Bessemer Converters in the United States.

At a recent meeting of the Iron and Steel Institute, London, Mr. James P. Witherow, of Pittsburg, whose converter had been described by Mr. Hardisty, said that in America, within the past two years, considerable headway had been made in the development of the Bessemer process with the fixed or stationary type of converter. Up to the present, however, sufficient reliable data have not been obtained to enable the claims that might be advanced to be fully determined and demonstrated. The reason for this fact is twofold. First, because the year 1884 was consumed in experimenting with and remodeling the Clapp-Griffiths type of converter by Messrs. Oliver Brothers, of Pittsburg, to the type the speaker now recommends, and which he now has in successful operation; and, secondly, because in such experimental stages it is more difficult to obtain reliable data, and even when obtained it is often more difficult still to get those interested to credit the facts put before them. However, the results of the working of Mr. Oliver's new converter, which was substituted for that of the Clapp-Griffiths, were such that during the winter and spring of 1884–85 contracts were closed for seven distinct plants, about one-half of which were in use during the past summer, and all will be working in the coming winter. From this fact, the speaker thought, it would be seen that a fairly extended field was at command from which he could gather reliable information, the area of observation extending indeed from the Mississippi to the Schuylkill. Oliver's plant, the speaker continued, apart from being the pioneer in America, was constructed from very crude designs, sent over from England, from which the makers were forbidden to deviate or in any way change. This was unfortunate, as it led to failures in working at the commencement, and although the difficulties had been overcome and excellent work had been done by Mr. Oliver's plant during the past year, they found the first unfavorable impression very difficult to eradicate. Bessemer practice in the United States owed much to Mr. Oliver's experiments, for before that time, Mr. Witherow stated, they had no idea of being able to make boiler plate or flanging steel, and it was only after his investigations had been published that workers by the Bessemer process began to experiment on low silicon, and this was accomplished by blowing small or half charges in the converters. By dint of great care and attention, following Messrs. Oliver's practice, the Bessemer workers have been able to approach it in the matter of quality, but seem indisposed to carry it out to a successful commercial issue. The Bessemer works of the United States that have been built for the rail trade are of little use, the speaker thought, and of no benefit to the general iron and steel trade of that country. It was true that in times of depression they forced themselves into the market and sold blooms, billets, and plates. But consumers had to accept whatever qualities of steel the makers happened to be producing, no matter how irregular in quality it might be, or unsuitable for the purpose required. Consumers were never allowed to complain, as the steel makers considered their practice infallible. But the moment they fill up with rail orders the general consumer is completely ignored, and therefore it behooves the trade to seek other means of supply. It is for this reason that the small fixed converter seems destined to play an important part, and the speaker thought that, in the United States, such a description of plant will take the place of the more general type for supplying the smaller class of work.

Mr. Witherow had only been able to obtain practical data from two plants up to last August. These were that of Messrs. Oliver, and another of the Western Nail Company, of Belleville, Illinois. The first is one of Mr. Witherow's latest designed converters, but it is smaller than those more recently erected. It would blow from 3,500 lb. to 4,000 lb. of iron at a charge, while the latter will blow from 6,000 lb. to 6,500 lb. The Western Nail Company's plant is of the latter size, but there is one now in construction which will take over 8,000 lb.

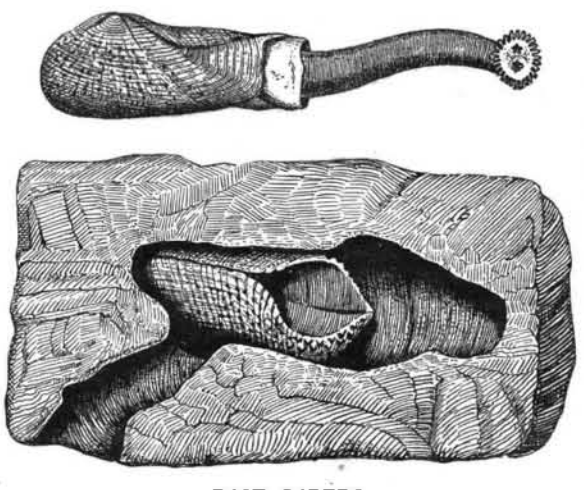
At Messrs. Oliver's, with two small converters working alternately, *i. e.*, following each other instantly on blast and charging, there has often been made 125 tons in a day of 24 hours, and over 75 tons has been made in a single turn. When working up to this output Mr. Oliver states that he can make his ingots at a cost of five dollars per ton, including waste, labor, ferro-manganese, and refractories, everything, in fact, but pig iron. The allowance for waste is two dollars, and it averages from 12½ per cent to 14 per cent. All the cinder in slag from the converter and all collections of shot about the platform are remelted in the cupola, and by this plan the waste is said to be reduced by at least two per cent.

