A CAUCASIAN WILD GERANIUM.

There are many geraniums, at present confined almost exclusively to botanic gardens, which, says *The Garden*, might be advantageously grown as ornamental plants in ordinary garden establishments; and among these, one of the most effective is that of which the accompanying engraving is an illustration. It is a beautiful Caucasian variety, named *g. platypetalum*. It grows wild in the Talish mountains, and is closely related to *g. sylvaticum*, from which, however, it only requires a superficial examination to distinguish it. It is of a stronger growth than that kind, and its flowers, which in color resemble those of *g. pratense*, attain, as will be seen by the engraving, which represents them in their natural size, much larger dimensions. This charming geranium is more especially valuable, both in large and small gardens, inasmuch as it is easily increased, both by division of the stem and by means of seed. In addition to this it is extremely hardy, and thrives in almost every kind of soil. It is, as will be seen, covered with soft, spreading hairs. The stem is erect and angular; the stipules broad; the leaves heart shaped and denticulated, and having from five to seven oboval obtuse lobes; the peduncles, which carry from two to three flowers, are covered with glandulous hairs, as also is the calyx, which has awn-like sepals. The petals, which attain double the length of the sepals, are two or three lobed; the stamens and carpels are slightly hairy, and the seeds glossy. The flowers, which are pendent previous to opening, remain erect during the time they are in bloom, a period lasting from May until July. Among all kinds of geraniums, *g. platypetalum* is one of the best for growing in clumps, in which it produces, when in full bloom, a striking effect, its flowers being large and produced in great abundance. It is a remarkably fine variety, and should always be cultivated where it is possible.

GERANIUM PLATYPETALUM.

Washing Flannels and Linens.

To whiten flannel, made yellow by age, dissolve 1½ lbs. of white soap in 50 lbs., soft water, and also ⅔ oz. spirits of ammonia. Immerse the flannel, stir well around for a short time, and wash in pure water. When black or navy blue linens are washed, soap should not be used. Take instead two potatoes grated into tepid soft water (after having them washed and peeled), into which a teaspoonful of ammonia has been put. Wash the linens with this, and rinse them in cold blue water. They will need no starch, and should be dried and ironed on the wrong side. An infusion of hay will keep the natural color in buff linens, and an infusion of bran will do the same for brown linens and prints.

THE EXTERMINATION OF THE PHYLLOXERA BY ALKALINE SULPHO-CARBONATES.

The sulpho-carbonates discovered by M. Dumas to be a specific against the ravages of the phylloxera, the parasitic insect which at one time bid fair to desolate all the vineyards of France, are formed by the combination of a mono-sulphide with the sulphide of carbon. In order to prepare them, the mono sulphide is dissolved in water or alcohol. To this solution the sulphide is added, and the whole is agitated, generating the sulpho-carbonates. Previous to their general application to vines, these substances were merely laboratory products, but recently in France they have been made industrially in large quantities and at low cost.

The alkaline sulpho-carbonates (potassium and sodium) are in the state of a dry salt, deliquescent and of a fine reddish yellow color; but it is often difficult to obtain them in that condition. More frequently they are to be had in a liquid state of solution, more or less concentrated, and marking from 33° to 40° B. The sulpho-carbonate of barium, on the contrary, is obtainable solid, and in the state of a yellow powder, sparingly soluble in water.

