

are anions, hence, the acid which the union of these substances forms will move to the positive pole without decomposition, as would be the case were either sulphur or oxygen a cation. The terms *ion*, *anion*, and *cation*, were first suggested by Faraday. The first is derived from a Greek word, to go, and anion signifies, literally, that which goes upward, while cation signifies that which goes down. These terms are applied to indicate the opposite directions in which substances move when their union is broken up by electrolysis, a word which, literally, signifies to loosen by electricity.

The laws which govern electrolysis are very simple. Bodies, with few exceptions, are only decomposed while in the liquid state, brought about, either by fusion or solution. No elementary substance can, from the nature of the case, be an electrolyte. The direction of the electrolysis depends upon the arrangement of the battery and the amount of it is directly proportional to the quantity of electricity passed through the electrolyte. Those bodies, only, are electrolytes which are composed of a conductor and a non-conductor of electricity. The conductors of electricity accumulate on the negative pole of the battery, and are the cations. The non-conductors accumulate on the positive pole and are the anions. These comprise all the general laws of electrolysis, so far as known.

The positive pole of a battery is now generally called the zincode, and the negative pole the platinode, because when zinc and platinum constitute the metallic plates of a battery, the zinc is positive and the platinum is negative.

Electro-plating consists in the electrolysis of a metallic salt, the object to be plated being connected with the platinode of the battery, as the metals, being electro-positive elements, or cations, will move to that pole, and accumulate upon it.

The objects to be plated must be chemically clean; that is, they must be entirely free from dust, grease, oxide, or tarnish from any cause. Oxides and sulphides are conveniently removed by polishing with rouge, and grease may be removed by washing with an alkaline solution. The surface thus prepared, the article, having a small slip of metal slightly soldered to the back, if necessary for convenience in attaching the wire, is suspended on a hook so that it is immersed in the electrolyte, or solution of a metallic salt, and the negative pole of the battery being connected by a conducting wire with the article to be plated, while a wire from the positive pole is connected with the electrolyte, the decomposition of the salt, and the deposition of the metallic element contained in it at once commence.

There are, however, many circumstances which may defeat success in electro-plating, and no amount of reading can compensate for practical experience in its execution. The metallic film may be imperfect, owing to the presence of impurities upon the surface of the article to be plated. This can be ascertained by examination, and remedied by the proper cleaning. Sometimes the rapid evolution of gas raises little blisters upon the surface, and at others, the deposit, instead of being smooth and granular, will be rough and crystalline. A great variety of means are employed by experts in the art to remedy these evils, such as wider separation of the poles, increasing the thickness of the conducting wire connected with the positive pole, warming the electrolyte, increasing or diminishing the number of elements in the battery employed, etc., etc. Experience, in these cases, is the best guide, in fact, it is the only one which can, with certainty, be relied upon.

The article, having received a sufficient coating, is washed, dried, and burnished, with the exception of such parts as are desired to remain as deposited, and this completes the operation.

**IS THE WEATHER AFFECTED BY SOLAR ECLIPSES?**

There is a popular belief that a season in which a solar eclipse occurs is either colder, or that the weather exhibits vagaries not observable in ordinary seasons. The present season has been in the vicinity of New York extremely cool, and more than an ordinary rainfall has taken place. This has not been universally the case, and must therefore be considered merely a local peculiarity of climate.

We have found that popular opinion very often has some basis in fact, although the cause may not be the one generally supposed to account for a given phenomenon. A good example of this is the discovery by Dr. Richardson, in his experiments with the great induction coil, at the London Polytechnic Institution, that arborescent marks may be produced on the bodies of persons struck by lightning, a fact which has been discredited by scientists. The popular opinion in regard to these marks has been that they were the images of trees photographed upon the skin by electrical agency.

Now, although the experiments of Dr. Richardson confirm the production of the marks, they show, that, instead of being images of trees or plants, they are the superficial tracings of blood vessels, which the electric current has followed on account of their greater conductivity.

So in the case of peculiar weather occurring at or near the period of a solar eclipse, we deem it probable that an examination may show the popular opinion to be correct, although the cause may have no immediate connection with the eclipse itself.

There remains, of course, the possibility that climatic peculiarities, thought to be more frequent at such periods, are merely coincident, but there is, undoubtedly, a growing disposition on the part of meteorologists to refer certain atmospheric phenomena to celestial and cosmical influences as their cause.

The subject is one of great interest and we should like to hear its pro's and con's discussed. Any of our correspondents who will give us facts bearing upon the subject will be welcomed to our columns. Theory will be out of place until the regular occurrence of peculiar atmospheric conditions in connection with solar eclipses is fully established.