Experiments have been made at Oliver Brothers' works with phosphorus pig, ranging in mixture up to from 0·34 per cent to 0·44 per cent. of phosphorus, and from this excellent cut nails were made. At the Western Nail Company's works, last July, similar experiments were made under the direct inspection of Dr. T. M. Drown, professor of chemistry of Boston, Massachusetts, and his observations were embodied in a paper he had prepared on the "Little Bessemer Process," and read before the American Society of Arts. In conclusion, Mr. Witherow said that no doubt his unpretending type of the Bessemer process has to contend against great odds, and as it is in the beginning of its development, it is impossible to obtain complete data to support the claim made by the few friends it possessed. If, however, positive proof of his claims could not be submitted in a year's time, then metallurgists and steel makers would have sufficient grounds for treating his statements with indifference.

ROCK BORERS.

According to the usual course of things, we would hardly look into the class of mollusks—the very name of which is derived from *mollis*, soft—to find an animal fitted for drilling holes in solid rock. Yet, nevertheless, it is here we find the rock borers. They are bivalves, the shells being thin, but brittle and hard, more or less open at both ends, and armed anteriorly with rasp-like spines. The animal itself is either club-shaped or worm-like; the mantle is closed in front with the exception of an orifice through which the truncated foot is passed; and the siphon tubes are long and united nearly or quite to the ends. The species are rather numerous, and inhabit most parts of the world.

The question as to how these mollusks bore out their dwelling places in the rocks has been a subject of much discussion. The supposition that the shell is the instrument of perforation originated with Bonanni, in 1684, and in the present century most naturalists have favorably entertained it. M. Cailliaud is a great upholder of this theory, and thinks he has clearly proved



ROCK BORERS.

by numerous experiments that such is the case. Geffreys says it is easy to scrape with the edge of a limpet-shell a cavity in chalk or shale, such as the rock limpet occupies; but can it be imagined that in this case the shell instead of the foot is naturally employed for that purpose? The fine and regular striæ or grooves, which are plainly marked on the sides of the cell or hole of the rock borer, are unquestionably caused by the friction of the spinous ridges that ornament the shell. These grooves are wanting at the bottom of the cell, and are replaced there by a far more delicate elaboration, which is, without doubt, produced by the sucker-like motion of the foot. Prof. Owen attributes part of the process to the action of the foot, which is sucker-like, and enables the animal to fix itself to the substance which it intends to perforate. The softness of the foot offers no obstacle, for it is certain that the perpetual renewal of a softer substance will render it capable of wearing away a harder one, subject to the friction of a softer surface, and, not like it, susceptible of being repaired. Lewis says the soft muscular disk is perpetually renewed, and the hard limestone has no self-renovating power; and thus, just as falling water wears away granite by the incessant repetition of gentle blows, so do these mollusks excavate rocks or wood by the incessant repetition of muscular friction.

Some writers have affirmed that the foot is armed or studded with silicious particles, thus forming a perfect boring instrument, on the principle of a "diamond drill." Others, again, declare that no such instrument exists in any of the species.

It has been generally supposed that the rock borer does not secrete an acid. However, both Thorrent and Cailliaud have discovered that they, at least some species, do secrete an acid, which may assist them in perforating the rocks they inhabit.

The work of boring into such rocks as gneiss must be extremely slow. It takes about a year and a half for a *pholas* to arrive at maturity; by that time it has made a hole five or six inches deep.

