Notice to Our Readers.

In order to obtain the opinion of the readers of the SCIENTIFIC AMERICAN as to what invention *introduced within the last fifty years* has conferred the greatest benefit upon mankind, we publish the accompanying card, which please cut out and return to the editor. Those who preserve the paper for binding and do not desire to deface their files, or who read this notice at a library, will please answer by postal card. It is desired to get as full a vote as possible. The result of the vote will be published in the *Special 50th Anniversary Number of the* SCIENTIFIC AMERICAN *on July 25.*

Editor of the SCIENTIFIC AMERICAN.

Dear Sir:

I consider that.....

.....

invented by.....

has conferred the greatest benefit upon mankind.

Name.....

Address .....

Some Odd Inventions.

A very odd inventor was the famous Drummond, of Hawthornden; of such finished oddity, indeed, that he appears to have forgotten all about his wonderful notions after publishing them in the most conspicuous form possible. The tale has been diversely interpreted; we have room only for a mere hint of the facts. Drummond was a poet, of wide culture, of the most amiable disposition; well born and well to do; that is, a man whom one would not suspect of mechanical inclinations. Nor has any evidence been found to suggest that he had a secret leaning that way. But suddenly the realm of Scotland learned that this gentle scholar was prepared to turn out military engines of the most awful truculence in great variety. There could be no question of the fact, for his gracious Majesty Charles I announced it in a solemn proclamation, dated "Hampton Court, the last day but one of the month of September," 1626. In that document Drummond undertook to produce sixteen machines specified, and he had "not a few inventions besides." They all had long Greek names—a very characteristic touch—but he was good enough to translate them for the convenience of the vulgar. The descriptions are long also, which is a pity, for the quaint effect is lost in abbreviation.

First comes Baktrobrontephon, the Thundering Rod, "from the dreadfulness no less than the suddenness of its effect;" it appears to have been an improved carbine. Next, Lonkakontises, the Thrusting Pike—in the nature of a bayonet probably. Then Armakeraunos, the Thundering Chariot, vulgarly the Fiery Chariot, which we give up. Anoxibaliston, an open gun. Plastoskedastikon, vulgarly the Flat Scourer, for defending walls and ships. Probolekinetos, the elephant or cavalier errant, for attacking walls; a new kind of vessel called, "from its truly stupendous and terrible effect," Limenolotheutes, vulgarly Leviathan. After ten of these horrid marvels, we proceed to scientific invention; as the Anerometron for calculating the strength of winds; "a certain light kind of craft" which can sail against adverse breezes called Enaliodromos—the Sea Postilion, etc. The list ends with one "organic machine producing from a natural and never-wearied cause Perpetual Motion," which receives the name Aeikinetos, the Eternal Mover. Every line of the voluminous papers which Drummond left has been scanned again and again by admiring editors and biographers, and it can be asserted that no shadow of allusion to this extraordinary announcement can be found among them. But there it is, among the state papers, without possibility of error—"Our Faithful subject William Drummond, of Hawthornden," the hero is named.—London Standard.

Amount of Sleep Required.

"A healthy infant sleeps most of the time during the first few weeks," says the New York State Medical Journal, "and in the early years people are disposed to let children sleep as they will. But when six or seven years old, when school begins, this sensible policy comes to an end, and sleep is put off persistently through all the years up to manhood and womanhood. At the age of ten or eleven the child is allowed to sleep only eight or nine hours, when its parents should insist on its having what it absolutely needs, which is ten or eleven at least. Up to twenty a youth needs nine hours' sleep, and an adult should have eight. Insufficient sleep is one of the crying evils of the day. The want of proper rest and normal conditions of the nervous system, and especially the brain, produces a lamentable condition, deterioration in both body and mind, and exhaustion, excitability, and intellectual disorders are gradually taking the place of the love of work, general well-being, and the spirit of initiative."

THE VEGETATION OF LOWER CALIFORNIA.

Lower California is a peninsula that extends parallel with the North American continent from 32° to 22° north latitude, that is to say, a little beyond the Tropic of Cancer. It forms part of the Mexican States and its limits are: at the north, the Desert of Colorado; at the west, the Pacific Ocean; and at the east, the Gulf of California. Its width (from 20 to 25 leagues, on an average) is slight in proportion to its length (about 330 leagues).

