monial dances were held: and near by was the creek in which the ablutions were performed. The council-house in this case was not in the village; the latter being built near the hills, contiguous to cool springs of water, thus rendering the distance from it to the creek too great for the convenience of the bathers. The writer is aware that this explanation will not apply in full to all the enclosures of this type, as the conditions are not the same in all the localities; and it is more than likely that the customs of the villages varied to some extent, although pertaining to the same tribe. The probable differences in the age of the villages, and the modifications of customs, are also to be taken into consideration; nevertheless this supposition gives us a key that will unlock most of the mystery of these works. They are in most cases located near a stream, and consist of a square or octagon with its gateways and protecting mounds surrounding the village, and a circle enclosing the corn-field. As a rule, the small circles, which may have been places of amusement and ceremony, are outside of the large enclosures. Even at Fort Ancient, which no one doubts is a defensive work, the supposed race-track and principal mounds are outside, though the crescent, in front of which the ceremonial rites were performed, is within the fort.

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NOTES AND NEWS.

SOME curious electrical phenomena were observed, according to a writer in the *Chemische Zeitung*, in a stearin and ceresin manufactory in Italy. One evening four vats of white ceresin (which is a paraffine obtained from ozokerite) containing about 500 kilograms each, were being stirred to cool. When the point of solidification was nearly reached, the electric light of the place accidentally went out; and, to the surprise and alarm of the rather ignorant workmen, the mass of ceresin was observed to give pale sparks on the slightest motion. If the hand was brought near, loud sparks nearly two inches long were obtained. The phenomenon lasted over half an hour.

— Some interesting explorations have been made in connection with the famous Adelsberg Cave. The Vienna correspondent of the London *Daily News* says that various citizens of Adelsberg, wishing to ascertain whether the Ottoker Cave, discovered a year ago at some distance from Adelsberg, was in any way connected with the great cave, followed the course of the subterranean river Poik. It was known that forty years ago a party of explorers had their progress barred by a large lake, and the present adventurers therefore carried with them a boat. Having successfully crossed the body of water mentioned, they came to lofty galleries through which the river flowed. It was possible to walk on the banks of the stream, but at intervals it expanded into small lakes, and the boat had to be used. At last the gallery branched into two corridors, one of which the stream rendered impassable, while the other was high and quite dry. The boat was dragged up, and the party proceeded. After crossing a fourth lake, the largest they had met, they found that the Ottoker Cave had been reached. The journey through the galleries lasted six hours. The explorers saw that they had by no means penetrated to the remotest parts of the grotto, and there is evidently still a wide field for discovery.

—We learn from *Engineering* of May 30 that the Chatillon-Commentry Steel Company have for some time past been experimenting with gun-tubes, projectiles, and armor-plates of steel tempered in lead. The process is simple, the steel being raised to a red heat and then plunged in a bath of molten lead, where it is allowed to cool gradually. The beneficial effects of this treatment are very marked, the elastic limit, breaking stress, and percentage elongation of the material being all increased. Actual tests of an armor-plate thus tempered, 10 8 inches thick, which was tested at St. Jacques by firing at it with a 3.75-inch gun, showed that the penetration in the tempered plate was much less than in an untempered one. The value of this test is, however, somewhat discounted by the fact that the power of the gun was much below that required for penetrating the plate, as the striking velocity of the shell was only 1,300 feet per second, and its penetration in wrought iron would therefore be only about 4.85 inches.

—At the instance of Professor Otto Pettersson of Stockholm, a hydrographic expedition has been arranged; the professor himself and Baron Oscar Dickson finding the necessary funds, with some assistance from two Swedish marine insurance companies. The expedition, which will start from Gothenburg, comprises the salvage steamer "Skandinavien," the gunboat "Alphild," the pilot steamer "Goteborg," and the two steamers "Themis" and "Iris." Men of science will be found on board all these steamers, and samples of water and measurements of temperature will be taken. The Skagerak and the Kattegat, which are to be the places of operation, have been divided into different sections. The appliances were tested at Stockholm the other day, says *Engineering* of May 30, and gave great satisfaction. They comprise an apparatus constructed by Professor Ekman for bringing up water from a depth of up to three hundred feet, furnished with a warmth-isolator; a turbine apparatus by the same gentleman for bringing up samples of water from any depth, and fitted with one of Negretti and Zambra's deep-water thermometers; and several appliances for similar purposes constructed by Commander Arwidsson, very quick in their mode of operating, but not intended for any great depth nor for very large samples.

