are far more likely to be noticed by insects than are very gradual changes of tint.

It does not need that we regard flower color as existing alone by virtue of the benefit it confers upon insects, any more than we allow older biologists to regard it as produced because of its moral effect upon mankind. It is the natural outcome of the tendency toward perfection in the reproductive part of the plant. It is a correlation necessitated by the lessened vegetation, and though undoubtedly of use to insects, which check or quicken the tendency to color in one case or another, they have only taken advantage of the tendency, which cannot thus be said to have resulted solely on their account and by their selection.—*The Gardeners' Chronicle*.

A LARGE CALIFORNIAN GRAPE VINE.

THE two accompanying engravings, from photographs, represent the lower and upper parts of a grape vine now existing at Montecito, Los Angeles County, California, and belonging to Mr. Albert Magee. The vine is but thirty years old, and already covers an area of 900 square feet. Its present yield is five tons of grapes, and its circumference at the earth is forty-six inches. Near by, at Carpentaria, there is another vine almost like it. Both in time will become genuine vegetable curiosities.

In 1887, says Mr. Charles Joly, from information obtained by Mr. Wetmore, the wine production of California was but 16,000,000 gallons. Last year it was 18,000,000 gallons, but would have amounted to 30,000,000 had it not been for frosts and the dropping of the fruit, which destroyed half the crop.

Despite this, despite the old and new diseases which besiege the vine, it still remains the most remunerative plant to cultivate, and in California, Algeria, and Australia, as in France, Spain, and Italy, every one is endeavoring to enlarge his vineyard. To make the vine grow is a relatively easy matter when the climate favors it; what is more difficult is the manufacture of wine—the oenological science that our compatriots have acquired after many years of observation—and the selection of vine stocks according to soil and climate. In this there is much to learn and observe.

In a note published in 1884 upon the nineteenth session of the American Pomological Society, Mr. Joly gave a sketch of an old vine existing at Montecito, near Santa Barbara. This vine, which covered a space of 10,000 square feet, and which produced from 10,000 to 12,000 lb. of grapes annually, was cut down in order that it might be shown at the centennial exhibition at Philadelphia in 1876. It was a variety called the "Mission," on account of its having been imported by the first Spanish missionaries, who colonized the Pacific coast very long before the arrival of Americans from the East. The mission grape is now almost everywhere neglected, and has been replaced by new varieties much superior in quality, which already amount to more than two hundred in number, where formerly scarcely anything but the Isabella or Catawba was known. Who knows whether the United States, after importing the best plants of their gardens from France and Belgium, and after sending us their phylloxera-proof vines and their early peaches (as the Amsden and Alexander), will not in turn send us in the future other varieties of fruits that will enrich our present collections?

In England, where the grape is much cultivated under glass, we may cite, alongside of the example presented in the United States, some remarkable specimens of grapevines. We may mention particularly that of Hampton Court, which last year bore 1,500 bunches, and that of Cumberland Lodge, at Frogmore, which yields nearly an equal product. Some varieties produce monstrous bunches, weighing from 20 to 25 pounds. According to the *Gardeners' Chronicle*, the most remarkable one was exhibited in September, 1875, at Edinburgh. It weighed 20 pounds and 4 ounces.

After our mention of these foreign wonders, we shall add that to him who is interested in the improved culture of the vine, and especially the preservation of the grape, Thomery, near Fontainebleau, is always the most interesting point to visit, especially if the grounds of Mr. E. Salomon, one of the most skillful viticulturists that exist, can be seen. Here the Chasselas is cul-

tivated over an area of 250 acres, surrounded by walls 10 feet in height and nearly 120 miles in length, giving the village a very peculiar aspect, like that of Montrenil, near Paris, for the culture of peaches.