The temperature and hygrometric state of this peninsula are exceptional. Rain is very rare, and so vegetation suffers. The latter has, as representatives, but a limited number of herbaceous plants and very few trees. Succulent plants, such as the Cactaceæ, are met in considerable abundance and sometimes of gigantic size. The order Fouquieraceæ, composed of some very interesting species, develops almost exclusively at this point of the globe. As for the yuccas, which dominate the series of arborescent species, they accommodate themselves perfectly to the conditions of excessive dryness of the country, and this has given them the name of desert palms. Finally, we also meet with two or three species of Prosopis, of the order of Leguminosæ, and a curious fig tree of which we shall speak further along.

It will be understood that in such a country the wealth of the soil lies in the metals that are extracted from its depths rather than in remunerative cultures. The flora of Lower California is therefore poor, and is not absolutely special to it, since it extends beyond the frontier into Arizona and the neighboring territory that the United States have taken away from Mexico, as well as along the Mexican coast situated on the other side of the Gulf of California. This flora, upon the whole, does not characterize Lower California solely, but is typical of this entire American region.

In order to protect themselves against a nearly constant evaporation, the plants of this country have had to take on strange forms, in diminishing the evaporating surfaces, which are usually the leaves. So the latter are rare or ephemeral. At all points where water is wanting, we meet only with dry and stony hills clothed with gnarled trees or leafless shrubs. Cactaceous plants alone relieve the dreary aspect of the country by their green color. But, when an abundant rain supervenes, nature, dead in appearance, is seen in a short time (two or three days only) to assume a new aspect. The vivifying element, so ardently awaited, gives these plants a holiday attire. A magnificent herbaceous vegetation soon covers the desolate and superheated earth, which was not even benefited by dew, which the stored-up heat checked. However, this fine state of things is of short duration. It may last several weeks, unless the action of the wind and the heat of the sun come to change the scene at short notice. Here is the whole explanation of the strange vegetation of Lower California. If, supposably, the humidity were prolonged, and the rains more frequent, we should find a tropical flora here in all its forms.

The fertility of the soil of this country is therefore unquestionable when water reaches it. We know, from evidence, that the missionaries in times gone by undertook farming here, which is still prosperous, although it is in inexperienced hands. These pioneer husbandmen impounded the rain water in the valleys by means of dams, so as to preserve it as long as possible for the benefit of their agricultural enterprises.

Although the foliaceous trees of these regions shed their leaves as soon as the dry season returns, the lax and soft tissues of their trunk, as well as the bark and pith, hold enough water in reserve to permit them to endure the persistent heat without perishing. The Fouquieraceæ (coach whip cactuses), represented by three or four species only, are, with the Cactaceæ, examples of this phenomenon.

That portion of the peninsula that faces the Pacific is more favored than the side that skirts the Gulf of California. The sea breezes coming from the west moisten the atmosphere of this coast without reaching the eastern one, and so the species of plants that are stunted at the east are much better developed upon the western coast. It is here that we meet with the torote and the lomboy—trees of medium size whose leaves and flowers disappear shortly after expanding. Yet their branches are often covered with a foliation slightly recalling the large sized lichens that cover the surface of the trees of our forests. These are Bromeliads of the genus Tillandsia, of which we shall speak again further along, and which live as epiphytes, pressed against each other and not meeting with the necessary conditions of humidity upon the opposite side of the mountain.

The torote belongs to the genus Bursera, some of the species of which are exploited in Mexico for the essential oil that is extracted from the trunk and branches of the tree. The name of linaloe has been given to these particular species ever since the conquest of America. The structure of their wood is very peculiar. Ligneous fibers are rare in it, and the element that prevails is ligneous parenchyma, that is to say, a tissue with a thin wall and not possessing the elongated form of fibers; and then come medullary rays of the same consistence, so that when it is desired to split this wood it resists and, owing to its elasticity, expels the wedges that one endeavors to drive into it. There is still another peculiarity to be pointed out. The essential oil of linaloe that is obtained through distillation does not exist in wood that is in a healthy state. In order that it may appear in the cells of the parenchyma, the wood must be in a state of necrosis, that is to say, dead. When a smallish branch has been broken (and the natives do not deprive themselves of the pleasure of mutilating these trees), the alteration that ensues extends from one place to another and the essential oil is seen by the brownish color that appears to gradually fill the cells of the wood. It is then that through distillation is obtained the essential oil of linaloe that is used in perfumery.