— Some sea-urchins are known to live in cavities in rock; and the diameter of the cavity is often wider than that of the entrance, so that the animal could not leave its home or be taken out without injury. On the French coast of Croisic (Lower Loire) may be seen thousands of urchins thus ensconced in the granite rock, which is rich in felspar and quartz. The animals, it is not doubted, make and widen the holes for themselves; but the question how has not been satisfactorily answered. Chemical solution of the rock seems excluded, considering both the nature of the latter, and also that no acid which could be thus used has been proved to exist in the urchin. The matter has been studied lately by M. John, and in an inaugural dissertation he explains the effects by mechanical action. With the so-called "lantern of Aristotle," as given in *Nature* of May 29, the animal probably bites the rock. The sucker feet are also attached, and a rotatory motion is imparted to the body; the prickle points, with the lantern, gradually wearing down the surface. These cavities afford a shelter to the urchins against the action of the waves. An attempt is made to conceal them by means of mussel and other shells. The rocks in which the cavities occur are in general thickly covered with calcareous algæ. It has been thought that possibly these decompose the rock, and so facilitate the work of the urchins. M. John, however, finds no such chemical relation; but atmospheric agencies, he considers, may help the work of boring. A number of other animals are known to penetrate rock, and it is supposed that they do it also in a mechanical way. M. Forel described to the Vaudois Society of Natural Sciences how, in the hard limestone of Constantine, Algiers, *Helix aspera* was found in holes four to five inches in depth.

— It was natural to suppose, that, as heat weakens the strength of a steel magnet, the susceptibility of a magnetic substance would increase with a fall of temperature, as also that bodies which in ordinary thermal conditions are neutral to magnetic influence, would exhibit magnetic properties if cooled down sufficiently. This point, says *Engineering* of May 2, was dwelt upon by Dr. Hopkinson in his remarkable address to the Society of Electrical Engineers, and was also made the subject of experimental demonstration by Mr. Shelford Bidwell in his recent discourse on magnetic phenomena at the Royal Institution. The substance used was an alloy of nickel and iron. Both these metals are magnetic at ordinary temperatures, but the alloy is perfectly neutral. A permanent magnet is unable to lift a strip of it; but, if cooled a few degrees below zero, the strip is at once strongly attracted by

the magnet. It is inferred that all metals would exhibit magnetic properties if cooled below this critical temperature; but of this, in the words of Dr. Hopkinson, "we have at present no indication." Mr. Bidwell also used on this occasion the very delicate apparatus which he has constructed for accurately studying the effects of a varying magnetizing force on bars of iron. He took up the subject where Joule left it in 1845, and showed that the bar lengthens at first, then contracts, becoming ultimately shorter than its original length. Joule's greatest magnetizing force was 120 C.G.S. units; Mr. Bidwell has carried his to 1000 C.G.S. units. The corresponding elongations and contractions were rendered plainly visible to a numerous audience in the usual optical way by the motion of a spot of light upon a distant screen.

— *The Engineering and Mining Journal* of June 14 is authority for the statement that small metallic articles, such as buttons, buckles, clasps, etc., have different colored films produced on them by various methods. Some of these are known as oxidized silver. Rainbow colors are produced on brass buttons by stringing them on a copper wire by the eyes, and dipping them in a bath of plumbate of soda freshly prepared by boiling litharge in caustic soda, and pouring it into a porcelain dish. A linen bag of finely pulverized litharge or hydrated oxide of lead is suspended in the solution, so as to keep up the original strength of the solution. While the buttons are in this solution, they are touched one after the other with a platinum wire connected with the positive pole of a battery until the desired color appears. The galvanic current employed must not be too strong. The colors are more brilliant if they are heated after they have been rinsed and dried. Colored films are more conveniently produced upon bright brass by different chemicals, by painting with them, or by immersion. For example: golden yellow is obtained by dipping in a perfectly neutral solution of acetate of copper; dull grayish green, by repeatedly painting with very dilute solution of chloride of copper; purple, by heating hot, and rubbing over with a tuft of cotton saturated with chloride of antimony; golden red, by covering with a paste of four parts of prepared chalk and of mosaic gold. In covering an article with any colored bronze in powder, it is first rubbed with a very little linseed-oil, and the bronze dusted evenly over it from a dust-bag. It is afterward heated in an iron pan to about 480° F. In recent times, small articles are also roughened by dipping in strong nitric acid; and, after washing and drying, they are coated with a rapidly drying alcohol varnish that has been colored yellow with picric acid, red with fuchsine, purple with methyl violet, or dark blue with an aniline blue. This gives the desired color with a beautiful metallic lustre. The latter colors are not very durable, and are for inferior goods.

