

The Durability and Preservation of Paintings.

A picture is one of the most precious of human documents, and at the present time artists are producing paintings which are changing—changing so rapidly in some cases that the beauty fades even before they leave the studio, and in a few years there will be hardly a trace of their original beauty. The treatment of pictures after they have passed from the artist's care is frequently one that tends to their destruction. The durability of a picture should be a point of honor with an artist. The permanency of ancient works of art is well illustrated by the fact that some madders are still quite vivid, and the same may be said of vermilion, while the high reds have changed only slightly. The red draperies of the Italian pictures as early as Fra Angelico, painted with rose madder, are perfect at the present time, and the Dutch and Flemish schools exhibit many very excellent examples of the most durable work. At the same time we find many failures—for example, patches of black occur in drawings by old artists where high lights were, and they had no permanent true yellow or orange pigment, the yellow used by older artists being fugitive. The yellows of arsenic have not only gone themselves, but have also injured the colors they came in contact with, while the orange hues produced from the same substance have turned dark brown, and in some cases black. In more recent times, in some of the works of Cox and Turner, there is noticeable a faded and changed condition.

In the past the young artist was apprenticed to an older artist, preparing all the materials and grinding the pigments to be used in the production of the picture, consequently the artist knew exactly the quality of the colors he was using and was not at the mercy of the color manufacturers. At Antwerp, there is a trunk which belonged to Rubens, in which he had placed pigments collected during his travels, showing what care he took in selecting his colors. The atmosphere of our city since the introduction of coal as a fuel is most detrimental to painting, fresco being well nigh impossible with the air full of smoke particles and sulphur compounds from the combustion of coal. If modern chemistry has produced many fugitive colors, it has also added very largely to the list of permanent ones. The English Architectural Review, from which we obtain our information, gives most interesting facts relating to the "Durability and Preservation of Paintings," written by James Leicester, F.I.C., F.C.S. The whole of a man's life work, the visible and surviving records of our great painters, are dependent upon a few tubes of colors; and when we consider the vast sums of money given for great works at the present time, it is only honest that they should be produced of good and durable materials, and artists should look to the future stability of their work as do architects. The preparation of colors too quickly and without sufficient washing, and in some cases the mixture of cheap and bright pigments with dull ones, should be condemned. There are many easy tests by which artists can detect impurities in their pigments, but they are not apt to go to this trouble, nor have they the requisite experience to test them, and they are too apt to be governed by the colormaker's word. The artist should demand, says Mr. Leicester, the chemical formula for each tube sold, or in other words, the true name of the ingredients.

The scheme of M. Vibert, that painter of splendid genre, is well worthy of consideration. He proposed that a permanent commission on the material processes of art be appointed, the members of the committee to be chosen from all branches of art having problems to solve and advantages to obtain from the work of the commission, also chemists and manufacturers; and the work of the commission being to investigate the inventions and processes, ancient and modern, and to indicate in special reports those which might seem preferable, and to conduct correspondence relating to the objects of the commission, also to establish a laboratory where analyses could be carried on on behalf of the artists, dealers or manufacturers. No commercial considerations were to be entertained, and the mark of the society was to be placed on all products recognized as good, the dealer or manufacturer depositing a sample of the product and binding himself to produce a product identical with the sample. All artists would thus be assured of a pure material in no way injurious to the preservation of their works. It would be very gratifying if a scheme of this nature could be adopted, and in the end it would add to the business of the manufacturers.