An endeavor was once made to utilize the bark of the torote, which contains a large proportion of tannin (from 10 to 12 per cent), but the exploitation of it was abandoned on account of the cost of transporting the bark.

The lomboy is less interesting. It is an arborescent Euphorbiad of the genus Jatropha, with soft wood, and which sheds its leaves during the dry season, like the preceding. Nevertheless, its bark contains a red juice which makes an indelible stain, and which, perhaps, from a chemical view point, possesses properties of some value.

To return to the Bromeliads, of which it has been a question above, we should add that they are probably the only known examples of plants of their order that are used as forage. The species observed by one of us is the Tillandsia recurvata, vulgarly called tojin, which covers the branches of the above named trees, and which is eaten with avidity by animals, for want of other and more succulent plants, during droughts.

There is, however, another kind of forage that will surprise the reader quite as much to learn about, although it has its analogue in Algeria and in the regions in which grows the Barbary fig tree, that the dromedaries do not disdain. Under the name of visuaga are designated throughout Mexico the large cactals belonging to the genus Echinocactus, and which, with age, reach 6 and sometimes 10 feet in height, as stated by Dr. Weber. These plants have prominent longitudinal ribs and are provided with hook-shaped spines. The diameter of their trunk may reach 25 or 30 inches. When forage gives out, the inhabitants, by means of a special instrument called a machete, remove all the spines from the visuaga by excoriating, from top to bottom, the summit of the ribs that bear them. Then they cut the fleshy mass of these visuagas into slices in order to feed them to horses and cattle, which are very fond of them. Finally, the spines of these Echinocacti are used as fish hooks.

There are other cactals that are at least as curious and useful as the visuagas. Such are the pitahayas, a name applied to various species of the genus Cereus.

These plants are true fruit trees. In fact, many of them bear saccharine or acidulous fruits that are eaten raw or preserved, or that are dried like prunes, and the equivalents of which are the Barbary figs that are sold in the south. The pitahaya dulce, p. agria, p. barbona, etc., are of the number.

Finally, there are others still that bear the name of cardon (Fig. 2). These form trees that, when old, reach a height of 50 or 60 feet and a diameter of 25 or 30 inches at the base. Their candelabra form allows them to be distinguished at great distances. One of these species is referred to Cereus giganteus or to C. Pringlei, which is closely related to it.

It will be understood that such plants need a stiffening tissue. In the center of the trunk and branches there is a very thick pith which becomes destroyed with age, so that the plant forms a genuine tube, having the ligneous cylinder as sides. The wood of which it is formed, although not very strong, is quite homogeneous, and its cylindrical arrangement assures its solidity, so that cardons are used as building material and as fuel.

Many other species of the order Cactaceæ, but of small size and varied form, are found here. But these have merely a scientific interest.

The yuccas are the only trees that hold their leaves, and, as they are monocotyledons having more or less resemblance to palm trees, they are named in the United States and Mexico desert palms (and also Spanish bayonets, Adam's needles, etc.) These plants and the cardons are about the only arborescent ones met with in the Mohave desert of Sonora and in all the analogous districts of Lower California having sterile portions. These yuccas are called heredatyl cimarron. They are more numerous and better developed upon the Pacific slope, and the specimen shown in Fig. 3 is certainly the largest example that is known. An endeavor has been made to utilize these plants by employing their leaves, which are rich in filaments, for the manufacture of paper pulp. In certain parts of Mexico, their root stock is used as soap, on account of the large proportion of saponine that it contains. In

Lower California the interior of the trunk is used for the manufacture of mattresses. To this effect, the trunk is allowed to macerate for some time in water, and the interior is then extracted, beaten and exposed to the sun. There then remains a fibrous mass which, having been rendered supple, assumes almost the consistence of horse hair. The young trees are the ones most esteemed for this purpose, the old ones being too poor in elastic fibers.