—The report of Arthur W. Winslow, State geologist of Missouri, states that the detailed mapping of the coal-fields has progressed with little interruption. Field-work has now been extended over nearly four hundred square miles, and the results have been plotted on the preliminary sheets, and are now being transferred to the final sheets. On May 3, Mr. Gilbert Van Ingen reported at the office of the Missouri Geological Survey. He is detailed by the United States Geological Survey to assist in paleontologic work in Missouri. He has been at work during the greater part of April in Pettis County. Detailed mapping was prosecuted during the early part of the month in south-eastern Missouri, and about seventy square miles have been covered. Work on the building-materials and clays of St. Louis was vigorously pushed during the latter half of April. Along with a study of the origin and distribution of the clay deposits and of the economically important limestones, inquiry has been made into the nature and extent of the dependent industries. About two-thirds of the stone-quarries have been visited, and nearly all of the clay-works. An idea of the magnitude of the interests involved may be gathered from the following approximate statement of the number of works in and about St. Louis: eight fire-brick and sewer-pipe manufactories, forty common and pressed brick manufactories, six potteries, one terra-cotta manufactory, two terra-cotta lumber manufactories, forty stone-quarries. The value of the annual output of the clay industries is at present in the vicinity of three million dollars, and that of the stone-quarries cannot fall far short of one million. In the laboratory nearly all of the samples of mineral waters collected during April have been analyzed, and the results will soon be ready for publication. In addition, some seventeen lots of specimens sent in by outside parties have been identified and reported upon, and a few analyses of coals and iron ores for survey purposes have been made. Preliminary inspections have been made in Platte, Clinton, Crawford, and Morgan Counties. In Platte and Clinton Counties are coal-beds of economic value, but their mineral waters and clays also deserve attention. There is every probability that the 22-inch coal-bed mined at different points in the vicinity of Leavenworth, Kan., as well as others found at different depths, extends under these counties. Its depth below the surface at Leavenworth is about seven hundred feet, but eastward into Missouri it must rise progressively towards the surface. The exact determination of these points, as well as the definition of the limits of the bed, cannot be made until systematic and detailed work is done in these counties. In view of the extensive development of the coal industry at Leavenworth close to the Missouri line, and in view of the probable establishment in the future of a similar industry in Missouri near the Kansas line, provisions should be made in the near future whereby encroachment of mining operations from a property in one State upon a property in the other State shall be prevented. In Crawford County iron ore still occupies a prominent place among its mineral products. Some of the deposits of this ore are, however, exhausted, and others are approaching that condition. The demand will before very long be urgent for new sources of supply. The conditions are such, in this and adjoining counties, as to justify the expectation that systematic and thorough geologic work may lead to the discovery of other deposits; and it is the intention to institute such work as soon as the means and the demands upon the force of the survey will permit. Operations looking to the development of zinc and lead mining are also in progress. In Morgan County there are prospects of a revival in lead-mining, and this in a more thorough manner than has been the case in past years. A profitable industry may be built up there if the developments are made cautiously and under competent direction, such as will lead to a knowledge of the origin of the ore, and such as will guide one in selecting localities for prospecting. The survey is not at present in a position to give specific advice on such matters, however, and cannot do so until detailed local work is finished. Zinc-mining is also being started in Morgan County, notably at the "Big Three Shaft," about five miles south-west of Versailles.

—A petition was lately presented to the Medical Assembly of the Grand Duchy of Baden by the German Women's Association of Leipzig, praying that women might be admitted to study medicine. The assembly passed a resolution declining to take any step in the matter, on the ground that women are unfit for the learned professions, and especially for that of medicine, and, moreover, that the latter is already overcrowded. Herr Arnsberger, the ministerial councillor representing the government, said the question was not yet ripe for solution. He also pointed out that the matter was one for the decision of the imperial authorities, not for that of the individual states. A similar petition has recently been presented by the same association to the Weimar Landtag, in which the ladies ask to be admitted to the University of Jena, not only to study medicine, but with the view of qualifying for appointment as scientific teachers.

—Duffield Osborne, author of "The Spell of Ashtaroth," has written an article on surf-bathing for the July *Scribner*, which will contain practical directions and sketches showing how to avoid the dangers of the surf, and how to get the most pleasure out of it.

—Messrs. John Wiley & Sons announce as in preparation "Mechanics of the Machinery of Transmission," being Vol. III., Part I., Section II., of "Mechanics of Engineering and Machinery," by Dr. Julius Weisbach, edited by Professor Gustav Hermann, and translated by Professor J. F. Klem, Lehigh University, Bethlehem, Penn.