the winged female, back view; greatly magnified, as the natural size is shown in the short line on the left.

The phylloxera spreads in several ways. The wingless insect is said, by Prof. Riley, to travel over the surface from vine to vine, or beneath the ground where roots interlock; while in the winged form it may fly or be carried by the wind 15 or 20 miles, and, under exceptional conditions, even more. Through man's agency by commerce in plants or cuttings, it may be carried indefinite distances. Therefore some governments, as the Australian, Algerian, Italian and German, have prohibited the introduction of vines from infested regions.

Signs of the disease are given by Prof. Riley as follows: "A vine attacked by phylloxera has the more fibrous roots covered with little nodosities or swellings, and a careful examination of the swellings during the growing season will disclose numerous yellowish lice of different ages and groups of brighter yellow eggs, barely visible to the naked eye. The swellings in time rot, and the lice settle on the larger roots. Vines that are more susceptible to the disease generally show external signs the second year of attack, in a sickly yellowish appearance of the foliage and in stunted growth; while the third year they frequently perish, when on examination the lice are no longer to be found; they have left or died, and all the finer roots have decayed and wasted away." The time to make the examination is as soon as the first signs of decreasing vigor appears. It is true, as a correspondent argues on another page, that sick vines may arise from other cause than the phylloxera, but it should be looked for, and for those who are not sharp sighted, we can but offer, as we have done before, the use of our eyes and microscope, to any reader who sends us suspected vines.

Interesting Experiments in Regard to Spontaneous Combustion.—E. Bing, of Riga, has experimented with different materials; wadding, raw flax, hemp, the waste from silk, wool and cotton spinning as well as sponge, and finally wood dust as found in any cabinet-maker's shop. They saturated with various fluids, viz., oils, fresh and in a gummy state; turpentine, petroleum, various varnishes, etc. All the fibrous materials took fire when saturated with any of these oils or with mixtures of the same. Sponge and wood dust, on the contrary, proved to be entirely harmless. Combustion ensued most rapidly with 17 grains of wadding and 67 grains of a strong oil varnish, in 37 minutes; while 200 grains of washed cotton waste, of which a portion was saturated with 750 grains of strong oil varnish and the remainder wrapped about it, required almost 14 hours. These materials were placed in a well-sheltered spot and subjected to a heat of from 18° to 40° C. Silk did not flame up, but slowly charred. Small quantities seem to take fire sooner than large.

Snow Illumination.—During a recent snow-storm, in the early afternoon, an interesting experiment was tried in Paris. At the moment when the sky was darkened by snow, the electric lamps were lighted in the square of the Theatre Francais. The reflection of the light from the snow-flakes immediately dispelled the darkness and produced a very pleasing effect. It is proposed to try a similar experiment in misty weather, and if the light can penetrate even to the distance of 20 meters (65.6 feet), Jablochkoff lamps will be established at points where the passing is most frequent.—*Les Mondes.*

Electro-Chemical Action Under Pressure.—In a series of about 50 experiments, each of which continued for several hours, and during which pressures of 100, 200, 300, etc., atmospheres were maintained, A. Bouvet found the following laws: 1. The decomposition of water by a current is independent of its pressure. 2. The quantity of electricity necessary to decompose a given weight of water is sensibly the same, whatever may be the pressure. The laws are in perfect accordance with the mechanical theory of heat.

THE ISTHMUS OF DARIEN CANAL.

The old problem of a canal cutting the Isthmus of Darien is now assuming new life through the persistent inquiry of the French. The results attained by the last body of French engineers sent out to study the feasibility of the canal have been published. Their report is being followed up by French writers who take up the resultant benefits of the canal and adorn them with rosy colors. The latest of these views is that of the *Economiste Francaise.* This journal has been figuring the sailing time between different commercial centers, which court the Chinese trade, and the computations are found to be vastly in favor of our Eastern seaboard over England. Our Eastern merchants and manufacturers are pushing their English competitors close to the wall in many ports of the world, and they will make haste to avail themselves of any advantages which they may find in assailing the eastern coast of Asia with their merchandise.

The French journal, to which we have alluded, gives statistics showing the actual differences in distances and time between voyages from the English channel to Pacific and Chinese ports, and from New York to the same points. The advantages are in favor of the latter, being to San Francisco, Callao, Valparaiso and Sandwich Islands, four and a half days, or from 3½% to 4¾%, and 8½ days, or 7%, to Shanghai. If an isthmus canal be opened, the difference for sailing vessels would be 24 days, or from 33% to 51% from New York to the four places named, and 22½ days, or 28% to Shanghai. The average gain to New York vessels would be 2,000 miles, or 19 days over English and French competitors. Attention is then called to the increased use of steamers since the opening of the Suez canal. The same result would follow by the isthmus route. The difference then in favor of New York for steamers, which is now very small, amounting to only one day, or from 1½% to 3%, would, with the canal, be, to San Francisco, 12 out of 29 days, 41%; Callao, 12 out of 21, or 57%; Valparaiso, 12 out of 27, or 44%; to the Sandwich Islands, 12 out of 35, or 34%—an advantage of 44% on the average for New York, simply doubling the commercial advantages to the United States with the Pacific.