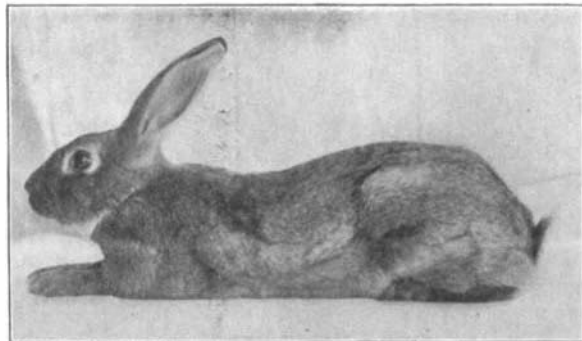
Mr. Leicester then describes the various media used during the Middle Ages and in the Renaissance, and gives some of the ancient directions for preparing colors. He recommends that as far as possible, pictures should be painted on panels in preference to canvas and carefully protected on the back to guard the painting from the action of the damp. Many scientists and artists are of the opinion that pigments should be tested by exposure to diffused daylight alone, for sunshine exposures are hardly the condition under which to test the durability of a pigment from an artist's point of view. Pigments are influenced ac-

ording to the pureness of the atmosphere and the dryness of the climate. It is possible to use pigments in the pure air of the country which would be greatly destroyed by the impure air of cities. In a fine, dry climate like Egypt a picture could be produced which it would be difficult to paint in England, and still remain as permanent. The artist, now as of old, is safest when he considers what pigments he should exclude rather than what new colors he can add to the palette, and the durability of the pigments should not be considered apart from the question of the medium, as many of the most fugitive of pigments having, owing to the medium they were used with, preserved their freshness for hundreds of years, and the use of copal and amber varnish with linseed oil for oil pictures is most advisable for the production of lasting work. At the present time it would be well if the scientist and the artist drew more together, in order that the emotions which the pictures are capable of conveying to the spirit which has been given to the painter shall not either be left unrecorded or allowed to fade from the book of record.

BELGIAN HARE RAISING IN SOUTHERN CALIFORNIA.

The growing of Belgian hares has recently become an extensive industry in Southern California, having its center in Los Angeles. Here, within the past two years, hundreds of firms have turned their attention to the timid little red brown hare, and thousands of hutches, or rabbit warrens, are housing the breeding or growing animals. Many of the concerns have extensive equipments costing as much as thirty and forty thousand dollars, while hundreds of others are mere boxes in back yards screened with wire netting, the proprietor of the place being some boy or woman of the establishment.

The economic value of the Belgian abides in its flesh for food purposes. This has no relation to the ordinary hare or rabbit. It is white, close-grained and tender, resembling very much the legs of frogs, being

**A HIGH-BRED BELGIAN HARE**

withal of delicate and most savory flavor. It is decidedly an epicurean dish, being superior to fowl of any kind; no roast could be more palatable than a good fat hare stuffed with oysters.

The animal commends itself to raising in small ways from the fact that it is very clean and will be healthy in the most limited and confined spaces. In this respect it is greatly superior to poultry; requiring neither the care nor the space of chickens. These considerations have made it distinctly the back yard pet of Los Angeles in which enclosures many thousands are now being raised. The prices of hares of good breeding points are now high notwithstanding the number in existence. A good buck or doe will bring from \$50 to \$250, sales at the latter price being very common. The ordinary does and bucks of the age of three months, not bred from parents of prize records, bring from \$20 to \$25. The sex most commonly sold is the females; a few unsalable does get upon the meat market where they are readily gobbled up at twenty-five cents per pound live weight, a price which makes the animal worth from \$2 to \$2.50. They are killed and dressed at the stalls while the purchaser waits. The animals can be grown to maturity for from thirty-five to forty cents, and they could be sold at seventy-five cents and great profit realized; the present prices, therefore, are very remarkable, yet they have kept steadily up since the inception of the industry and give no indication of waning.

The hares of Los Angeles come directly from England and Belgium; several of the firms make a speciality of importing. It is said that a hare having the points of the Belgian, but of smaller size, runs wild in the country to the west of Antwerp; and by the importers it is said that it was from this hare crossed with English breeds, the crossing being with regard to a table animal, that the now popular Belgian was procured. Los Angeles appears to have gotten the start upon the rest of the country as shipments are being made daily from this place to all parts of the United States, Florida being one of the largest takers. A southern climate, however, is not necessary for successful culture of the animals. It will thrive equally well in Michigan or Wisconsin and would do as well in Massachusetts as in Mississippi.

