against floating enemies. Compared with more recent guns they are now mere pigm'es, of no sort of consequence, and the quicker they are broken up and removed the better.

Mr. Menelaus, new President of the Iron and Steel Institute, England, says: "Mr. Longsden informs me that they are making at Essen, at the present time, 14 inch guns of steel, which weigh, when finished, 57½ tuns, carrying a shot of 9 cwt. 9½ English miles, using a charge of 210 lbs. of gunpowder. They are about to make steel guns of the following capacities and weights: 15¾ inch bore, 30 feet long, weighing 82 tuns, using 300 lbs. of powder, with a shell of 1,500 lbs. weight; guns of 18 inches bore, 32 feet 6 inches long, weighing 125 tuns, using 440 lbs. of powder, with a shell of 2,270 lbs. weight. Mr. Longsden demurely adds: 'It is calculated, for the present, that these guns will be heavy enough to destroy any armor a ship can carry.' In gloating over the destructive properties of these weapons, he is leaving out of his calculation, perhaps, the flash of lightning ships which Mr. Reed is about to build, and which may, under smart management, be able to get out of the way of such a conspicuous object as a shell weighing over a tun, even when fired with about a quarter of a tun of gunpowder."

THE DISTRIBUTION OF WEALTH.

We cannot hope to give, in the brief space here at our disposal, more than a passing notice to a few of the more salient thoughts in the admirable address recently delivered by Mr. David A. Wells, before the American Social Science Association, at Detroit. The subject, "The Accumulation and Distribution of Wealth," is one which relates to the much discussed relation of capital and labor, regarding which no one topic exists more encumbered with sophisms and popular fallacies. In these times, when the latter underlie a constant succession of agitations, ranging from the French commune to a local trade uprising, such views as those of Mr. Wells, boldly spoken and widely published, are doubly welcome. We commend them to those who would limit the distribution of wealth, who believe in the subversion of the relations of employee and employed, who denounce the substitution of machines for hands, and indeed all who, while ostensibly laboring for the imaginary rights of a semi-deified ideal dubbed the working man, are themselves the main obstacles to the advancement and to the amelioration of the real grievances of the laboring poor.

Mr. Wells points out that never before has man been able to produce so much with a given amount of personal effort. The productive power of this country since 1860 has increased 20 per cent, and there is no more curious incident of this continuing progress than the fact that, in staple manufactures, the abandonment of large quantities of costly machinery, and its replacement by new, is periodically rendered a matter of absolute economical necessity to produce more perfectly and cheaply, and at the same time to avoid the destruction of a much greater amount of capital by industrial rivalry. On the other hand, a highly increased consuming power on the part of the masses is evident, showing a corresponding rise in the standard of comfort. Despite this, however, the difficulties of earning a living are not lessened, the cry of the poor is as loud, and the discontent with the irregularities of social condition even more strikingly manifested. The relative position of poor and rich, in other words, remains practically unchanged, although every one knows that the benefits conferred by Science and invention have fallen on all equally. The humblest laborer of the present day possesses luxuries which kings not many years ago could not obtain; but still, if a disparity exists between him and other men, due no matter to what cause, he becomes the propounder of that interminable social problem which, stripped of all disguises, amounts to the reduction of all men to the level of the weakest in mind or body, and the prevention of any future inequality by the abolition of every species of reward for superior effort, skill, or attainment.

There is no doubt but that, as Mr. Wells in another portion of his address remarks, the doctrine of every man for himself is a pernicious one from a social point of view. Society must protect itself; it must labor for its own benefit as if it were a body physical, and each member is thus compelled to work for the welfare of his fellows in order to serve his own material interests. The conditions precedent, however, to the future progress and well being of society are not merely that shall be increasing abundance, but that it shall be distributed among the masses to the greatest extent consistent with the retention and exercise of individual freedom. To gain this last end, demands have been made extending to the cutting down of the working time to six hours per day, and the actual *per capita* division of all the wealth of the country or of the world.

Mr. Wells shows very clearly the fruitlessness of these propositions, by pointing out that. even with the better mode of living wrought by the introduction of improved machinery, people must labor as much as they do now, in order to maintain themselves in their present condition. There is not enough capital in existence to allow of reduced laboring hours. The maximum value of the annual product of this country is $7,000,000,000; and of this, nine tenths must be immediately consumed in order that we may live, and to make good the loss and waste of capital. The result has been that, after 250 years toiling as a nation, we have only managed to get three and a half years ahead in the way of subsistence If now, as a whole people, we should stop working, four years would be more than sufficient to starve three fourths of us out of existence, and reduce the remaining one fourth to barbarism. If the annual profits of the country could be divided among the inhabitants, it would give each an income of but $175 a year. The average annual earnings of common unskilled laborers is about $400; or allowing each man to support three other people, this would average $100 to each individual. The wealth of the country, according to Mr. Wells' estimate, is $25,000,000,000, which, if divided among the inhabitants, would be $6,000 each. The division, however, would be of short duration, as the money would inevitably find its way back into the hands of the most prudent. cunning, and skillful.