The useful application of the alkaline sulpho-carbonates to the cure of attacked vines requires, 1st, that all the infested surface may be treated; 2d, that the toxic action may be carried sufficiently deep in order to reach all the phylloxeras. These two conditions combine for the complete destruction of the parasite. It is necessary, moreover, that the remedy should act in the most economical manner. The best means of obtaining a perfect diffusion of the poison in the soil consists in the use of water as a vehicle. The quantity of water employed may depend upon the degree of humidity of the earth and upon expected rains; but the use of some water is necessary. From experiments conducted at Cognac, in France, and many times repeated throughout that country, it appears that, to apply the sulpho-carbonate solution, square excavations should be made in the soil, about 3 inches deep and 30 inches wide. As all the infested locality must be treated, these holes should be made sufficiently near together that the earth partitions between them shall become soaked after the liquid is poured in. The bottom of the excavation, it is hardly necessary to state, should be horizontal, so as to afford the best opportunity for the solution to infiltrate uniformly into the earth; and this should be borne in mind when the natural level is inclined. The holes should be brought up close to the base of the vine treated. The above done, about 2⅞ ounces of the sulpho-carbonate, at 40° B., is mingled with any quantity of water, in the ordinary watering pot or other vessel, thoroughly mixed, and the whole poured into one hole. Repeat this for every hole made, the area covered by the whole number of excavations of course being that under run by the roots of the vine. Then return the earth about the base of the vine and pour on plenty of fresh water, so that the poison will be forced deep down to all the roots. The annexed illustration, which we extract from *La Nature*, and which is copied from photographs, will give an idea of the effect of treatment with sulpho-carbonate of potassium. The two feet of vines shown formed part of a single attacked group, in which the parasite had existed for three years, and they had reached about the last stage of the disease. In March, 1875, one half of the selected group was treated with the chemical, the other left to its fate. In the treated portion, it should be noted that, out of 260 vines, 60 were already dead. Up to July the vegetation of the vines, without growing any weaker, had not improved; and it was not until the beginning of August that the leaves began to grow green and the shoots to elongate. Meanwhile, the vines not treated were daily perishing. In October, two average vines, one from each portion, were selected and reproduced, as stated, by photography, for the purpose of the present illustration. The vine on the left has very short branches, and its radicular system is almost destroyed; it may be considered, in fact, as dead. That on the right, which was in similar condition to the other before treatment, is evidently considerably improved, new shoots appearing and new roots being thrown out, so that it may be predicted that by next year it will have regained its former vigor.

EFFECT OF SULPHO-CARBONATES ON VINES.

The water necessary as a vehicle for the poison, in order to conduct it into the soil, is really a disadvantage; and besides, the most suitable season for the application of the sulpho-carbonates is during the rainiest period, when the earth is already soaked with water. Then, however, the quantity of water actually added as a solvent may be reduced to its minimum.

In order that the remedy may produce its best effect, there should be no delay in using it. Apply as soon as the disease becomes apparent. In the majority of cases, however, judging, as many will, from the harvest, few will have any fears of the malady during the first year of its existence; for it is now known that the plant, although strongly attacked, will still go on bearing; but during the second year, the disease will show its effects and require prompt treatment. Even then, however, if there be no further delay, the vines will not materially feel the ravages of the insect.

It is well to remember, in taking into consideration the cost of the chemical—and that, at present, is a rather indefinite matter—that the sulpho-carbonate of potassium is an excellent manure, and that it is quite probable that the excess of crop gained will largely repay the expense of treatment. It is reasonably certain that, in the sulpho-carbonates, the long sought remedy against the terrible vine disease has been discovered; but, on the other hand, with the exception of the facts above detailed, little is known or understood regarding its practical use, so that in that respect a promising field lies open for future investigators.

Radiant Heat as a Motor for Automata.

Among the many suggestions which have been advanced relative to the way in which automata may be caused to work without the aid of a confederate of the exhibitor hidden in the apparatus itself, some ideas offered by Professor Proctor, in an essay in his recently published "Science Byways," deserve credit for superior ingenuity.