The property the rock borers possess of giving forth phosphorescent light in the dark is remarkable. This property is not confined to the skin or outer membrane, but every part of the body, and when a pholas is cut into pieces each portion is luminous, and much of the water that drops from them sparkles brilliantly. Out of fifteen living specimens obtained by Cailliaud, at the end of April and in December, ten or twelve only gave out phosphoric light. In none of these did the foot exhibit any luminosity. Geffreys says: "I am disposed to believe that this light is caused, *not* by the rock borer itself, but by extraneous microscopic organisms; but," he adds, "the subject ought to be further investigated."

The rock borers have been found inhabiting new red sandstone, slate rocks, coal shale, hard rocks, chalk, marl, and submarine wood.

A curious little boring mollusk, the *Martesia cuneiformis*, is sometimes found in the oyster shell along our coast. In a large shell from the Chesapeake Bay, Md., I counted six excavations made by this little borer. None of the holes, however, went entirely through the shell. There was no mistake as to what animal drilled the cavities, for each of them contained a *Martesia*.

C. FEW SEISS.

The Dreams of the Blind.

A paper read before the biological section of the American Association for the Advancement of Science was on "The Dreams of the Blind," by Dr. Joseph Jastrow. The object of the paper was to determine the extreme age at which a child may become blind and yet lose all memory of the visible world, so that it no longer sees in its dreams.

Almost all dreams of normal persons are sight dreams, and a dream is often spoken of as a vision. The blind are deprived of this most important sense; but if they have not been born blind, they may remember enough of what they have seen to enable them to imagine how things look, and when the imagination has free play in sleep, to picture themselves as in full possession of all their senses. Physiologists would explain this by saying that during the years in which they saw, a certain part of the brain has become educated to receive and interpret all these messages which the eye sends, and that when this part of the brain acts spontaneously in sleep, the person dreams of seeing. Such a portion of the brain would be called the sight center.

If now we find out the latest age at which blindness may set in and yet the person keep on dreaming of seeing, we shall find out the time it takes for this sight center to develop. For this purpose about 200 blind persons of both sexes were questioned at the institutions for the blind in Philadelphia and Baltimore, and it was found that those who became blind before their fifth year never dreamed of seeing; of those whose sight was lost between the fifth and the seventh year, some did and some did not see in their dreams; while all whose eyesight was destroyed after the seventh year had quite as vivid dream visions as seeing people. The fifth to the seventh year is thus shown to be the critical period. This period corresponds with the age which authorities assign as the limit at which a child becoming deaf will also become dumb, and also with the age of one's earliest continuous memory of one's self.

It is interesting to note that blind persons dream quite as frequently as normal people, and that with those who do not see in their dreams, hearing plays the principal part. When dreaming of home, for instance, they will hear their father's voice or their sister singing, and perhaps will feel the familiar objects in the room, and thus know they are at home. We, in such a case, would see it all.

Cold and Tobacco Smoking.

Dr. Chudnovski publishes in the *Russkaya Meditsina* an account of a series of observations made on twelve soldiers in a military hospital, who were perfectly healthy with the exception of slight injuries, with the object of determining the effect of cold applications to the epigastrium upon the rapidity of digestion. The stomach tube was of course freely used, and the completion of digestion was taken to be marked by the disappearance of solid particles in the gastric contents, as revealed by drawing them up through the tube. The author found that when ice bladders were applied next the skin over the region of the stomach, digestion was retarded in nine out of the twelve cases. Six of the men were smokers and six non-smokers. In the former the time required for digestion averaged seven hours, while in the case of the non-smokers the mean period of digestion was only six hours.

An Interesting Monument.

M. Clermont-Ganneau has communicated to the Academy of Inscriptions and Belles Lettres a note relative to a discovery made by him in an old building at Jerusalem. It was a block of stone, with a Greek inscription signifying that any stranger who should have passed that limit would be condemned to death. It is evidently a fragment of one of the posts which formed, in the temple built by Herod, a dividing line between the exterior inclosure of the Gentiles and the inner precinct reserved for the Jews. It will be remembered that St. Paul barely escaped stoning when he was accused of having introduced Greeks into the inner circle with himself. The stone has been removed to Constantinople, but a cast has been taken, which will be preserved in the Museum of the Louvre.—*Cosmos.*