In conclusion, Mr. Wells said that "it is entirely within the power of society to effect a remedy, by adopting agencies whose simplicity and effectiveness long experience has proven beyond all controversy. But herein lies the difficulty. Like Naaman, we are anxious to be cleansed, but, like him, expect to be called upon to do some great thing, and are apt to be disappointed when we are told that the simplest measures will prove the most effectual. In point of natural resources, we have all we can desire. To make these productive of boundless abundance, there must be industry and economy on the part of the individual; and on that of society, a guarantee that every man shall have an opportunity to exert his industry and exchange its products with the utmost freedom and the greatest intelligence. When society has done this, we shall have solved the problem involved in the relations of capital and labor so far as the solution is within the control of coöperative human agency; for in giving to each man opportunity, conjoined with freedom and intelligence, we invest him as it were with crown and miter, and make him sovereign over himself."

THE DURABILITY OF GLASS.

It is well known that many kinds of glass, especially when submitted to the influence of moist air, do, in the course of time, undergo certain changes; the polish is tarnished, the transparency diminished, while the surface becomes covered with thin iridescent layers, small fragments of which peel off, while threads show themselves in the mass. All kinds of glass are not equally subject to these changes; but certain qualities possess the tendency to undergo such modifications in the highest degree. They show, sometimes in the course of a few days or weeks, a very slight efflorescence on their surface, which we should be very much inclined to consider to be dust. But in order not to be deceived, it is well to apply the microscope and chemical analysis; and then, in many instances, the supposed dust is proved to be composed of transformed glass. Some kinds of glass soon become covered with an exceedingly thin layer of moisture, which causes the dust to adhere, and the glass never shows a fresh, clean, or brilliant surface.

These changes may be observed in the highest degree, and studied the most easily, in glass which has been buried a long time. Such glass, when unearthed, is found to be opaque, almost through its whole mass. It has often lost its solidity, and consists of a number of thin and opalescent layers. We have had the good fortune to obtain specimens of glass recently found in an ancient temple on the Island of Cyprus. It had been buried for 3,000 or 4,000 years, and most of it exhibits an opalescence, surpassing in beauty the finest mother of pearl. For these specimens we are indebted to General Di Cesnola, who made the collection of Cyprian antiquities known by his name, now belonging to the Metropolitan Museum of Art, New York city. General Di Cesnola has returned to Cyprus in order to continue his investigations. and, if possible, secure for our country a series of interesting antiquities forming the intermediate link which succeeded Egyptian and preceded Grecian art.

Colladon states that he discovered that, if our modern glass is buried for a long time deep in the earth, it becomes flexible. and may be changed in form without being broken; but that, when again exposed to the air for some time, it becomes hard and brittle as before.

The modifications which glass undergoes in the air are especially due to water and carbonic acid. It is well known that many of the hardest minerals, such as felspar, become disintegrated and change their nature entirely under the influence of these two agents. Their destruction is sure, and is only a question of time. All the particles soluble in water are gradually washed away; while, in regard to the others, when they are not carried off by mechanical action, they remain in the place where the disintegration happened. It is the same with glass. The silicic acid, which, in glass, is combined with an alkaline base, is set free by the carbonic acid of the air, which combines with the said alkali. The alkaline carbonate thus formed is dissolved by the water and washed away; and finally there remains, in the place of the glass, nothing but the almost pure silicic acid. According to Griffith, all very ancient glass proves by analysis to possess this composition. Hausmann has analyzed glass which had been buried for a long time. It possessed an opalescent surface, was opaque, and disintegrated; while only the interior layer was still transparent. He found that the opalescent surface contained almost no alkali, that the lime, as well as the sub-oxide of iron, had been carried off, and that the transformed mass contained nearly 20 lbs. of water. We found that the Cyprian specimens also, alluded to above, contained no trace of alkali, consisting as they did of an al most pure and beautifully opalescent silicic acid.

The first things carried off by the water are the soda and potash. Then follows the lime, which is less soluble. This was especially verified by Bingley, who analyzed specimens of glass which had, for various periods of time, been submerged in a lake. The action of water on glass was first investigated by Scheele, and is very remarkable. According to the old experiments of Bischof and Fuchs, if a good, hard glass is placed in water, after having been finely pulverized, the glass soon shows a blue reaction on red litmus paper, when placed in contact with it, which reaction can only be due to carbonates of the alkalies. Pelouse made recently the same experiment; and not being aware of the older experiments, he announced it as a new discovery.