He argues that, while it is possible that chess may be played by a machine, it is utterly impossible that cards can be, and hence an automaton like Psycho, supposing no person to be inside, is merely a curious deception. We have only to discover the trick which infallibly exists, and all is clear. One very plausible and novel way of performing the juggle, Professor Proctor finds in the invisible heat rays radiated from a concealed hot body. A metal globe filled with boiling water will retain sufficient heat to answer all the purposes of an exhibition of ordinary duration. This globe may be placed as near as possible to the automaton, of course out of sight of the spectators, and so arranged with reference to a concave mirror that its radiated heat rays are brought to a focus on the figure. A screen of blackened quartz, which would not obstruct the passage of the rays, might be used to hide the globe, or a lens of the same material might be employed to converge the rays, in lieu of the mirror. By a simple mechanical arrangement, a confederate located anywhere in sight of the exhibitor could so govern the mirror or lens that the focal point of the rays could be directed on any desired spot on a given surface of the automaton. The latter has before it thirteen cards, and its performance consists in lifting one of these cards at its proper turn during the game. This purely mechanical operation is not at all difficult to execute, since the movements are few and simple—involving only the turning of the body until the arm is in position to descend and seize the proper card. If thirteen buttons existed on the machine, by touching any one of which the apparatus would take a different position and then operate, the intervening devices (clockwork being the motor) could easily be imagined. The trick would be then to touch the button without detection, even under the closest scrutiny; and this is the operation which Professor Proctor proposes that the focussed heat rays shall perform. For buttons substitute thirteen thermo-electric batteries, any one of which will generate a current of electricity when heated even to a very small degree, and direct the heat rays on each at will. Then the one which the rays strike will, by its current, change a stop or otherwise affect the general mechanism, to make the figure take up the card to which that particular battery corresponds. Information is conveyed to the confederate, by any prearranged system of signals, from the exhibitor, who watches the game; and thus the automaton might be worked in a way to which even an examination of its interior would fail to give a certain clue.

Hanging Investigations.

Professor Haughton, of Dublin, has recently described some investigations undertaken by him with a view of discovering which was the most certain mode of death, the long drop or short drop in hanging. The results are that the most comfortable method of hanging is to be sure of a rope of sufficient elasticity, to place the knot under the chin with a running noose, and to drop about 10 feet.

THE *Medical Times* says that the test employed for selecting the men for the British Arctic Expedition consisted in making each candidate stand with his bare feet on a cube of ice. Those who endured the longest were chosen.

The Uses of Aluminum.

When we consider the excellent qualities possessed by this metal, its color, its brightness, its unchangeableness in air and in sulphuretted hydrogen, that it is not injurious to the health and can be worked into any shape, it seems remarkable that it has found so little use, and that the great hopes, which greeted its preparation according to Deville's process, are so far from being fulfilled. The price of aluminum would be considerably less if it were made in large quantities, as it depends on the price of sodium, the manufacture of which could also be conducted more cheaply if there were a certain and large demand for it. But there is at present no such inquiry for it. The advantages of vessels made of aluminum are not so evident and conspicuous as to be able easily to overcome old habits. At the London Exhibition of 1862, numerous articles of aluminum were exhibited; the Paris Exhibition of 1868 and the Vienna Exposition of 1873 showed that the interest in this "silver from clay" had died out.

Aluminum made by Deville's process was used at first for ornaments and other *articles de luxe;* on account of its lightness the tubes of opera and spy glasses were made of it. In physical apparatus and all fine instruments where weight is an objection, aluminum replaces other metals with advantage. Saber sheaths and dagger handles have been made of it. The eagles on the flag staffs of the French army are about 4½ lbs. lighter since they have been made of aluminum. As the metal can be drawn out to the finest wire, it has been used for embroidery, lace, fringe, and other decorations. They have some advantages over the same articles when made of silver, being lighter, and they do not tarnish.

Nevertheless, the use of aluminum has, as we have said, greatly diminished. Aluminum jewellery is scarcely seen at the present day. Opticians still use it for spy glasses and the like. Recently it has been much employed for surgical instruments. In the *atélier* of C. Schmidt, in Berlin, a considerable quantity is consumed in the manufacture of splints.

Although there is no mistaking the fact that the high expectations, with which the appearance of aluminum filled the public mind, have not been fulfilled, yet the aluminum industry has a safe guarantee of its existence in the use of the metal for aluminum alloys, which are capable of the most extensive use on account of their excellent qualities.

Aluminum will alloy directly with most metals, generally with strong heat, which may increase up to the glowing point. Small quantities of other metals affect the properties of aluminum, while, contrawise, small quantities of aluminum change the properties of other metals.