The Ficus Palmeri merits notice as an interesting tree. It always grows upon the side of the basaltic cliffs of ravines, in thrusting its numerous adventive roots into the fissures of the rock in order to seek humidity therein. What is strange is that the branches, and especially the roots, are flattened, and not cylindrical. After the tree has grown old, the roots come into contact and become adherent, and then, reaching the rock, mould themselves thereon, just as a soft semifluid substance would, and exhibit a curious whitish aspect. Under proper conditions, this fig tree, which sheds its leaves only during exceptionally hot weather, yields edible fruits of the size of a walnut all the year round. The ancient Indians greatly esteemed these, and the possession of the zelate (the name they gave this tree) was often disputed among them with force.

In Lower California we find also a shrub that has somewhat the appearance of a young olive tree, with divaricate branches, and opposite leaves protected by a reinforced epidermis (one might say metallic leaves covered with a light felting). When Nuttall, who was for a long time justly regarded as the leading American botanist, took a specimen of this plant in hand, he at once saw that it must form a new genus. He therefore erected for it the genus Simmondsia, which took its place in a small family alongside of the box, that is to say, in the Buxaceæ, with the specific name Californica. When the season permits it, this shrub puts forth inconspicuous flowers that are soon followed by dry fruits having the aspect and size of acorns, the nucleus of which forms one of the food materials of the region. If, unfortunately, there has been insufficient humidity, the crop fails. It will be understood that in such a country, where the resources are so limited, this crop interests the inhabitants to the highest degree, and so, when it fails, they are very sorely tried.

We shall terminate this nomenclature of curious or useful plants with the cirio (Fig. 4), which may be justly regarded, like the Welwitschia of the west coast of Africa and the Didiera of Madagascar, as one of the strangest representatives of the vegetable kingdom.

It was observed for the first time in 1751 by the Jesuits who were traveling over the peninsula to establish missions there. It is spoken of by Father Clavigero in his Historia de la Baja o Antigua California. The description of it is given at some length by this writer, who had remarked the oddness of the plant. The cirio grows almost like a cactal, with the difference that it bears leaves like the other plants of which we have spoken. Some of these leaves are spiny and persistent, while others are normal and fall at the time of drought.

The stalk becomes inflated at an early age of the plant, but the branches that spring from this hypertrophied part are totally different and disappear in part, while they persist at the summit of the stalk. The latter, in time, rises like a column without ever dividing, unless it happens to get broken by accident, in which case it bifurcates. The lateral branches spoken of above cover the stalk to a greater or less degree, but the top branches, which are large, form a persistent crown and are the ones that produce the inflorescence. This latter assumes the form of a ramose panicle of a straw yellow color, bearing flowers that are destitute of brilliancy. The stalk is covered with a cortex—a sort of shining parchmented skin (rhytidoma) for resisting transpiration to as great a degree as possible. Beneath this is found a half inch layer of thick and almost osseous cells (sclerenchyma) forming a rampart against evaporation as well as a support for the cirio, which, as its name indicates, has the appearance of a taper (cierge). Deeper in the interior are found one or two rows of weak fibro-vascular bundles, and, finally, in the center there is a thick pith.

The soft nature of this plant, the trunk of which can be easily perforated by means of a saber, or a stiff blade, gave rise to the belief that it might be possible to turn it to some account. The International Company, which was organized for the exploitation of the land and the agricultural and other products of the northern part of Lower California, thought that it might be possible to manufacture paper pulp from the pith of the plant. A large quantity of it was unfortunately sacrificed, and the enterprise was then abandoned on account of the expense that the transportation of the raw material involved.

From a botanical view point, the cirio has a history that is worthy of being narrated. After the rush of people into Upper California at the time of the discovery of gold in this country, its development was rapid, and scientific establishments, among others, were created for the dissemination of as much information as possible in this new center. Voyages of exploration were undertaken to districts not well known, and, although the sterility of Lower California had been observed by the missionaries who traveled through it in the middle of the eighteenth century, scientists penetrated it and brought home interesting materials for study.

Along about 1859, Dr. J. A. Veatch, who was a conchologist, but who had some knowledge of botany, made collections of plants as well as of animals, and, among the former, obtained specimens of the cirio in flower. This species, as well as several others, was communicated to Dr. Kellog, a botanist, who, like Dr. Veatch, was a member of the California Academy of Natural Sciences. This new genus of the order Fouquieraceæ was published in the bulletin of the Academy in 1859 under the name of Idria, and the species was called columnaria. The small order to which the cirio belongs was up to then composed of but three species, all of which inhabited the same region. The Idria is a fourth representative and lives in company with two of them—the Fouquiera splendens and F. floribunda, which are widely distributed in this country. It is very curious to remark that four types of an order not as yet well known to botanists, and the place of which in classification has been much discussed, are quartered at this point of the globe—three species in Lower California, and a fourth, the Fouquiera spinosa, on the other side of the gulf, that is to say upon the Mexican coast.—L. Diguet and J. Poisson, in La Nature.

