LAPIDARY WORK.

Translated from the French.

There were, in 1860, 146 establishments engaged in this branch of industry in Paris, of which 5 employed over 10 hands, 39 from two to ten, and 102 but one each. The total number of hands employed was 317, there being 148 men paid by the day, and 105 by the piece; 6 women paid by the day, and 58 apprentices, who were boys under sixteen years of age. The total value of the annual production was 3,849,-120 frs.

The lapidary's art is very ancient, but the method of cutting diamonds with their own dust was scarcely known before the thirteenth or fourteenth century. This discovery has for a long time been attributed to Louis de Berquem, of Bruges, who lived in 1746, and it is only within a short time that new researches have proved that the art of cutting diamonds was known before that period. It is known, for instance, that, early in the fifteenth century, princes and lords owned and made presents of diamonds, and that there was in Paris, in 1407, a diamond cutter named Herrmann, who had the reputation of being very skillful in his art. It is proper, also, to add, that the jewelers, in an act of 1739, against lapidaries, quote an ordinance of the Provost of Paris, dated Nov. 18th, 1387, according to which the number of jewelers who devoted themselves particularly to the cutting of diamonds and precious stones was about 15 or 16.

In the Middle Ages, as has been shown, the jewelers alone practiced the cutting of precious stones; this privilege they preserved without opposition until the year 1584, when some of their members associated themselves with the masters of an old society of crystal cutters, founded in the time of St. Louis, and obtained from the former a number of workmen sworn to cut precious stones for them, to the exclusion of all others, even the jewelers themselves.

Dissentions immediately sprang up between the lapidaries and the jewelers. The former, not being satisfied with the power which they had obtained, began to encroach on the privileges reserved to the jewelers; while the latter continued to practice gem cutting, while awaiting the final judgment of the trial pending before the Parliament. Finally, on the 6th of September, 1631, the court rendered a decision by which the lapidaries were maintained in the sole right to cut all kinds of precious stones, and to work in pearl and crystal, but they were expressly forbidden to set the stones in gold or silver. Two decrees, one rendered by the Council of State, Jan. 28, 1673, the other by the Parliament, Feb. 9, 1740, prohibited the lapidaries from assuming the rank of merchant jewelers, and from giving to their workmen the title of guards and allowed them only to call themselves master lapidaries, engravers, and workers in all kinds of precious natural stones. In spite of these decisions, the lapidaries did not cease to claim the right to sell mounted gems, and asserted their claims with such persistence that, after the reorganization of the society, in 1776, they were allotted the exclusive right to set artificial stones, and authority to set natural stones conjointly with the manufacturing jewelers.

At the time of the Renaissance, lapidaries often cut precious stones in the form of vases and cups, but their principal work has always been the cutting of precious stones to be set in rings, necklaces, etc.

The art of cutting diamonds has been very slow in attaining perfection. In the fifteenth century, diamonds were table cut, and cut in the form of shields and stars; in the following century, the cutting of rose diamonds was introduced, and it was only under the reign of Louis XIV. that the method of cutting brilliants was discovered; the twelve diamonds to which Cardinal Mazarin has left his name were the first in France that were cut in this way.

During the latter part of the eighteenth century, diamond cutting was practiced on a great scale in the city of Amsterdam, and the minister Calonne, wishing to establish a diamond-cutting establishment in the Faubourg Saint Antoine, was obliged to call a master and some workmen from Holland. The Revolution finally dispersed the Parisian lapidaries, and, since that time, Amsterdam has exclusively practiced the art of cutting diamonds.

The work of cutting is performed in the same way as in former times, the only modifications in the art arise from the substitution of steam engines for the old motors. The cutting of diamonds is divided into three operations: the cleavage, which is designed to remove the defective parts of the stone, consists in breaking the diamond by means of the blade of a chisel placed in a groove made with another diamond; the blocking out or reducing it to its first rough form, which is done by rubbing together two diamonds fixed by means of mastic to the ends of two wooden handles; and finally the polishing, by means of which the diamond receives its smooth and brilliant surface and its regular facets, which is done on a horizontal wheel covered with diamond dust soaked with olive oil. The workman fastens the diamond to the end of the cement rod by pouring lead around it and then applies it to the mill. He is the sole judge of the best form to be given to the diamond, and has no guide but his own experience.

Formerly, the cutting of diamonds caused a loss of from 50 to 60 per cent of their weight, but by the present methods of cutting, the loss is not more than from 40 to 50 per cent. The diamonds do not appear as well, but as they are sold by weight the merchant obtains a better price.

Diamond lapidaries cut diamonds only. The other precious stones, such as rubies, emeralds, sapphires, topazes, amethysts, garnets, etc., are cut, in Paris, by special workmen, who also cut jasper, onyx, agate, cornelian, turquoise, etc.; still, merchants, when they have large quantities of stone to cut, apply to the lapidaries in the Jura, and even to those of Germany and Switzerland, where hand labor is much cheaper than in Paris.

