working with a good machine man he will be allowed to crank the drill occasionally and in a short time he is able to run the drill himself without jamming the steel too much, or poking out one of the cylinder heads.

After this, if there is a vacancy, he may be made machine man. In order to hold this position, however, he must be strong bodied, must know how to drill the holes, how to load and fire the shots, and must always be calm and level headed. Through all these promotions the salary is advancing, the salary at the beginning and the advance varying in different camps.

While he is at the mine he eats and sleeps with the rest of the miners, eating in the big dining room, and sleeping in the "ram pasture" or room with from ten to thirty beds in it, each holding a tired miner, and every one trying to outdo his neighbor in sawing wood. The new man soon gets used to it, and after his shift underground is generally tired enough to sleep anywhere. Some mines have abolished the "ram pasture" and the bunk house is divided into small rooms, each one holding two men. This is the exception rather than the rule, and a man should not be disappointed if he does not happen to get such accommodations.

Financially, summer work is usually not a great success, especially if a person has to travel any distance to the place where he is to work.

There is another and much more important side to summer work than the financial side. This is the actual knowledge gained. The student goes to the mine with a vague idea of the different terms used in mining, and with certain pictures in his mind of the way things look underground. These ideas are gained from books or lectures and the pictures from ideal sections in the books. He finds, however, that when he gets underground things look entirely different from the ideal sections, and it takes him some time to fit the terms used to their proper places.

The summer's work is an immense help the following year in school, especially in lectures. Here the student is able to understand better the different terms used, and understanding them, his interest is kept up more than it might be otherwise.

When the man graduates, if he has had one or two summers' practical experience, he finds that he fits into the work better, and pushes ahead much faster than he would had he graduated and then started in to get his practical work.