**THE DIAMONDS OF BRAZIL.**

The diamond-washing establishments in Brazil have recently been visited by the distinguished traveler J. J. von Tschudi. On his way thither he was invited to stay in the neighboring town, Serro, where considerable commerce is going on in this gem. Tschudi was not little surprised when he witnessed how unsuspectingly the dealers intrust their goods. At the request of a friend he was immediately furnished with over 570 carats, or about one quarter of a pound of diamonds, making a value of 21,400 rix dollars.

One of the most remunerative washing establishments (Lavra) of Brazil is, according to Tschudi, that of San Joao de Barro. It is, however, not rich in stones of the first water, or those free from slightest faults, while diamonds of the second and third water are met with quite abundantly. Diamonds of the second water are called such, which exhibit spots, clouds, or flaws; but those having an undecided color, or that are injured by other material faults, are designated as being of the third water.

The washing operation requires considerable skill. For an inexperienced eye it is exceedingly difficult to detect a small diamond among a mass of glittering quartz, talc, or micaceous schist. Tschudi, in spite of carefully searching, and although the gem lay on the top of the sand, was unable to find it. To the keen and well-practiced eye of the negro, however, not a diamond of the size of a pin's head remains unnoticed.

The quantity of gems collected per day amounts to from thirty-five to seventy carats, which is equal to about one hundred and fifty diamonds. The gems collected, from the beginning of the season up to the time of Tschudi's stay, weighed 2,700 carats, and consisted for the greater part of beautiful stones, some of which exhibited a greenish tint, which disappears in grinding.

During the time when the washing establishments were under royal administration, every negro who found a diamond of seventeen and a half carats, received his entire freedom, and presents were awarded to those who found smaller ones. As to the etymology of the term carat, it is derived from the word *kuara*, the coral tree, the red pods of which, when dry, were formerly used for weighing gold dust. Four grains are equal to one carat, 151½ carats being equal to one ounce troy weight.

Dr. Lewis Feuchtwanger, in his treatise on gems, gives the following prices for diamonds in gold currency, viz.;

2 grains (half a carat), from.....	\$ 68 to \$75
3 "	80 to 90
1 carat.....	110 to 140
1½ carat (6 grains).....	200
2 " (8 "	400
3 " (12 "	1,200 to 1,400
4 " (16 "	1,600 to 2,000
6 " (20 "	3,000 to 4,000

Diamonds differ considerably in their color. Forty per cent are in general colorless, thirty per cent may exhibit a slight tint, and as many may show a decided color. Aside from the limpid or colorless stones, those of a dull whitish or greenish tint are most common. In polishing them some of the colors disappear, when the diamonds will distinguish themselves by their pure water. Light shaded rough stones are therefore not always less valuable than limpid ones. Light-tinged diamonds are more common than deep-colored ones, blue and green are very rare, and bring exorbitant prices.

Tschudi enumerates the following colors which diamonds exhibit: Citron and wine-yellow, brass, ochre, and brown-yellow, but not sulphur-yellow; light-brown, pink, and red-brown; rose, peach blossom, and cherry-red; green in all shades, as pale sea-green, leek color, pistachio olive, thistle-finch color, emerald and bluish green, greenish gray; light gray, ash gray, smoky gray, pure black and dirty black.

Most colored stones are found in Rio da Bagagne, they also occur frequently in Sincora in the province of Bahia. The most refractory to the cut is the black diamond, such as used for the carbon tool points, which were described in our issue of July 24. It mostly occurs in the latter province, sometimes in pieces of from one to two pounds.

One of the most extraordinary curiosities in the way of diamonds is a crystal inclosing a gold leaf. Dr. Nello Franca, who makes mention of this stone, asserts that the gold is seen as if not imbedded in the diamond at all. This peculiar specimen speaks against the hypothesis of those who consider this gem as having directly originated from carbon or carbonic acid.

**PATENTS OR NO PATENTS--THE OPPONENTS OF PATENTS USED UP.**

Our readers have been made aware that a movement has been for some time on foot in England to repeal the patent laws of that country. As might have been expected a lively discussion has taken place, and Mr. Macfie and Sir Roundell Palmer, the principal champions in Parliament of abolition, have received some rough handling, both in parliamentary debate and from the press. We learn from the *Scientific Review* that a conference of workmen was held on Saturday, the 24th of July, at Shaftesbury Hall, Aldersgate street, London, under the auspices of Sir Roundell Palmer, M.P., Mr. Macfie, M.P., and a few other opponents of patent property, to consider the desirability of abolishing the patent laws.

Mr. R. Marsden Latham, of the Inventors' Institute, together with a deputation from the Delegates Invention-right Committee, a body composed of delegates from the Workingmen's Technical Education Committee, the Workmen's International Exhibition Committee; the Foremen Engineers' Association; the Workingmen's Club and Institute Union;

the Public Museums and Free Libraries Association, and other workmen's organizations, attended to watch proceedings, and if necessary to take part in the debate.