A well cared for espalier produces on an average about half a pound of Chasselas grapes to the superficial foot. It costs about one hundred and fifty dollars per acre for the culture; but the product is worth from \$700 to \$800, according to the price of grapes, which

a healthy condition. As all alveolar ridges and palatine arches are of unequal density, we must therefore make a thorough examination of every part we wish to modelize to ascertain the relative softness and hardness.

The mouth should be rinsed with water previous to taking the impression. The most accurate impressions can be taken with plaster of Paris, but in deep arches wax should always be used first in the impression cup

FIG. 2.—UPPER PART OF THE SAME VINE.

varies from one to four and five cents a pound, according as the fruit is sold in October, March, or April.—*La Nature*.

MECHANICAL DENTISTRY.

By Dr. E. E. SHATTUCK, Kansas City, Mo.

No branch of dental practice requires more skill and judgment than that of the construction of artificial dentures. It is the duty of every dentist to become so dexterous in this branch as to be able to supply his patients with artificial teeth which may be worn without the slightest discomfort, and so closely resemble the natural ones as to be readily mistaken for them.

The utility of artificial teeth depends upon their proper construction and direct application. Perfect mechanism is not the sole element of success, generally it is not the most essential one; we must have a knowledge of the anatomy and physiology of the mouth—its pathological condition—if we expect to become skilled in dental prosthesis.

We must know when to use gold or some other materials, when to secure a piece by clasp bands or simple adaptation; also the proper time for its insertion. Accurate impressions are indispensable with atmospheric pressure. In the construction of every kind of artificial plates, we must remove all roots, or teeth, that are diseased, which will not yield to treatment. All tissue in contact with the base plate should be in

to copy the roof of the mouth. Remove, and trim the wax as much as desired; then fill with plaster and insert; press the rear of the cup up first, forcing the contents to the front of the mouth. In this way there will be no trouble from the plaster causing choking or nausea.

Never remove an impression until the plaster will break without crushing.

After the model has been taken from the impression, it should be scraped more or less, to correspond with the softness of the alveolar ridge and the palatine arch.

If there is only a small part of the roof hard, scrape the impression, instead of the model, at that point.

In all cases the plate should be in contact with the parts, but with slight relief of pressure over the hard portions. If this is not done, you will have an imperfect fitting plate.

A great many dentists have formed the erroneous idea that it is necessary to construct the plate with an air chamber, to secure its adhesion to the mouth, and that the tenacity is according to the depth of the cavity. This is a great mistake. There is no form of space cavity, or air chamber, that gives such firmness as absolute contact over the entire surface.

It is true the base with an air chamber when first introduced will adhere more readily than without, as long as the cavity acts in the retention of the plate, but it eventually draws the membrane into the space. The plate is then held only by contact.

If the air chamber is over a certain depth, it will cause the mucous membrane to become diseased. Every day's experience furnishes abundant proof of this fact.

If the space is not filled with membrane, after the plate has been worn a few days, it shows imperfect adaptation.

Next in importance to accuracy of the impression is correctness of articulation. This must be perfect. The teeth, if possible, should be set well under the alveolar ridge. If they are set outside, it is difficult to retain the best fitting plate during mastication.

The lower teeth should strike those on the upper jaw, both sides, at the same instant, with the exception of the last molars, which should just clear. This matter should never be overlooked.

Unless judgment, science, and art are exercised in constructing the work, from the taking of the impression till its completion, a total failure may be expected; or, at least, the plate will never be worn with satisfaction.

The firmness with which plates can be made to adhere to the mouth is wonderful, if made correctly. The work of nature can never be equaled by artificial teeth, but it is surprising how near they can be made to resemble them in looks and usefulness. The human teeth are so liable to decay that few persons reach adult age without losing some of these valuable members. As there will always be mechanical work for the profession, we must so perfect ourselves in this branch that we may be able to surmount every difficulty that may be presented to us. We must know what kind of material to use for a base when gold and porcelain crowns or bridge work are suitable. Crowning and bridge work are the most useful, if constructed rightly, to take the place of the natural teeth.

