of one part of the nitrate dissolved in six of water is first applied with a sponge, then a solution of one ounce of the sulphuret of potassium dissolved in six of water is applied, and the hair then becomes quite black. A little rose water is applied afterward to neutralize the odor of the sulphuret. What an important part the solutions of silver play in the arts! They convert grey hairs into sable locks; and with the sun beam for his pen, the artist can transfer to his tablets the lineaments of youth and age, and the resemblances of insect, leaf, fruit and flower.

A GREAT LAW OF NATURE.

The various objects and substances of the material world are naturally divided into groups and classes. These several classes, however marked the distinction between them in their full development, fade into each other upon their confines by imperceptible gradations.

In comparing an oak tree with a horse we have no difficulty in deciding that one is a vegetable and the other an animal; but there are organisms varying so little from either animals or vegetables that it puzzles the most learned naturalists to determine to which kingdom they belong. The sporules of the yeast plant swim about vigorously in water, simulating the motions of conscious life so closely that every inexperienced observer, without any hesitation, pronounces them to be sentient beings. Even the French and German microscopists, with the great Ehrenberg at their head, still class these sporules in the animal kingdom, though the English and American naturalists regard it as entirely settled that they are simply seeds of the yeast plant. There are numbers of other organisms in regard to the classification of which, either in the animal or vegetable kingdom, a dispute has long been going on among those who have studied most closely their structure and habits.

The several divisions of the animal kingdom also melt into each other by gradual transitions. The broad distinction between fishes and land animals is bridged over by a class of amphibious beings which can live either upon land or in the water; while the whale and the porpoise, though having the form and habits of fishes, are joined by the structure of their lungs and other organs to the family of land animals. There are fishes and squirrels that can fly like birds, and the characteristics of fishes, birds and quadrupeds are all combined in the ornithornycus of Australia. Even the great divisions of males and females are connected by a group of hermaphrodites which possess the characteristics of both sexes.

The same law is found to pervade the vegetable kingdom, and it is encountered upon the boundaries of every department of nature. Chemical combination is a very different thing from mechanical mixture, but to which of these two forms of union a solution of salt in water belongs, the clearest intellect would find it difficult to determine.

Where shall we draw the line between natural philosophy and chemistry? Between botany and geology? Between astronomy and mathematics? In short, all classes and divisions fade by imperceptible gradations into each other.

Rich Monopolists Shirking their Tax.

The gas companies of New York charge so high a price for their gas that the business is enormously profitable. This is proved by the fact that none of the stock of these companies finds its way into market; the owners holding it with miserly care as their most lucrative investment. These great profits are the result of special privileges granted to the companies by legislative enactment—privileges not shared by the rest of the community. Notwithstanding these advantages, these rich monopolists are the very first to set the unpatriotic example of trying to shirk their share of the tax, and to shoulder it off upon people less able to bear it. We see that the gas companies of Philadelphia have pursued a more honorable course, having resolved to pay their tax out of their own profits. We cannot but think that the action of our companies has been without sufficient consideration, and that these wealthy concerns will, on reflection, be most ready to contribute their share of the public burdens.

Since writing the above we see that our gas companies have probably killed the goose that laid their golden eggs by this little extra strain of their greediness. A resolution has been adopted in the Board of Councilmen directing the Counsel of the Corporation to prepare the necessary papers to transfer all the rights and privileges of the New York and Manhattan Gas Light Companies to the city, in consequence of their expressed determination to make an extra charge of fifteen cents for every thousand feet of gas consumed by their customers after the 1st instant.

THE LONDON EXHIBITION—WROUGHT IRON.

England is the most distinguished country in the world for the manufacture of iron, hence its display of that metal at the Great Exhibition is of the most imposing and interesting character. There are several marked varieties of wrought iron, all of which possess the valuable property of welding. At a high degree of temperature wrought iron may be hammered into almost every form and rolled into very thin sheets. It is a very tenacious metal and its power of resistance to being torn asunder is usually called its tensile strength. Suppose the bar were exactly an inch square, and required 23 tuns to break it, it would be said to support a tensile strain of that weight; and in every case the tensile strength is computed for a transverse sectional area of one square inch, so that comparisons with regard to this property may be conveniently made between different varieties of iron.

The character of the broken surface or fracture of wrought iron affords indications as to quality of great practical importance. The fracture may be fibrous, granular, or distinctly crystalline. But much depends on the manner in which fracture is produced. The same bar may present either a fibrous or crystalline fracture, according as it is broken slowly or rapidly. Thus, iron plate made of good fibrous iron will, when shattered by cannon shot at a velocity of from 1,100 to 1,600 feet in a second, present a crystalline fracture. The presence of phosphorus tends to render wrought iron more largely crystalline in fracture; and the presence of carbon within certain small limits induces a granular fracture, which, indeed, is only a particular degree of the crystalline. Problems of the highest practical importance are connected with this subject.

The Lowmoor iron, so universally known, is made in Yorkshire. It is fine grained and much used for railroad purposes. It has a bright and steel-like fracture, and is applied with advantage to objects which are exposed to much wear from friction, such as railway tires and railheads, and certain parts of machinery. Railheads composed of it are not subject to lamination in the same degree as those of fibrous iron.