The high profit in growing the hare abides in their wonderful fecundity and in their eating cheap provender. The doe brings forth every sixty days, having from six to eleven and as high as fourteen in a litter. As the doe can only suckle eight, a white rabbit, usually an Angora, is kept in breeding to serve as nurse for the surplusage. The youngsters grow fat at a rate of about one pound per month for eight months when they are matured at eight pounds. They are bred at seven months. They eat about the same food as a sheep, their preference being for alfalfa or clover hay. When the doe comes to yield her litter she prepares for them a nest of hair which she pulls out of her own body. If not prevented by spreading boards or wire netting over the surface of the ground the doe will burrow and produce her young in a chamber about five feet under the ground. In this the animal follows a trait of the rabbit and not of the hare; another rabbit quality is that the young do not open their eyes until about ten days after birth, while hares are born with their eyes open. But with all these qualities of unconformity there is no doubt that the animal is a hare. It has the small fore limbs and the large strong kangaroo-like hind legs of the hare and it moves by leaps and bounds.

In color the Belgian is a yellowish red when mature with white upon the belly, and with long erect ears.

They are nearly black when born, turn almost gray when a week old, but darken and redden as they approach maturity.

A Belgian Hare Association has been formed in Los Angeles which has an extensive membership and all the indications are that another enduring and extensive industry has been added to the live stock interests of the country, with incident benefit to the pelt industry, for the skins make excellent furs for hatters' uses, and for the lighter winter apparel for women, while they are beginning to enter the trade as trimmings.

O. P. WALCOTT.

Los Angeles, Cal.

Mines of Mount Sinai.

The Egyptians had mined the rugged sides of Mount Sinai for copper and torquoises thousands of years before Moses climbed the mountain to receive the Tables of the Law, and the Egyptians waged wars for the possession of these mines. M. de Morgan with a party of French engineers recently visited these abandoned workings which is situated convenient to the Gulf of Suez, and explored two of the ancient deposits. He found the mineral deposits in the sandstone region and not in the porphyries which constitute the great mass of the mountain. These deposits consists of copper and iron-bearing minerals, especially hematite and some gypsum. Among the cupriforous minerals the most valuable were the torquoise, many valuable specimens of which have been discovered from time to time in the tomb and treasures of the Egyptians, says The National Druggist, from which we derive our information. M. de Morgan brought back to France quite a collection of minerals most of which were turned over to M. Berthelot who made a most interesting report on the minerals, in which he stated that the copper-bearing specimens were poor in metal and not very plentiful. Mining such ores must have been tedious and severe labor. The Egyptians were still using arms of wood and chipped or ground stones and copper was a rare and precious metal, the possession of which was thought to repay the most severe labor. Later on, wood and stone implements gave place to bronze which was made possible by the importation of tin from remote regions. The extraction of the metal was effected by methods similar to those followed in the metallurgy of copper in its production of similar ores from the remotest antiquity down to recent times—the use of wood as a reducing material along with silicious, ferruginous and calcareous fluxes.

The mines have been abandoned for at least 3,000 years, probably on account of a constantly growing scarcity of the material and the poverty of the residue in metal. The mines were probably worked from 3,500 to 4,000 years. It is thought that the working of the mines began nearly 7,000 years ago.

THERE is a close connection and to a certain extent inter-dependence between the relations of forest fires to insect ravages, and insects to forest fires, diseases of trees to insects and insects to fungous diseases, which are not obvious at first sight. Dr. A. D. Hopkins in a report on the insects enemies of the forest in the Northwest treats quite fully of this subject. Trees dying from injury by fires or weakened in vitality offer favorable conditions for the multiplication of vast numbers of destructive insects. Moreover, the trees which have been killed by insects furnish, in their fallen branches and partially decayed trunks and dry bark, a most favorable propagating ground for the starting, spread and perpetuation of forest fires. It is, of course, well known that forest trees weakened by disease contribute to the multiplication of insect enemies to forests, therefore, the study of insects associated with unhealthy forest trees should lead to results of economic importance.