It will be greatly to the glory of the French engineers and capitalists if they succeed at Darien, where so many commercial powers, including our own government, have explored and turned back in dismay. Although, we should dislike, on general principles, to see any foreign nation win control of any artery of commerce which will be so important to this country as the isthmus canal, still if the project goes much longer by default by our inactivity, their can be no cause for complaint. Perhaps it would be as well to have the French own the canal as any other foreign power, and so long as we get the commercial benefit, perhaps we can afford to let the French raise the money and reap the glory.

Iron and Silicon.—Some time ago there was taken from the ground, we forget in what locality, a metallic ingot having the look of iron, but, notwithstanding its long contact with moisture, showing no trace of oxidation. Prof J. Lawrence Smith, who lately analyzed it, found it to be a sillicide of iron, containing 17% of sillicide. This compound is so inalterable that it will remain without change in nitric acid of 1.40 density, or in bromine. Hydrochloric acid affects it somewhat. The history of the ingot is not known, but it is thought to owe its existence to some accident in the manufacture of iron. M. Daubree, commenting on this in the French Academy, stated that, notwithstanding every effort, it had not been found possible to incorporate more than eight per cent. of silicon with iron. M. Saint-Claire Deville was struck with the analogy of the product in question to the sillicide of manganese produced some years ago by M. Brunner.—*Journal of Chemistry.*

LIGHT AND LIFE.

The question as to how life is affected by the different colors of the spectrum has at various times engaged attention, and plant life has apparently been more studied in this respect than animal. Two distinct series of researches lately described to the French Academy seem to afford some fresh insight into the matter, and it is interesting to compare them together.

One series, by M. Bert, was on plants; the other, by M. Yung, on the eggs of certain animals. M. Bert kept plants within a glass trough inclosure, containing an alcoholic solution of chlorophyl (very frequently renewed), and exposed them thus in a good diffuse light. The solution, which was very weak, and in a very thin layer, intercepted little more than the characteristic region of the red in the spectrum. This excluded part, then, was proved to be the indispensable part of white light, for the plants immediately ceased to grow, and before long died. It is in this red region (as M. Timirigzeff has lately shown) that the greatest reduction of carbonic acid takes place. If red rays are kept from the leaf the plant can no longer increase its weight, it is reduced to consuming reserves previously accumulated, exhausts itself, and dies.

This part of the spectrum, however, though necessary, is not sufficient. Behind red glass plants may no doubt live long, but they get excessively elongated and slender, and their leaves become narrow and little colored. This is owing to the absence of the blue violet rays. Thus each region of the spectrum contains parts that play an active *role* in the life of plants.

Now turn to animals. M. Yung has experimented during three years on the effect of different spectral colors on the development of the eggs of frogs (the common frog and the edible frog), of trout, and of fresh-water snails. It was found that violet light favored the development very remarkably; blue light comes next in this respect, and is followed by yellow light and white light (which two gave nearly similar effects). On the other hand, red and green appear to be positively injurious, for it was found impossible to get complete development of the eggs in these colors. Darkness does not prevent development, but contrary to what some have affirmed, retards it. Tadpoles of the same size, and subjected to the same physical conditions previous to experiment, died more quickly of inanition when deprived of food in violet and blue rays than in the others.—*London Times.*

Effect of Electricity on Vegetable Growth.—During last summer, Pasteur, according to *Comptes Rendus,* made some interesting experiments on the effect of electricity on vegetable and fruit growths. On the 4th of August, he enclosed some vine-sets in hot-beds, almost hermetically sealed. The grapes ripened about October 10th. Grapes that had ripened in the open air fermented in less than 48 hours, in a temperature varying between 25° and 30° (77° to 86° F.), but those that ripened under glass remained unchanged. This result, which had been predicted by Pasteur, lends strong confirmation to his views. Again, on July 30th, 1877, M. Celi planted three kernels of maize under each of two bell-glasses. The weight of the kernels, the kind of earth, and the quantity of water supplied daily, were equalized as nearly as possible. On August 1st, the kernels sprouted. During two days the growth was nearly the same under both glasses. On the third day the plants in electrized air began to develop more rapidly than the other. On August 10th, the following measurements were taken, from the base of the stalk to the extremity of the upper leaves: Plants in electrized air, 17 cm. (6.69 in.); plants in ordinary air, 8 cm. (3.15 in.).

California, for the first time since her admission to the Union, was unrepresented in the House of Representatives at the opening of the special session.