A great number of specimens of Yorkshire and Staffordshire iron are on exhibition. The latter is not so fine in the grain as the former. The best plates are made of mixed iron, chiefly scrap Swedish, Shropshire and Derbyshire refined iron. There is one armor plate which bears the following inscription:—"This armor plate, 21 feet 3 inches long, 6 feet 3 inches wide, 5½ inches thick, having a superficial area of 133 feet, weighing upward of 13 tuns, was forged at the Mersey Steel and Iron Works, Liverpool, and has been neither smithed nor tooled since it left the steam hammer. This plate would have been made 15 feet to 20 feet longer if space could have been obtained."

The Butterley Company have sent two armor plates, each 14 feet long, 5 feet wide, and 4½ inches thick, and weighing when finished six tuns.

John Brown & Co., of Sheffield, exhibit two armor plates, whose dimensions are as follows:—No. 1, length 21 feet 8 inches, width 4 feet 2 inches, thickness 6½ inches, weight 10 tuns, 12 cwt.; No. 2, length 24 feet, width 3 feet 8 inches, thickness 5 inches, weight 7 tuns 17 cwt. A few years ago the rolling of such enormous masses of iron would have seemed incredible. Several large plates, only two inches in thickness, for gunboats, are also exhibited.

The display of bars, rails, and girders is magnificent. There are gigantic rails exceeding 100 feet in length, but these are to be regarded as curiosities and interesting as exhibitions of power and effective mechanical appliances, showing what might be done if required. The Butterley Company have sent a rail 117 feet long and 5¼ inches deep, and a tension bar for girders 83 feet long, 1 foot wide, and 1 inch thick.

The Dowlais Company exhibit two rails of the following dimensions:—one 53 feet 6 inches long, 4¾ inches across the head, and 10 inches deep, the other 31 feet 6 inches long, 5½ inches across the head, and 15 inches deep.

Belgium makes a very creditable show of rails and rail sections, and it is declared that in certain foreign markets she has beaten the English producer both with respect to quality and price. The Austrian Society of State Railways exhibit specimens of rails—some with the head of granular and the foot of fibrous iron, and others of puddled steel. This is a great manufacturing company, established with the view of producing everything required for the use of railways.

There is a railway solid wrought-iron wheel, stamped by ingenious mechanism, invented by M. Arbel, a Frenchman. It is forged under the steam hammer, and combines strength and cheapness.

The Monkbridge Company exhibit railway iron tires faced with steel welded upon them. The iron tire in bar being heated to whiteness, and dusted over with borax powder, the melted steel is cast round it and it is then hammered. The union of the iron and steel seems to be perfect. This improvement was introduced into England from France. There are also wrought iron unwelded tires exhibited by the Blenavon Company, which are the invention of M. M. Petin and Gaudet, also of France. Rolled beams and girders of great size were introduced but lately from Belgium and France into England. In the perfection of several processes and in the use of more powerful mechanism for working iron, the French and Germans have been in advance of the English iron workers. This will be news to many of our readers, but it is a fact. H. Krupp, of Essen, intends to erect a set of rolls so large that he will be able to roll out a boiler plate of such a size as to form an entire boiler for an engine of considerable power. When this is effected it will certainly be a triumph of mechanical enterprise.

Wealth of Great Britain.

A writer in the *Edinburgh Review* estimates the property of Great Britain and Ireland in 1858:—

Real Estate	£3,200,000,000
Personal Property	2,775,000,000
Total	£5,975,000,000

Which is in round numbers twenty-nine thousand millions of dollars. This is just about $1,000 to each inhabitant.

By the last census returns the wealth of the United States was estimated at sixteen thousand millions of dollars—about $500 to each inhabitant.

The tax for the support of the British Government amounts to a little more than one per cent of the whole wealth of the kingdom. This is in addition to city and other local taxes, the church tithes, poor rates, &c. The public debt is four thousand millions of dollars—about 14 per cent of the wealth of the nation.

More Big Guns.

The Pittsburgh *Chronicle* states that the Fort Pitt works in Pittsburgh, are turning out the immense fifteen inch guns now at the rate of three a week. These guns weigh each in the rough about 70,000 pounds, and apart from the difficulty of casting, the labor of handling, turning and finishing such a mass of metal must be immense. There are four of these guns now in the lathes, and by the time these are out others will be ready to take their place. It is the intention to turn out three a week, we believe, for the balance of the year. These guns are intended for the new *Monitors*, and are the most formidable of their character in the world. Arrangements are now in progress for casting a twenty-inch gun. This latter gun will throw a ball of one thousand pounds, and is expected to have a range of four miles.

AERATED BREAD IN CALIFORNIA.—A large bakery has been commenced in San Francisco, for manufacturing bread charged with carbonic gas, instead of being fermented. A steam engine supplies the power needed for mixing the dough (which is never touched with the hand), and forcing the gas into it. The time required for the whole process, from the putting in of the flour till the bread comes from the oven, is less than an hour, and the capacity of the machinery is sufficient to turn sixty barrels of flour into bread in a day.