Science Notes.

The fund for the naval arch at New York city is being slowly increased. The location of the new arch has not yet been determined upon.

The Committee on Coinage, Weights and Measures of the House of Representatives is again considering the subject of the adoption of the metric system as the legal system of the United States. Now that we have acquired new territory the value of the metric system should be brought home to all.

The Russians are preparing a map of France for the Paris Exposition. Each "Department" is shown in colored jasper, while the sea is represented by lapis lazuli, the rivers by platinum and the towns, to the number of 106, are marked by precious stones. The map rests on a marble slab about three feet square.

A liquid air plant has been given to the University of Michigan by Charles F. Brush, of Cleveland, Ohio. It is actuated by a 5-horse power electric motor and its capacity is about a quart of liquid air an hour. It is to be used in the laboratory for cooling purposes for certain reactions. It will also be used to furnish liquid air for experimental purposes.

The ugly church of St. Maria Liberatrice on the edge of the Roman Forum is to be demolished and excavations have been made on its site. The church was bought for 375,000 lire, although a million lire was at first asked. It was a prominent object in all views of the Forum, but the results of the explorations on it will be of the most value. This will be the first step toward the noble scheme of reuniting the Forum and the Palatine.

The Municipal Council of Venice has voted a message of condolence to the family of the late John Ruskin. They have also decided to place a memorial tablet upon the house where he lived while he was gathering his materials for the "Stones of Venice." This is certainly mere justice, for Ruskin really discovered Venice and made it famous. A considerable amount of the annual income of this most curious of cities may be directly traced to his influence.

The Prussian Meteorological Institute is about to arrange for the systematic examination of the Aeronautical Observatory at Tegel, near Berlin, says The Engineer. Kites and balloons will be employed at heights from 3,000 to 5,000 meters to ascertain the atmospheric conditions. The registering apparatus is taken up by a kite-balloon inflated with hydrogen, and can lift 500 meters of wire. To it a second kite is attached and to this latter a third, and so on until the balloon reaches a height of 4,000 or more meters.

Plans for the Passion Play have now been definitely announced. The prices for seats will vary from 50 cents to \$2.50, and excellent accommodations can now be obtained in the town which can be reached by railroad. The part of Christ will be played by Anton Lang, a young man who has not before had any important part. Joseph Mayr, who played the part in 1870-71, and 1880 and 1890, is now too old for it. It is a mistake to suppose that the scenery is crude and that the acting is bad. The scenery is painted by some of the best scenic artists in Germany. The costumes are elaborate and the acting is excellent. The little Bavarian town will certainly be visited by thousands this year.

There is now on exhibition in London an employes' checking clock which, in addition, takes a picture of the employes, says The Railway and Engineering Review. The apparatus resembles a somewhat bulky camera with a large lens aperture in front and a button to be pressed just below the opening. Inside the box is a clock and a sensitized ribbon. The idea is that the instrument should be placed in a suitable position near the employes' entrance and that on his arrival and departure each man should stand in front of it and press the button. The result is that a tiny photograph of the clock is taken on the ribbon of celluloid of the employe who is registered. It is claimed that forty attendances per minute are easily recorded. The records can be taken out once a week and can be made ready for checking attendances by an office boy in a short time. This seems however, a very clumsy method of keeping time.

A recent number of The Philosophical Magazine contains a paper on earthquake sounds, by Dr. C. Davison, a somewhat neglected branch of seismology. The sound is described, says *Nature*, as generally deep and rumbling, like that of a heavy wagon passing. It sometimes resembles thunder or wind more closely, the fall of heavy stones, or the fire of distant cannon. Near the epicenter of the earthquake loud crashes are heard by some, but not all, observers at the time when the shock is the strangest; further away it becomes rougher and more grinding at this moment, while at a greater distance the sound is throughout smooth and almost monotonous like the low roll of distant thunder. The neighborhood of the sound at the lower limit of audibility is shown by the fact that it is heard by some observers like the rumbling of a heavy traction engine passing, while others equally alert hear no sound at all.

