certain cases, of the very hard and poor quality used for making pins. It was at the time being used for welding coils of brass wire into continuous mile lengths (twelve coils to the mile length). The wire was about an eighth of an inch in diameter, and of a very good quality of brass.

Mr. Kennedy had five short pieces of the brass wire welded together into a length of about 18 inches and the burrs removed (the whole operation only taking four or five minutes), and then took the welded pieces to the wire-drawer and had it passed six times through the dies, reducing its diameter from .12 of an inch to .031 of an inch. The existence of the four welds made no difference whatever in the drawing, which was continued until the diameter was reduced to about .002 of an inch.

In order more thoroughly to examine the conditions of straight butt welding in ordinary sections, he made a number of experiments at Lynn. In these experiments, as it was impracticable to measure the power going to the dynamo, he measured the net electrical power going to the welder, and also the exact time during which the current was supplied to the welder. These measurements were made on 25 pieces of wrought iron and steel bar of diameters varying from half an inch to two inches. No sensible difference between the iron and the steel in respect to power or time was found. The horse-power required varied, of course, according to the duration of the operation, and it has been found convenient to make this duration vary directly in proportion to the diameter of the bar, taking forty seconds as the standard time for an iron bar of one inch diameter. Keeping to these conditions, the horse-power per square inch of material remained very nearly constant for bars between half an inch and an inch and a half in diameter, its average value being 20.8. This corresponds to about 30 indicated horse-power at the steam-engine per square inch of welded section during the time that the current was on. This power can be very largely reduced without detriment to the weld, if the saving of power should be of greater importance than the saving of time. Of course, with slower working, the quantity of work which a machine will turn out is proportionately decreased.

The Thomson welders have been used for brazing as well as welding. At the immense bicycle-works of the Weed Sewing-Machine Company in Hartford, Conn., Mr. Kennedy found a brazing welder which had been at work about nine months, and which had made, by register, 29,800 separate operations. The managing director of the works said that he was now modifying the design of his bicycles throughout, with the special object of brazing or welding electrically as many joints as possible.

Inquiries were made as to the wages paid to the men who worked the welders at the different factories visited, and it was found that in no case had highly skilled labor been found necessary.

In summing up the whole matter, it may be said that the Thomson electric welding process has already, in America, been carried fairly beyond the experimental stage, and has achieved sufficient success in regular commercial work of somewhat varied kinds to warrant the belief that its industrial future is one of the greatest practical importance.

The process of welding in use by the Thomson Electric Welding Company has been fully investigated also by a United States naval board, consisting of George A. Converse, A. S. Greene, S. W. Armstead, and Gilbert Wilks, which convened at Boston, Feb. 10. They find that at the present time this process renders it possible, practically, to weld wrought-iron, cast-iron, brass, and copper rods from the size of the smallest electrical conductors in use for distributing purposes, to rods of two and a half inches diameter, and to weld pipes of larger sizes; to weld dissimilar metals, and pieces of different forms of cross-section; to join by welding the ends of wire cables, and to form welded rings of small or large diameter.

The board is "convinced that the Thomson welding process can be found of great utility to the naval service, both on shore and afloat, for the following reasons: it can be used (*a*) in welding breaks in rods without altering them either in length or shape; (*b*) for welding tubes; (*c*) for welding angles and shapes of intricate form; (*d*) for welding copper, brass, cast-iron, or other metals; (*e*) for heating metals for forging, tempering, and upsetting; and (*f*) for welding wire cables."

HEALTH MATTERS.

Consumption in Hayti.

THE natives of Hayti believe phthisis pulmonalis, according to Dr. R. P. Crandall (*Medical Record*, Jan. 11, 1890), to be both contagious and infectious, and fear it much more than yellow-fever or small-pox.

A native who is believed to be affected with this disease is avoided and shunned by all who know him, and becomes an object of prayer for the priests, and of pity for the people.

When a consumptive dies, the entire contents of the room in which he died are either destroyed or thrown into some place set aside by the government for that purpose. This sacrifice of property not only includes the furniture of a room, but also articles of value, such as jewelry, gold, and precious stones. This idea of destruction is carried to such an extent by some, that the paper is sometimes removed from the walls, and the floors torn up. Cases have even occurred where small houses, in which deaths from phthisis have taken place, were burned down to the ground to prevent the spread of disease.