The alloy of aluminum with copper, aluminum bronze, is of the greatest importance in the arts. According to Tissier, as little as 1 per cent of aluminum, added to pure copper, considerably increases its ductility, makes it more fusible, and gives it the property of completely filling the mold, making a dense casting, free from air bubbles. At the same time the copper becomes more capable of resisting chemical reagents, increases in hardness without losing malleability, and unites in itself the most valuable qualities of bronze and brass. The color of the alloy is almost a copper red.

A copper alloy with 2 per cent of aluminum is used in the studio of Christofle, in Paris, for works of art. It works well under the chisel and graver.

The true aluminum bronzes, namely alloys of 90 to 95 per cent copper with 10 to 5 per cent aluminum were first made (says R. Wagner) by John Percy, in 1855. They became generally known through the researches of Deville.

For the preparation of this alloy, perfectly pure copper must be employed. If to a quantity of melted copper there be added one ninth its weight of aluminum, the two metals unite energetically, with the evolution of so much heat that the crucible, if it be not exceedingly refractory, softens and sinks together. The bronze obtained is at first very brittle, but by frequent resmelting increases in strength and ductility; the right degree is determined by hammering out a piece after each fusion. As a rule, two or three refusions suffice. Probably the amount of aluminum sinks somewhat below the original 10 per cent. Aluminum bronze with 5 or 10 per cent aluminum possesses a color very like that of gold. The alloy with 10 per cent has the color of green gold, an alloy of gold and silver. The alloys polish beautifully, make perfect castings, and possess great strength: according to Anderson's experiments, an average of 75,618½ lbs. per square inch. They are also very flexible, and, at temperatures from a dark red heat to near the melting point, perfectly malleable. The castings are perfectly sharp, and can be worked more easily than steel. This bronze engraves nicely, is easily rolled into sheets, and offers greater resistance to the air than other bronze, brass, silver, cast iron, and steel.

These excellent qualities give it a number of uses. In the construction of physical, geodic, and astronomical instruments, it is far preferable to all other metals. In jewelry and articles of art and luxury, it is employed in large quantities. Many kinds of house utensils are made of it, and it is also adapted to journal and axle boxes. Gun and pistol barrels, as well as rifled cannon, have been made of it, and have done excellent service. At present the high price of aluminum bronze alone prevents its general use for arms. Morin (who has probably gone out of the business now) furnished these bronzes at the following rates: 10 per cent aluminum, $6 60 per lb.; 7½ per cent aluminum, $5.50 per lb.; 5 per cent aluminum, $4 40 per lb.

These prices are four or five times as tin bronze. In articles where the price of the raw material is of little consequence as compared to the value of the work, as in physical instruments and the like, the aluminum bronze is always to be preferred.

In England, kettles made of aluminum bronze are employed for making preserves and ices from acid fruits. Morin & Co. manufacture weavers' shuttles of bronze, which, of course, do not oxidize so readily as steel. Cambrien recommends this alloy for type casting. Type made of it can be used 50 times as long as those from lead and antimony. Hulot employs it for the bed of perforating machines for perforating postage stamps. Lange, in Glasshütte, Saxony, makes watch mainsprings of an alloy of 5 parts aluminum and 90 parts copper, or of 100 parts aluminum and 5 parts silver. The advantages possessed by such springs over steel springs are that they do not rust, are not magnetic, nor so brittle, but are very hard and elastic.

Aluminum alloys not only with copper but with most other metals. It does not unite with lead or with iron. R. Wagner therefore suggests the possibility of aluminum being employed for desilvering argentiferous lead.

An alloy of 100 parts aluminum and 5 parts silver can be worked like pure aluminum, but is harder and takes a fine polish. An alloy of 5 parts aluminum and 100 parts silver is almost as hard as coin silver, and has the advantage of containing no metal that is poisonous, or that alters the color of the silver. Such an alloy has been recommended for coinage, but in vain.