Sir Roundell Palmer, M.P., presided, and in the course of a long address, which though attentively listened to, provoked occasional expressions of dissent, said that the opinion he had formerly held in regard to the patent laws had materially changed, and he had now come to the conclusion that they did more harm than good, and therefore it would be better for the people if they were abolished. (Loud cries of "No"). Some men might neglect their business in the hope that a windfall might fall to them in the shape of some invention, but it was doubtful if one man in twenty drew a prize in the inventors' lottery. In many cases the most useful inventions got into the possession of employers and of capitalists. The legitimate reward of poor inventors would, probably, in the event of the abolition of the patent laws, fall to them much in same way as it did now. There was no analogy between the copyright in a book and the right to a mechanical invention. No two men could ever write the same two books, therefore no author could ever stand in the way of another. Ninety-nine patents when useful stood in the way of the people. (Cries of "No" and "Impossible.") They were monopolies—(cries of "No," and a voice: "Not more so than other descriptions of property")—and a patent was a monopoly given to one man for fourteen years, who had discovered something before any one else, but everyone was in search of the same thing. A stop was put to their exertions, as they could not proceed without paying a royalty to the man who had patented it. He considered that a person who had found out a new invention which might benefit mankind, had no right to block up the way for fourteen years by a monopoly which was called a patent. ("Oh!") Patents stood in the way of the improvement of the people in a far greater measure than they benefited the inventor. (Expressions of dissent).

Mr. J. W. Richardson remarked that the patent laws drove many men out of the country to America, where inventions were appreciated. (A voice: "America has better patent laws, and grants three times as many patents as are granted here." Cheers). He suggested that Greenwich Hospital should be converted into a museum of patents. Greenwich was near to London, and was a better site than South Kensington. He had received a very courteous letter from Mr. Gladstone in reply to an application for converting the hospital into a national patent museum, in which the right Hon. gentleman stated that the subject should have his best consideration. There was a national patent museum in America, which had been productive of great good, and he thought that if a national mechanical and designers' co-operative institution, to assist inventors, could be established in England, it would be productive of much benefit to the community.

Mr. J. R. Taylor, of Gray's Inn, speaking of the cost of obtaining and defending patents, concluded that it was almost an evil for a man to be an inventor and obtain a patent. (A voice: "Then cheapen patents and simplify the law.") He considered that patents for new inventions limited the national wealth. ("Oh!")

Mr. Clarke denounced the monopoly enjoyed by the Post-office and desired by the Government in the case of the telegraphs. This, he thought was a still greater evil than the so-called monopoly which the patent laws conferred.

Mr. Thomas Paterson said that what was wanted by the workmen inventors of this country was a real security for their inventions—(hear, hear)—and he thought that they were as much entitled to a property in the results of their brain labor and expenditure of time and money in perfecting and elaborating new inventions as authors were to copyright in their books. (Loud cheers). He for one could not accept the finely-drawn sophisticated distinction between copyright and invention-right which Sir R. Palmer, with so much pains and ability, had endeavored to develop in his opening address—(loud cheers)—and he was satisfied that the good sense of the workmen of England would prevail, and could not be imposed on by such hair-splitting arguments as had been addressed to them by the worthy chairman. (Hear, hear).

He contended that the patent law system was the best practical means of remunerating inventors yet devised—(cheers)—that without encouragement and remuneration inventors would never incur the cost and labor of devising new inventions—(cheers)—that the public introduction of new inventions could only be accomplished in a large majority of cases at great expense—(hear, hear)—and that manufacturers and capitalists would not embark money in publicly introducing new inventions, unless some inducement, such as the patent laws afforded, were accorded to them. (Loud cheers). To abolish all protection to invention would be to hand over all the profits of new inventions to the great capitalists, who would come in and undersell the inventor, which they could then easily do. Patents should be granted free from charge, and a tax might be imposed upon the profits of the patented article. He was one of the honorary secretaries of the Workmen's International Exhibition Committee, and they found that it was almost impossible to get skilled artisans to send new inventions for exhibition, unless some special security was guaranteed to them that their inventions would be freed from piracy. (Hear, hear). He had attended meetings of workmen at the great centers of commerce, and in all parts of the country, and a general feeling prevailed among them, that the patent laws should not be abolished, but simplified and brought within the reach of all. (Loud cheers). To abolish the patent laws would be to plant the seeds of England's decline—(hear, hear)—and he could assure those of our legislators, who, seeking to obtain popularity, might truckle in favor of such a measure, that, among the working