"While riding one day near the suburbs of Cape Haytien, the commercial capital of northern Hayti," writes Dr. Crandall, "I came across a sort of marsh or land of mud known as the Cimetière des Chevaux. Scattered over its surface, and half sunk in its muddy depths, were innumerable household articles, furniture of all kinds, sewing-machines, pianos, book-cases, books, etc. Here and there also appeared the whitened skeletons of animals. My curiosity being excited, I asked of a native standing near the reason for this apparent waste of property. He informed me that the Cimetière des Chevaux was a repository for the dead bodies of anmials, and for every thing that was found in the room of one who had died from *la poitrine* ('consumption'). When asked if any thing was ever removed from the cemetery, he answered that nothing would induce a Haytien to even touch any thing that had been placed there. I found this to be strictly true, as on several occasions I offered natives sums of money to bring me articles from the cemetery, and was always refused with looks of horror and repugnance. On careful investigation, I found that phthisis was regarded as contagious by all classes throughout Hayti."

THE HOUR AT WHICH DEATH OCCURS.—From a study of fifteen thousand cases, extending over a period of twelve years, Dr. J. F. Burns states, in the *New York Medical Journal* for Jan. 4, 1890, that it would appear that death occurs seemingly without any particular predilection for any certain hour, and that the number of deaths for each hour is very evenly proportioned, considering the large number of cases taken and the time covered. The only very positive conclusions the author has formed from the figures are (1) that the idea that more deaths take place in the early morning hours is an erroneous one; (2) if stimulants are to be pushed in disease during these hours, the practice must be justified upon some other ground than to avert the possibility of danger supposed to be very probable at this period; (3) that the vitality of an individual in disease is not regulated by the same influen es or subject to the same laws that govern the vitality of a healthy human being, the normal equilibrium maintained in health between the mental and physical states being altered.

PUTREFACTION AT GREAT DEPTHS IN THE SEA.—Dr. Regnard has raised the question, says the *Bristol Medical Journal*, as to whether a corpse which sinks to a very great depth is preserved indefinitely or otherwise from putrefaction. According to his researches, published in the archives of the Biological Society of Paris, putrefaction does not take place in decomposable substances submitted to a pressure of 600 to 700 atmospheres. These figures correspond to a depth of 6,000 or 7,000 metres at sea. From these experiments it must be concluded, according

to Dr. Regnard, that there is a total absence of putrefaction in the greater depths of the sea. The curious "abysmal" fishes discovered in the "Challenger," and other expeditions appear to rise after death, so that they are sometimes found on the surface; though, as a rule, they go to pieces, as the surrounding pressure diminishes, long before they reach the air. Still, there is no proof that bathybial or abysmal micro-organisms do not exist; and, if so, they could cause decomposition in the corpses of men as well as in the dead bodies of abysmal fishes. The question is of considerable medico-legal, and yet rather biological, interest, and it is far from settled.

NOTES AND NEWS.

ACCORDING to *Nature*, for the purpose of growing plants under more natural conditions than those usually afforded by the soil and surroundings of ordinary botanic gardens, M. G. Bonnier, the director of the Botanic Garden in Paris, has obtained from the director for higher education in Paris the grant of a piece of land in the forest of Fontainebleau as an annex for experimental culture. It has been placed under the special charge of M. Cl. Duval.

— A pamphlet published by the Cornell University Christian Association, containing a map of the campus, and giving detailed information about the village of Ithaca, the university buildings, examinations, boarding-houses, etc., will be sent free to prospective students. Apply to the treasurer of the Cornell University, Ithaca, N.Y.

— One of the problems presented by the frightful eruption of Mount Bandai in Japan, two years ago, was the manner in which a large number of holes in the earth in the neighborhood of the mountain were formed. It was suggested, says *Nature*, that they owed their existence to the falling of rocks and stones cast up by the eruption, while another theory was that they were formed by forces beneath the surface. At the last meeting of the Seismological Society of Japan, Dr. Knott read a paper on the first theory, in which he demonstrated that it was quite insufficient to account for the phenomena. Professor Milne, it may be added, has expressed the same view from the beginning.

— Mr. A. R. Bonsdorf has contributed to the *Izvestia* of the Russian Geographical Society (vol. xxv. 5) an elaborate paper on the conclusions as to the secular upheaval of the coasts of Finland which may be drawn from the accurate measurements made since 1858 under the direction of the Finska Vetenskaps-Societeten. It appears from the mathematical analysis to which the measurements have been submitted, as we learn from *Nature*, that the average upheaval of the coasts of South-West Finland is 55 centimetres per century; and that the rate of upheaval increases from Ut-ö (in the Aland Islands) towards the north, and towards the east as far as Porkala (not far from Helsingfors), whence it decreases again towards the east. The interpolation formulæ better correspond to actual measurements if the changes of the level of the Baltic Sea resulting from the changes of atmospheric pressure are taken into account.