Engineering Notes.

According to The Engineer fifty thousand tons of bituminous coal are being shipped from Philadelphia by contract to Italy. It is for use on the railways and the price is estimated at \$1.50 per ton.

According to The Engineer, grindstones should not be run by gas engines if they run other tools, as the putting on and throwing off of the power affects appreciably their speed, and thus causes the stones to burst.

The Exposition authorities are anxious on account of the condition of the Seine, which in rising has done considerable damage to the buildings along the river bank. The infiltration of water has sunk one of the wings of the Palace of Electricity ten feet.

It is said that up to November 20, over 1,300 projectiles were thrown into the besieged town of Mafeking by the Boer guns with the extremely feeble results of six persons killed. This, says The Engineer, probably forms a record of ineffectiveness in the annals of military warfare.

Excellent results have been obtained with the use of oil in blast furnaces. It is interposed between the hot-air stoves and the tuyeres of the blast furnace. The oil is drawn by the blast into the furnace where it increases the temperature and also facilitates the reduction of the ore.

The following from an Indian contemporary is interesting:

The running of night trains on the Howrah-Anta Light Railway has been permitted at a speed not exceeding ten miles an hour, on the condition that the locomotive carries a 1,500-candle power Wells' light. The line is ballasted, but, we believe, is unfenced, and the precaution of a powerful Wells' light on the engine is a wise one.

The clinker from the refuse destructors at Bradford, England, which in 1894 cost nearly \$5,000 for carting and dumping, is now turned to profitable purpose in mortar and concrete making, says The Practical Engineer. Ground and mixed with cement, it has been found to give excellent results for the formation of reservoirs and inverts. During the winter months screened clinker has found favor for sprinkling on roads made slippery by the frost.

There are several places in New York where the crossings are extremely dangerous even for an agile man, and something should be done to ameliorate the condition. Thirty-fourth Street and Broadway is possibly the worst crossing, and Twenty-third Street and Broadway is about as bad, although the angles at which the lines cross are better. It has been suggested that "islands of safety" or "refuges" be built at points between the pairs of tracks, in order that the pedestrian may have a moment's rest before crossing and where they can remain in safety until the policeman is able to conduct them across. The preferable form of such shelters would be circular and the platforms should be high enough to stay the progress of even a runaway carriage. Such shelters would greatly simplify the work of the police.

The number of manufacturers of acetylene generators is quite large in France and in other countries, says *Le Monde Moderne*, while the number of consumers is constantly increasing. In Germany, in 1898, according to published statistics, the manufacturers sold 35,000 generators capable of supplying altogether 113,000 burners. In other countries, the proportion is almost the same. This indeed shows progress, but the fact remains, nevertheless, that acetylene has not yet shown that development which was expected of it, and this is due to the fact that no really practical generator has yet been devised for use by the small household who wishes to have his own plant. On the other hand, if the gas is delivered highly compressed, in cylinders, the user is exposed to dangers, the reality of which has been confirmed by sad experience. There yet appears to be no solution of the problem which furnishes some interesting results; it is what is known as dissolved acetylene. MM. Claude & Hesse discovered that this gas can be dissolved in acetone which, at ordinary temperature, absorbs twenty-four times its volume at atmospheric pressure. This proportion can be considerably increased by lowering the temperature, and, at 80° C. below zero the acetone absorbs more than two thousand times its volume of gas. Unfortunately under these conditions, it could not be practically made use of. Returning then, to ordinary temperatures of from 15° to 20° C., if a pressure of 10 atmospheres is used, which is not a dangerous one, there may be stored in a liter of acetone 240 liters of gas. In order to make it still safer, the company has recently perfected this process by adding a species of filter, formed of a porous ceramic, which is so placed in the reservoir as to effectually check the gas in it from being ignited from the burners. It has been demonstrated by experiment that in tubes of small diameter the flame of this gas does not spread, and the porous material constitutes in reality a series of small tubes. The P.-L.-M. railway company is about to try this system on its cars.