Many other useless roots can be crowned with gold or porcelain, and are far better than teeth with large fillings. By bridging from one tooth or root to another, we can insert teeth, where they have been extracted, that will perform the service of the natural ones, preferable to partial plates.

Crowns and bridge work, as constructed by some of the profession, are filthy and injurious to the health. We must have a knowledge of how they are to be constructed, if we perform the operation, and wish to become skilled in mechanical dentistry.

FIG. 1.—TRUNK OF A LARGE CALIFORNIAN GRAPEVINE.

Notwithstanding the high state of excellence to which prosthetic dentistry has arrived, at no previous time was there so much injury inflicted by artificial teeth as at present, resulting solely from an incorrect application.

The construction of artificial plates is performed by every one who makes any pretence to dentistry. Unfortunately, it is but little understood by a great many. The readiness with which they can be made, and cheapness of material, has helped forward a style of practice in the highest degree detrimental to the profession.

A dentist who properly respects himself or his patrons should not be guilty of performing such work as we see nearly every day. This poor grade of work is owing largely to the better operators discarding the practice of mechanical dentistry.—*Archives of Dentistry.*

THE ETIOLOGY OF SCARLET FEVER.

By E. KLEIN, M.D., F.R.S., Lecturer on General Anatomy and Physiology at the Medical School of St. Bartholomew's Hospital, London.*

THE investigation the results of which I now record was commenced at the end of December, 1885. It arose out of an inquiry into the prevalence of scarlatina in different quarters of London, undertaken by the medical department of the local government board as a part of its business of investigating local epidemics. That inquiry had demonstrated milk from a farm at Hendon as the cause of the scarlatina, and had adduced strong circumstantial evidence that the scarlatina had been distributed, not in the whole, but in sections of the Hendon milk, and further that the ability of the sections of milk service to convey the disease had been related to a malady affecting particular cows. This evidence against particular cows at the Hendon farm could not and did not aim at furnishing direct and definite proof of the connection of this cow disease with scarlet fever of man, for the inductive methods usually employed by the medical department of the local government board when applied to inquiries about epidemic spread of scarlatina can for obvious reasons yield but circumstantial evidence.

As on various former occasions, so also on this, the medical department sought to put the above conclusions to the test of scientific experiment. This task was delegated to me by the board. The first part of this work has been published in the recently issued volume of the reports of the medical officer of the local government board for 1885-86. I have therein shown that the suspected cows from the Hendon farm that had been made the object of special study showed besides a skin disease—consisting in ulcers on the udder and teats, and in sores and scurfy patches and loss of hair on different parts of the skin—also general disease of the viscera, notably the lungs, liver, spleen, and kidney, which resembled the disease of these organs in acute cases of human scarlatina.

I have further shown that the diseased tissues of the ulcers on the teats and udder produced on inoculation into the skin of calves a similar local disease, which in its incubation and general anatomical characters proved identical with the ulceration of the cow; and further, that from the ulcers of the cow a species of micrococcus was isolated by cultivation in artificial nutritive media, which micro-organism in its mode of growth on nutritive gelatine, on Agar-Agar mixture, on blood serum, in broth, and in milk, proved very peculiar and different from other species of micrococci hitherto examined. With such cultivation of the micrococcus I have produced by subcutaneous inoculation in calves a disease which in its cutaneous and visceral lesions (lung, liver, spleen, and kidney) bears a very close resemblance both to the disease that we observed in the Hendon cows as well as to human scarlatina.

The second part of the work, carried out during 1886-87, for the medical department, had for its object to investigate whether or not the disease human scarlatina is associated with the identical micrococcus, and whether this, if obtainable from the human subject, is capable of producing in the bovine species the same disease as was observed in the Hendon cows and in the calves experimented upon from the latter source. The definite and clear proof that this is really the case has now been obtained, and the evidence I now bring to the notice of the Royal Society.