Small coins of pure aluminum, which can be stamped nicely, would be proof against mistake and deception on account of their lightness. Aside from the fact that the price of aluminum would vary with its increased product, another chief objection to its introduction into coinage is that the people cannot separate the idea of weight from the idea of a valuable metal.

Aluminum alloyed with 4 per cent of silver is used by Sartorius, of Göttingen, for making the beam of analytical balances, for which its lightness and unchangeableness especially fit it.

An alloy of 99 parts by weight of gold and 1 part of aluminum is very hard, but still ductile; its color resembles that of green gold; 90 parts of gold and 10 parts of silver make a white and brittle alloy.

The best alloy of aluminum and tin contains 7 per cent of the latter; it works easily, polishes nicely, but on attempting to cast it a portion of the tin separates from the aluminum.

An alloy with 3 per cent zinc is, according to Débray, harder than pure aluminum, but very ductile and brilliant.

A thousandth part of bismuth makes aluminum as brittle as glass, says Tissier.

According to the same authority, aluminum will unite with mercury only when moistened with caustic alkali. The amalgam is very brittle; the aluminum in it oxidizes easily in the air, decomposes in water, and in general acts like the metals of the alkaline earths. Jehn and Hinze have found that aluminum, when rubbed with leather impregnated with mercury, oxidizes to alumina.* Perhaps an aluminum amalgam was first produced.

With iron, aluminum produces an extraordinarily hard alloy. A compound of 24·5 parts aluminum with 75·5 parts iron is silver white, and does not rust in the air. On treating with dilute sulphuric acid, the iron dissolves and leaves the aluminum behind. A slight addition of 8 parts to 1,000 parts of steel imparts to it all the properties of the best Bombay wootz. Rammelsberg has, however, never found any aluminum in the samples of so-called aluminum steel analysed by him.—*Dr. Biedermann.*

SCIENTIFIC AND PRACTICAL INFORMATION.

THE SECRET OF EDUCATING FLEAS.

The editor of *La Nature* has been investigating fleas, with a view of discovering where, in those aggravating insects, resides the capability of being educated. His conclusion is radical; he says they cannot be educated, and that all the tricks so ingeniously exhibited by self-styled trainers are merely caused by the natural efforts of the insect to escape. Any one can make them draw minute wagons or go through similar performances, if care be taken to secure them to their work so that they cannot jump. It seems to us, however, that it must require considerable skill and ingenuity to hold the lively creatures while the securing operation is in progress.

ROYAL ROAST BEEF.

The traditional baron of beef, which since time immemorial has graced the sideboard of the king or queen of England on Christmas day, weighed this year 300 pounds. An English contemporary states that it was cut from a prize bullock bred from the choicest stock on the Royal Farm. Rounds of beef weighing 80 lbs. each, and spiced, were forwarded by the Queen, also in accordance with old custom, to the courts of Germany, Austria, and Belgium. The Queen's stock farm is said to be a model establishment. It appears certainly to be a productive one, judging from the fact that the Christmas sale of fat cattle netted Her Majesty the neat sum of $15,935.

THE ARTIFICIAL BUTTER INDUSTRY.

The perennial French artificial butter has turned up again, this time under the name of *beurrine.* It has recently been patented in France, and consists of beef suet mixed with from 15 to 20 per cent oil (kind not stated) and from 5 to 10 per per cent milk. This reminds us that at present there is an open field for artificial butter in this country, the so-called oleomargarin having gone out of existence. The material met with a fierce opposition from the butter and cheese trade and from dairymen generally, on the alleged ground that it was used as an adulterant and not as a *bona fide* production. There is no doubt but that it met with very little popular favor, and probably this, together with misfortunes in business management, threw the concern eventually into financial trouble. Several well known scientific gentlemen of this city were interested as stockholders, and upon them some of the pecuniary losses fall.

*Professor Henry Wurtz, of Hoboken, had previously discovered this property.

Curiosities at Central Park.