Automobile News.

Automobiles are not allowed in the Forest Hills Cemetery, Boston. This rule was made to obviate the danger of accidents.

Special bells are now being made for automobiles. They can be attached to the footboard and can be reached by the foot of the operator.

Steam carriages cannot as yet be run freely in Paris. An application has been made to the Minister of Public Works for permission to run such carriages.

The British Government is endeavoring to purchase five automobiles of the "tracteur" class, each capable of drawing two tons. They are for use in the Transvaal.

The motor vehicle is likely to prove valuable for piano moving. A Cleveland firm is now using one made by the Woods Motor Vehicle Company, of Chicago, Ill.

At last the automobile has reached the department-stores. One prominent New York firm is offering automobiles for \$1,200. The advertisement announces that one is ready for delivery and that others can be furnished in a short time.

At the electric cab station in Boston where there are over 100 automobiles, arrangements are provided for working the carriages after the batteries have been removed. An electric cable is suspended from the roof and this transmits the power to the carriages by the aid of a plug so that the carriages can be run around the floor with its aid.

The tour of England which is now being arranged for by the Automobile Club of Great Britain and Ireland will be one of the interesting events of the year. The automobiles entering the competition are to cover a route of 1,000 miles, laid out from London to Edinburgh and back, passing through a number of the larger cities, in each of which the vehicles will be put on exhibition for one day. This event will be preceded by the Automobile Exposition, which is to be held under the patronage of the club in Agricultural Hall, London, April 14-21. It will be probably be followed by an exhibition of the vehicles which have taken part in the 1,000-miles' tour, from May 12-19. Among the cities to be passed through on this tour are Bristol, Birmingham, Manchester, Edinburgh, Newcastle-on-Tyne, Leeds and Sheffield, these being separated by distances varying from 65 to 135 miles. Prizes are to be awarded by the club to the amount of \$5,000.

The Automobile Club of France has received the names of four clubs which intend to compete for the Gordon Bennett cup, these being the Automobile Clubs of America, Germany, Belgium and Italy. According to the rules previously laid down, the entries closed on December 31 last, and therefore, the cup will be contested for by the five clubs above named. The Belgian Club takes a wise precaution in having its representatives compete first in the Paris-Bordeaux races, which will take place on June 14 over a route of 568 kilometers to be decided upon later. The three conductors who make the best record will be chosen to represent their club, on condition that an average speed of 40 kilometers per hour be attained; this matter will be looked after by a committee of experts appointed for the purpose. The same club has signified its intention to require the makers of the vehicles used in the contest to furnish a certificate stating that they are entirely of home manufacture, as the rules require. It is expected that the other competing clubs will adopt similar measures. To distinguish the vehicles of each country, it is probable that they will be painted a different color; thus the French automobiles will be painted blue, the German red, etc.

The programme for the international competitive tests and races to be held in connection with the Paris Exposition of 1900, at Vincennes Park, has recently been decided upon by the Automobile Club of France. There will be six principal events, one being held every month, lasting for five days. The first of these will be a competitive test of touring vehicles, commencing May 14, including automobiles of 2, 4, 6 or more places. This will be followed by a test of cabs for city service, on June 18. A series of races at high speed will be held, commencing July 23; this includes three classes, large and small automobiles, and motorcycles. On the 13th of August the small vehicles of two places, breaks, phaetons, etc., will be represented; on the 17th of September, light delivery wagons. The last of the tests will be held October 8-13, and will include heavy vehicles of all descriptions for the transportation of freight and passengers. A space has been set apart in the park for each of the two main classes, bicycles and automobiles, the latter including motorcycles. Each of the sections will be provided with a race-track. A charging station is to be erected for the accumulators of the automobiles, besides supplies of gasoline, oils, pneumatic tires, etc. Sheds are to be provided with facilities for cleaning the vehicles when they leave the race-track before entering the exhibition hall.