Fig. 1.—VISNAGA (ECHINOCACTUS PENINSULÆ).

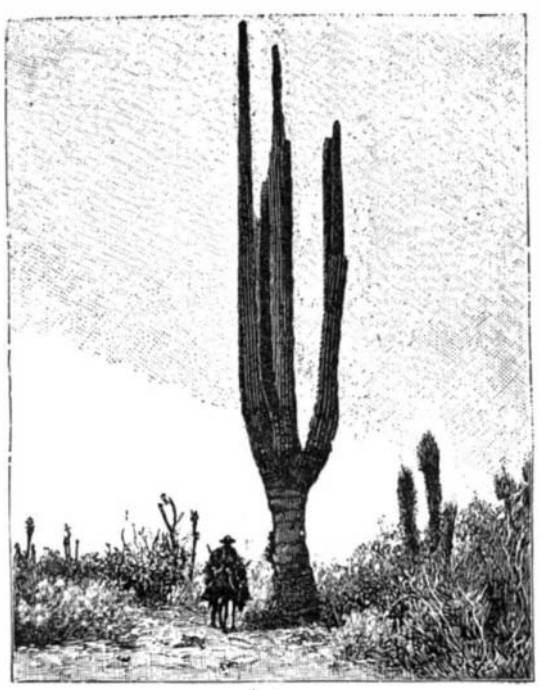

Fig. 2.—CARDON (CEREUS PRINGLEI).

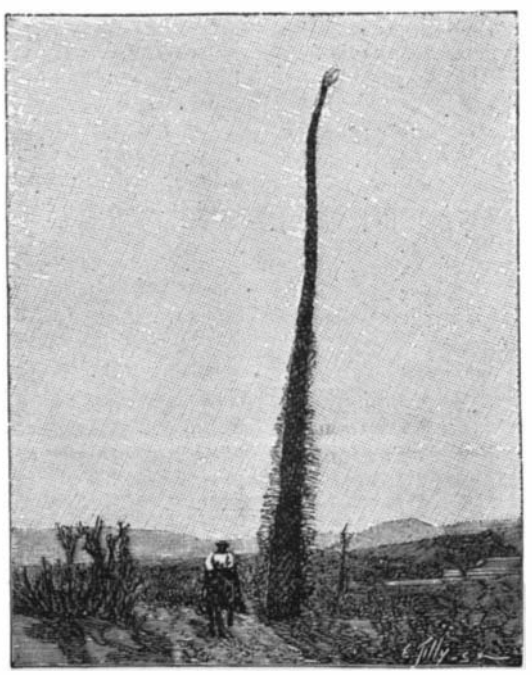

Fig. 4.—CIRIO (IDRIA COLUMNARIA).

Fig. 3.—DATYL CIMARRON (YUCCA BREVIFOLIA?).

Butter in Plaster of Paris.

There seems to be no limit to the ingenuity bestowed upon the devising of means for accomplishing the transport of the perishable produce of distant climes to the English market. A new method, described in the Australasian, is that of packing butter in a box made of six sheets of ordinary glass, all the edges being covered over with gummed paper. The glass box is enveloped in a layer of plaster of Paris, a quarter of an inch thick, and this is covered with specially prepared paper. The plaster being a bad conductor of heat, the temperature inside the hermetically sealed receptacle remains constant, being unaffected by external changes. The cost of packing is about ½d. per lb. Butter packed in the way described at Melbourne has been sent across the sea to South Africa, and when the case was opened at Kimberley, 700 miles from Cape Town, the butter was found to be as sound as when it left the factory in Victoria. Cases are now made to hold as much as 2 cwt. of butter, and forty hands, mostly boys and girls, are occupied in making the glass receptacles and covering them with plaster. The top, or lid, however, is put on by a simple mechanical arrangement, and is removed by the purchaser equally easily. A saving of twenty-five per cent on freight and packing is claimed in comparison with the cost of frozen butter carried in the usual way.