Hard stones are cut in the same style as diamonds, and are polished with tripoli and water. The hardest are cut with emery on lead wheels, or with tripoli on wooden wheels.

The average wages received by the hands employed in this branch were: men, 6·37 fr.; women, 2·54 fr.; and apprentices receiving pay, 1·5 fr.

The amount exported was 257,000 fr., of which 48,000 was to America, 35,000 to England, and 30,000 to Russia.—*Industrial American.*

HOW TO OBTAIN A FINE PATINA ON BRONZE STATUES.

Translated for the Scientific American from the Polytechnic Journal.

It has been experienced in most large cities, especially in those where mineral coal is used as fuel, that bronze statues erected in public places do not obtain a fine patina, but become dark-colored and unsightly. The desire to find a means for obviating this, induced the Berlin Society for the Promotion of Industry to make careful experiments on this subject. The first question to be answered was this: Does the existence of a patina depend on the chemical composition of the bronze? To decide this query, samples were taken from ten different bronze statues, all of which were covered with a beautiful patina. Each of these samples was analyzed simultaneously, by two reliable chemists. The results obtained showed these bronzes to be of very different composition The amount of copper varied from 77 to 94 per cent. One sample contained as much as 9 per cent of tin, others 4 per cent, and some only 0·8 per cent of tin, but up to 19 per cent of zinc. The other accessory ingredients, such as lead, iron, and nickel, also varied very much. However, all these bronzes had formed a fine green patina. It is quite possible that the chemical composition of the bronzes has some influence on the time required for the production of a patina. But the above-mentioned analyses undoubtedly prove that a fine patina can originate on bronzes of the most different composition.

It has been noticed that those parts of public bronze monuments which were accessible, and which were often touched by the hands of visitors, were covered with a fine, though not a green patina; all the other parts of the same monuments being dark-colored, and of a very unfavorable appearance. This fact led the investigating committee to the supposition that the presence of greasy matter might be of importance in the formation of patina. Some experimental bronze busts were therefore set up in such parts of the city where impure exhalations are frequent, and where several public statues previously erected had assumed a dirty-looking black color, without forming even a trace of patina. One of these experimental busts was daily rinsed with water to keep it clean, and was besides painted over with neat's-foot oil once a month; the oil being put on by means of a brush, and rubbed off again with woolen rags immediately after. Another bust was rinsed with water every day like the first; but was not treated with oil. A third was also rinsed with water daily, and treated with oil twice a year. A fourth was set up and left entirely untouched.

The 1st and the 4th of these busts were put up in 1864, the 2d and the 3d in the beginning of 1866. They have fully verified the supposition of the committee regarding the action of greasy matter. The bust treated with oil once a month is now covered with a dark-green patina, which is declared very fine by all art critics. The one treated with oil twice a year has a less fine patina; while that cleaned only with water, presents nothing of that peculiarly fine appearance produced by the formation of patina. The bust which was not cleaned at all looks black and dull, making a highly disagreeable impression on the observer.

It may be safely inferred from these experiments that a bronze monument erected in a public place can be made to obtain a fine patina, if the bronze is kept clean and rubbed with oil once a month. If the frequency of this operation can be reduced, and to what extent, can only be decided by future experiments. The operation presents some practical difficulties with many large monuments.

The committee has put up two more bronze busts which had been artificially patinated by chemicals; and it now remains to be seen how these will stand, when subjected to similar treatment. It has not as yet been explained in what way the oil takes part in or influences the formation of the patina. So much, however, has been ascertained that any surplus of oil has to be avoided, and that all the oil that has been put on, must at once be removed as carefully and as completely as possible. If any oil remains on the bronze, it makes the dirt stick to it, and gives it an unclean appearance. It cannot be supposed that the remaining small quantity of oil would form a chemical combination with the layer of oxide on the bronze, especially because neat's-foot oil, as well as olive oil, has been found to be equally adapted for the purpose. It seems more probable that the oil, by forming a thin layer over the bronze, prevents any moisture from settling on it. This moisture, if not kept off, would cause the dust to adhere, would absorb gases and vapors, and would favor the growth of a vegetation of microscopic plants, by which the appearance of the surface of the metal would inevitably be slighted. However this may be, it is an established fact that grease is an important agent in the formation of patina. It is to be expected that the treatment with oil will also be advantageous in another respect. It has been noticed that bronzes which are covered by a fine patina get a white, opaque, chalk-like surface in those places over which the rain-water is chiefly running. A proper treatment with oil will doubtless prevent this. At any rate it may be expected that through the use of oils, finely patinated bronze monuments will in future be seen in large cities where mineral coal is used as fuel, and that these monuments will not appear light-green, but dark, perhaps even black, but they will have the peculiar luster and other fine qualities of patina. S.