On examining acute cases of human scarlatina—for which opportunity I owe great thanks to Dr. Sweeting, the medical superintendent of the Fulham Fever Hospital—I soon ascertained the fact that there is present in the blood of the general circulation a species of micrococcus which on cultivation in nutritive gelatine, Agar-Agar mixture, blood serum, and other media, proved to be in every respect identical with that obtained from the Hendon cows.

Out of eleven acute cases of scarlet fever examined in this direction, four yielded positive results; three were acute cases between the third and sixth day of illness, with high fever temperature; and the fourth was a case of death from scarlatina on the sixth day. In all these four cases several drops of blood were used, after the customary methods and under the required precautions for establishing cultivations in a series of tubes containing sterilized nutritive gelatine, and generally only a very small number of these tubes revealed after an incubation of several days one or two colonies of the micrococcus. This shows that the micrococci were present in the blood in but small numbers.

Having ascertained the identity in morphological and cultural respects of the micrococcus of the blood of human scarlatina with the organism obtained from the Hendon cows, the action of the cultivations of both these sets of micrococci was then tested on animals and the results compared. It was found that mice—wild mice better than tame ones—after inoculation or after feeding, became affected in exactly the same manner, no matter whether the one set of cultivations or the other was used.

The great majority of these animals died after between seven and twenty days; the *post mortem* examination revealed great congestion of the lungs, amounting in some cases to consolidation of portions of the organ, congestion of the liver, congestion and swelling of the spleen, great congestion and general disease of the cortical part of the kidney. From the blood of these animals, taken directly from the heart, cultivations were established in nutritive gelatine, and

hereby the existence of the same species of micrococci was revealed; they possessed all those special characters distinguishing the cultivations of the micrococcus of the Hendon cows and of the human scarlatina.

In the third and concluding section of the work, cultivations of the micrococcus of two cases of human scarlatina were used for infecting calves; two calves were inoculated, and two were fed from each set of cultivations. All eight animals developed disease, both cutaneous and visceral, identical with that produced in the calves that had been last year infected with the micrococcus from the Hendon cows.

From the heart's blood of calves thus infected from human scarlatina the same micrococcus was recovered by cultivation, possessing all the characters shown by the cultures of the micrococcus of the Hendon cows and of the cases of human scarlatina.

It must be evident from these observations that the danger of scarlatinal infection from the disease in the cow is real, and that toward the study and careful supervision of this cow disease all efforts ought to be directed in order to check the spread of scarlet fever in man. It is also obvious that in the agricultural interest investigations of this cow disease are greatly called for.

CATARRH OF THE ANTRUM.

In cases of catarrh of the antrum, Dr. Schiffer, of Liege, instead of extracting the second molar, gains access to the cavity through the opening in the middle meatus of the nose. Through this he inserts a director, and with the help of a curved probe-pointed bistoury he opens up a passage for the free exit of the confined secretion. By the use of cocaine the patient suffers but little during the operation. Dr. Schiffer points out that catarrh of the antrum is frequently overlooked and mistaken for an affection of the nasal mucous membrane. When an abundant fetid discharge runs from the nose, especially when it is intermittent, the existence of disease of the antrum should be suspected, and a careful search made, with the help of the nasal speculum and a good light, for the welling up of the secretion through the foramen in the middle meatus.—*Lancet.*

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THE "BLEEDING" OF PLANTS.

HERR C. KRAUS (*Forschungen aus dem Gebiete der Agricultur-Physik*, 1887) has examined the phenomenon of "bleeding" in a number of plants, both woody and herbaceous. He finds it to be invariably the case that when the plant is still attached to the soil by its roots the sap that first exudes from the wound is acid, while that which flows out later is either neutral or slightly alkaline; and the same he found to be the case also with the cut shoots of the vine. The exuding sap is derived partly from the vessels and tracheids of the wood, partly from the tissue immediately adjacent to the wound. A larger amount of bleeding takes place as a rule from younger than from older plants.

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* Abstract of a paper lately read before the Royal Society.