A glass containing 77 per cent silicic acid, and thus quite hard, when finely pulverized and treated with water, gives to the latter over 10 per cent of its substance. This consists, however, not entirely of alkaline ingredients, as a small portion of the silicic acid dissolves at the same time. In order to comprehend the latter statement, it must be considered that insolubility is only relative; there is scarcely a substance which is absolutely insoluble. Water drops constantly falling will at last perforate a stone, so that every drop must carry off some of the substance. Water kept in glass bottles will ultimately dissolve traces of the silicic acid of the glass, and many springs of water contain silicic acid, as the chemical analyses of several kinds of spring and well waters have demonstrated.

The influence of carbonic acid on moistened glass gives rise to many interesting experiments. Pulverized glass moistened with water absorbs carbonic acid from the air, and becomes effervescent. If the glass powder be boiled with the water, it will, after cooling, absorb carbonic acid more rapidly. The researches of Louis on pulverized felspar show that this mineral, which resists most chemical agents so successfully, is easily disintegrated by simple boiling in water. Experience shows that the various kinds of glass found in commerce behave in various ways when exposed to moist air. And why should it be otherwise? These various kinds of glass differ in their chemical composition, in the ingredients used, and in their proportions. They differ in molecular structure, in thickness, mass, and solidity, all of which details affect the properties. At the same time, whatever be the physical or chemical condition of the glass, that is, its molecular state or composition, it is certain that the destruction is more rapid in proportion as a greater surface is exposed to the attacking atmospheric agencies. This being the case, it is an interesting problem to find out which kinds of glass are, by their chemical composition, best adapted to resist these atmospheric agencies.

Government Tests for Metals.

Among the recently passed acts of Congress was a provi sion for the appointment of a Board of Experts to test the Strength and Value of Iron, Steel, and other metals. The President has appointed the following persons to constitute the Board, namely: Lieut. Col. T. T. S. Laidley, President; Commander L. A. Beardslee, Lieut. Col. Q. A. Gillmore, Chief Engineer David Smith, W. Looy Smith, A. L. Holley, R. H. Thurston, Secretary.

This Board of seven persons has organized and divided itself up into fifteen separate committees of three individuals each. W. Looy Smith is chairman of four of the committees, R. H. Thurston chairman of three, Lieut. Col. Gilmore chairman of two, A. L. Holley chairman of two, and Chief Engineer Smith chairman of one.

Most of our modern scientific discoveries are the results of investigations made under adverse circumstances, in many cases by obscure persons living in penury; in others, by teachers or college professors of limited means, oppressed by laborious professional duties. Of late the idea has begun to prevail that the true way to promote original investigation is to employ prominent men at the expense of the government, giving them good salaries, comfortable quarters, and first-rate apparatus for experiments. Relieved of all anxiety in respect to making a living by other duties, it is supposed they thus will be able to devote themselves so exclusively to Science that the boundaries of knowledge will be rapidly extended. The present Board has been created on the above idea. All the members are persons of ability, and if we do not now learn a thing or two that is new about metals, their strains and qualities, it will probably be because nothing remains to be discovered. But our expectations of the present Board are very exalted, and, as fruits of their labors, we hope to chronicle many early, interesting, and important discoveries.

SCIENTIFIC AND PRACTICAL INFORMATION.

THE PROPAGATION OF CELERY.

Celery is a native of Norway and Sweden, where it grows near the edges of swamps. This plant is rarely cultivated as it should be, hence the stunted specimens which appear in our markets. A deep trench should first be dug, at the bottom of which a layer of sticks of wood, say six inches thick, should be placed, a drain pipe being placed endwise upon one or both ends of the layer. The sticks should be then covered with about a foot of rich mold, wherein the plants should be set, in a row and about five inches apart. The plants should be kept well watered, the water being supplied through the drain pipes, so that, passing through the layer of sticks, which serves as a conduit, the water is supplied to the roots of the plant. In earthing up, care should be exercised to close the stems of the plant well together with the hand, so that no mold can get between them. The earthing process should be performed sufficiently frequently to keep the mold nearly level with the leaves of the outside stems. If these directions are carefully observed, the plant may be grown at least four feet in length, and this without impairing the flavor, which deterioration is commonly noticed in overgrown vegetables and fruits.

PHOSPHORUS CRYSTALS.

M. Blondlot announces that crystals of phosphorus may be be obtained by heating dry phosphorus in a sealed tube at 112° Fah. The phosphorus volatilizes and forms crystals on the upper portion of the tube.