SCIENTIFIC INTELLIGENCE.

BISMUTH.—The increased demand for this metal has occasioned the examination of new localities, and the search has, in several instances, been attended with success. A remarkably pure ore has been found in Peru, which, on analysis, gave: Bismuth, 93·372; antimony (with trace of tin), 4·570; copper (with a little iron), 2·058—total, 100. The absence of arsenic and sulphur is noteworthy, and distinguishes this ore from the Saxon variety. Also, in South Australia, seams of bismuth have been found associated with copper.

NAPHTHALIN RED.—This coloring matter is called in England, "Magdala Red," in honor of Lord Napier, the hero of Abyssinia, in imitation of the French names of Magenta and Solferino for aniline colors. It is prepared by the action of nitrous acid on naphthylamin, and is manufactured in large quantities in France and England. It is a dark brown powder, soluble with deep red color in boiling alcohol; only slightly soluble in cold water, but largely in hot water; not soluble in ether. The solution in alcohol is highly fluorescent, which reaction affords, according to Hoffman, a method for distinguishing it from aniline red. In depth of color it is said to be equal to aniline, while it is superior to that dye in permanency; but it loses luster on dark tints, and hence its use is limited to light shades.

ARTIFICIAL ALIZARIN.—At a recent meeting of the Chemical Society of Berlin, Messrs. Graebe and Liebermann made the interesting communication that they had succeeded in preparing artificially the beautiful red principle of madder from anthracen, one of the waste products of the distillation of coal oil. They exhibited specimens of the color and some cloths dyed with it. The process of the manufacture is not divulged; but if it proves to be practicable it will be one of the most important contributions yet made by organic chemistry.

RECENT EXPLORATIONS OF DEEP-SEA FAUNA.—In the January number of the *American Journal of Science and Arts*, Professor A. E. Verrill gives an interesting summary of recent investigations on life at great depths. The first observations were made by Dr. Wallich, in 1860, when worms, crustacea, bryozoa, and echinoderms were found at depths varying from 445 to 1,913 fathoms. This was deeper than life had previously been supposed to be possible. Similar observations were made by Milne Edwards, by the discovery of living mollusca or corals adhering to the telegraph cable between Algiers and Sardinia, when taken up for repairs, on portions that had been sunk to depths of 1,093 to 1,577 fathoms. Later, G. O. Sars found nine fishes living at 200 to 450 fathoms. These discoveries have very important bearings upon geological science and physical geography, as well as geology, and will occasion important changes in many generally accepted theories. The following are some of the results already obtained. (1). Life does not disappear at 300 fathoms, as supposed by Forbes and others, but shallow-water animals are found at much greater depths. (2). It follows that a great abundance of fossils, in a geological formation, is no proof of shallow-water origin. (3). Bright colored animals are also found at great depths, so that this peculiarity cannot be assumed as evidence of shallow-water origin in fossils. (4). Several species of deep-sea crustacea have perfectly developed eyes, which would seem to show that light penetrates to greater depths than is commonly supposed. (5). That the temperature of the water at great depths is not everywhere the same, but is often far below the freezing point, as shown by Carpenter at 700 fathoms. (6). Finally, the investigations throw new light on the manner of the deposition of rocks, and modifies the doctrine of natural selection.

WHAT GEORGE STEPHENSON ACCOMPLISHED.

At the banquet given by the manufacturers of Pittsburgh to the American Railway Master Mechanics' Association on the occasion of its last convention, which was held in that city, Hon. J. Tyng Brooks, in response to the toast, "George Stephenson, the Great Master Mechanic," made an eloquent speech, from which, as published in the Second Annual Report of the Association we make the following extract:

"How marked is the change in the public sentiment respecting railroads now and forty years ago, when George Stephenson, whose name and deeds we would recall to-night, was reasoning, pleading, coaxing, and fighting, for it took all of these to persuade England into having a railroad. Far different from this scene of splendor which is spread before us to-night were the associations of his early life; no banquets were given to him when he was unfolding the properties of the locomotive and studying how he might make it useful to his fellow-men. Instead of plaudits from the press, encouragement from the Government and men of science, the unlettered Northumbrian miner had to fight his way in the face of them all until he planted his railroad and locomotive in their midst and justly won a place among the benefactors of his race.

"Go to the mining districts of your own State, to the Lehigh valley, the Westmoreland or the Youghiogheny mines, and you cannot find so humble an abode as that in which George Stephenson was born and reared. One single room in a house of four rooms, each occupied by a family, was for years the home of his father, mother, and six brothers and sisters. Away from schools, books, and educated companions, his toil at the mines began when he was big enough to lead a horse, his comrades, the rough uncultivated miners and