A reporter of the *Evening Post* has been the round of the American Museum buildings, including the Zoölogical Gardens, located in Central Park in this city. We extract the following interesting observations from his report:

The Museum and Zoölogical department of live animals, and the Park in which they are located, are among the most attractive places in which strangers visiting New York can spend a half day. The new building of the American Museum will soon be finished. Contributions of fossils and other curiosities are constantly being made by our citizens and travelers. A very beautiful series of polished calc spars from England, and a large number of ores, were given by Mrs. Riley, of New York, who has also sent, for the archæological department, a number of rare implements of ancient and modern date. The Museum received a very valuable Christmas present from its president, Robert L. Stuart, namely, the library of Mr. Carson Brevoort, which cost some $15,000 and includes a large number of works on ichthyology.

A BIBLICAL DEPARTMENT.

An interesting department has been established, in which are certain of the animals that are spoken of in the Bible—a department for Bible animals. This was begun by the reception from Beyrout, in Syria, of a collection comprising foxes, wolves, some reptiles, and birds, all from the Bible neighborhood of Syria. The specimens were preserved and stuffed by students of the Protestant College in Syria, which is under the charge of the Rev. Stuart Dodge.

ANCIENT IMPLEMENTS.

The American consul at Shanghai has very kindly sent for the department of archæology a collection of implements which represent the customs of ancient times. His object is to secure specimens of typical implements that have not become modernized. China and Japan, like every country opened to civilization, show many signs of innovation.

Lately he has sent a collection of the implements used in games. Dominoes in many shapes are among them, as are also playing cards, somewhat resembling those used at the present day.

THE CAT FAMILY.

Mr. D. G. Elliot, a naturalist of this city, who has long lived in Europe, engaged in publishing his large and valuable monographs on birds and mammals, has at various times given to the Museum valuable specimens. Being a gentleman of leisure and competence, he has devoted himself to the interests of this institution, and has secured many objects of great value which were offered for sale in the large cities of Europe. One of his latest gifts is a series of specimens of the cat family. Seven specimens of cats, represented by stuffed and mounted skins, that are included in the abovementioned work, have been given to the American Museum, and now are numbered among the elegant specimens in the case assigned to the cat family. One of the largest tigers ever captured is in this collection, mounted in the manner of those in the British Museum in London.

OTHER RECENT GIFTS.

A most valuable gift by Mr. Elliott is the collection of Madagascar monkeys or lemurs, mounted in the best style of taxidermy. Another exceedingly rare and valuable acquisition from the same source is the manatee, and a skeleton of another. The above are all mounted in the manner adopted at the British Museum.

Mr. Elliott has also given several thousand specimens of skins of North American birds, a collection made especially for the use of students in ornithology. These specimens are stuffed but not mounted; they are neatly laid out and placed in drawers to be placed in the ornithological rooms of the new Museum building. One room is arranged for a chemical laboratory, and another for work requiring lapidaries' tools, etc. Rooms are assigned for the various departments of conchology, geology, etc.

Dr. Rudolph Witthaus, of this city, has given recently a valuable cabinet, consisting of several thousands of species of beetles, in addition to his gift of foreign coleoptera which the Museum has already in its possession.

Mr. William Heins, of New Jersey, a prominent business man of New York city, has found time in his leisure moments to accumulate a very large collection of foreign and domestic butterflies of some thousand species. These will find place in the Museum as soon as the new cases are ready for them.

The fact that the new building of the American Museum is absolutely fireproof, both as an isolated structure and as one entirely built of stone and metal, gives confidence to those who desire to place objects there. Specimens are admirably exhibited also, which is another inducement, everything having a place worthy of its value.

THE ZOOLOGICAL GARDENS.

The wild animals of the zoölogical collection in Central Park seem to thrive very well, though the accommodations are not of the best. Much interest has been felt in the success of the experiment of trusting the important duties of nursing the infant king of beasts to a dog. One of the lionesses of the Park collection gave birth to two healthy kittens, and from some unexplained caused failed to give them requisite nourishment. A fine large mastiff was at hand