—An expedition has been despatched by the Peruvian Government to the Javary River, on the borders of Peru and Bolivia. The primary object of the expedition, as we learn from the "Proceedings of the Royal Geographical Society," is a military one, being the chastisement of the Indians for the murder of white traders; but, as not less than five scientific men accompany the party, some important results with regard to the topography and ethnography of the region may be expected. Among the *savants* is M. Richard Payer, who, on returning to South America after a hurried visit to Europe, was invited to join the expedition.

—An industrial exhibition will be held at the Swedish capital during 1892, a remarkably well-positioned site in the proximity of the town having been fixed upon. A committee has been considering the financial question of the matter, and arrived at the result that the expenses would be likely to exceed the profits by 1,200,000 krona. This deficiency is proposed to be covered by a grant from the state of 400,000 krona (half to be taken from the industrial manufacture fund), by a grant of 300,000 krona from the city of Stockholm, and the balance of 500,000 krona it is proposed to raise through a lottery. Stockholm is a beautiful town, and the Swedish manufacturers are sure to exert themselves: so the exhibition should become one of some interest, even in these days of excessive exhibitions.

—The annual report of the trustees of the Lenox Library shows that there has been no change in the condition of the library since their last report to the Legislature. A re-arrangement of the various collections of which it is composed, begun during the year and still in progress, was determined on by the trustees with a view to its easier administration in the service of the public, who are freely admitted to its inspection and use. The total number of visitors in 1889 was 8,708. An addition of special interest has been made to the picture-gallery in the gift, by Mr. Alexander Maitland, of the portrait of Van Brugh Livingston, by Sir Henry Raeburn. The chief additions to the other collections have been made by the purchase of the library of the late president, Robert Lenox Kennedy. The Drexel Musical Library, the legacy of the late Mr. Joseph W. Drexel, has been completely arranged in special cases. The completion and publication of the catalogue, which is now in progress, will make available to the musical world what is perhaps the most important collection of the kind in this country.

—An interesting paper by Major Rogala von Bieberstein, German Army, has appeared in the February number of *Colburn's United Service Magazine*. The principal deductions derived from the last summer (1889) manœuvres in the presence of the Emperor, when "extensive use was made of smokeless powder by different divisions of the Guards, as well as by the whole of the Tenth Army Corps," may be summarized as follows. Cast-steel guns were seriously injured; bronze guns were unaffected; steel-bronze guns are recommended. It was found necessary to lubricate gun-barrels from time to time by means of an oily cloth. The cartridges take up less space in the powder-chamber. Whether with guns or rifles, "a better aim is obtained, as also quicker firing; it is easier to judge distances; a better view of one's own troops is obtained; a clearer general view is presented; and a better control in directing an attack or defence is practicable. . . . Troops can suffer great losses from an enemy's fire without knowing whence it comes, and whither they shall direct their fire in defence. . . . The artillery. . . will in future fill their shells with explosives which produce dense smoke, in order the better to observe the" bursts. "Cavalry will suffer more than any other branch of the service by the introduction of smokeless powder, for their best friend was always the smoke which veiled their attack. . . . Their tactical worth in field operations will become much less" than formerly. As to the defence, defenders "can use their weapons with more composure, especially in the front line, than can the attacking party. . . . The spade will play a more important part than formerly, as well for the infantry as for the artillery." As regards the attack, the cavalry will reconnoitre a position under great difficulties, they "must be prepared to suffer . . . greater losses than heretofore," and "must develop a more careful reconnoitring activity. . . . The attacking party of to-day must make great use of his artillery to shake the enemy's infantry" before the position is assaulted. Major Bieberstein considers that the "attacking force which leaves its cover to advance will be cut down by a murderous fire, better aimed than formerly. . . . The increased deadly effect of the repeating rifle and smokeless powder on an enemy repulsed after an unsuccessful storm, will tend to annihilation, and probably change an orderly retreat into hopeless flight." Applying these deductions, it appears more than ever necessary that generals in the field should be experts of the highest order. Also it appears that the preponderance of advantages gained by modern inventions lie with the defence, and that troops which may not possess sufficient experience to attack, may nevertheless defend a good position against the best soldiers in the world, and especially in an enclosed country.