Scientific American.

The "Dugong," or Vegetarian Whale.

A writer in the Gentleman's Magazine gives some interest. ing particulars relative to this species of whale, now taken to a considerable extent in Queensland, and valuable alike for its oil and as food. Its size varies from eight to twenty feet in length, it lives upon submarine meadows of seaweed, it has no gills, but breathes air by means of lungs, its head is round and somewhat human like, and has hair something like that of a man's beard. It is said many stories of merman and mermaid may be traced to these creatures. Their oil is said to have all the medicinal merits of cod liver oil without its unpleasant flavor; at ordinary temperatures it deposits crystals, as olive oil does in frosty weather, but on warming slightly becomes liquid and clear. The flesh is much prized in Australia, being cut off in flitches and slabs, and it is stated that "from the same animal is taken meat resembling heef, veal, and bacon."

THE THIBET DOG.

The peculiar dogs of Thibet have frequently been described by travelers, and generally the size and strength of the same have been exaggerated. A very fine specimen of these animals was exhibited at the Vienna Dog Show, a picture of which is given herewith. The animal is about as high as a large pointer or setter, and has some resemblance tothose Newfoundland dogs known as "Labrador dogs."

mediate insize between a mouse and a rat, and his anatomy is highly interesting from the manner in which all the muscular power goes to the fore arm, which does the burrowing, and the spade-like hands with the long claws. Anatomists at one time were greatly puzzled by what appeared to be a sixth finger, which would have been a terrible anomaly. Fortunately it was discovered to be not a finger, but a radial sesamoid, of which the human anatomy contains numerous instances, as, for example, the knee cap. It was for the purpose of extending the forking power of the mole's hand. When an honest agriculturist comes to a bit of hard ground, he first loosens it with the fork and then shovels. The mole does precisely the same. When he opens his fingers as wide as he can, he does the forking business; when he closes them compactly, he shovels. I have seen at an agricultural fair avery smart digging machine, but upon examining it I found it to be only the mole's hands multiplied and set on wheels.

"The mole has eyes, but he does not use them very much. Shakespeare speaks repeatedly of the blind mole, but the sweet bard of Avon was incorrect. The mole is not blind, but his eyes are exceedingly small. If any person wants to find out this for himself he must first hold his mole, which

eruption had continued at a very great height in the atmosphere," and thus been more widely distributed over the earth than ever before. The Sandwich Island observer thus describes the appearance there at that early date:

"I would note three peculiarities of this phenomenon, distinguishing it from ordinary sunset reflections, and unlike anything I remember to have observed before. First: It appears to be a reflection from no cloud or stratum of vapor whatever. An undefinable haze might, perhaps, be fancied to be the medium reflecting sunlight. Second: The peculiar glow, as of a distant conflagration, totally unlike our common sunsets. Third: The very late hour to which the light was observable, long past the usual hour of total cessation of twilight. To these may be added a fourth peculiaritythat the center of brilliancy was more or less to the south of west."

Vaccination and Small-Pox.

Notwithstanding the almost universal consensus of public opinion among intelligent persons as to the importance of systematic and thorough, and, if necessary, compulsory vaccination, as a preventive of small-pox, we fear it is too true that the majority of people "take chances," or omit the is no joke, for they bite like fiends and scratch with their fore. precaution till they hear of the spread of the disease. Some paws like wild cats. Then by blowing away the fur, a of the Southern cities have been energetically agitating this small black speck appears, which is the eye. But the best subject, and the New Orleans Auxiliary Sanitary Association



THE THIBET DOG.

and is not kinked; the color is a deep, brilliant, glossy black with yellow spots over the eyes and light colored spots on the paws. The wrinkled forehead, the small eyes, and hanging upper lip give the animal a threatening appearance, which corresponds with its ugly and vicious disposition.

These animals have generally been known as "Thibet hounds;" but this name is not correct, for although they resemble hounds somewhat in their appearance, they do not belong to this class of dogs.-Illustrirte Zeitung.

> -+++ Mole and His

the mole blind gives it credit for a sense of hearing singularly delicate; yet the fact is that the ears are not specially acute. The delicacy of hearing is due to the singular manner in which the earth carries wave sounds, a circumstance well known to hunters and military men. The sense of smell is the pre-eminent quality in this creature, and upon which he depends chiefly to procure food. Moles

His long, thick, and soft hair lies closely against his body | way is to put the mole in water, when the eye immediately | publish, for the information of the public, a pamphlet appears, showing that he has the power of projecting the eye thereon, written by Prof. Stanford E. Chaille, M.D., which beyond the fur. The same proverbial wisdom that made gives arguments and statistics it is impossible to gainsay. Among other matters suggested, is the fact that on some few persons vaccination can never be made "to take," which is not singular, since some persons will not take small-pox ; the estimates of the proportion of persons insusceptible to small-pox vary from 4 to 22 in every 100. Other persons are insusceptible to vaccination at one time, yet susceptible at another; which is also true of small-pox. On some are flery to the last degree, and quarrelsome. Whenever persons vaccination will take several times, which is also two meet they fight, and the vanquished is devoured by true as to small-pox, for there have been persons who have had veritable small-pox not only twice, but even six tim On some persons, not the majority, the protection given by vaccination wears out in time. Actual experiment by vaccination is the sole means of determining whether any person belongs to either of these classes. The most serious imperfection connected with vaccination is its frequently careless and, therefore, imperfect performance. The good results necessarily vary with the efficiency of the operation. Any sensible person can estimate this efficiency by the appearance of the resulting scar or cicatrix. This, if perfect, is indelible, circular, depressed, dotted with minute pits, and not less than a quarter of an inch in diameter. Several such scars indicate greater security. English official instructions require four to five separate punctures.

The Rev. J. G. Wood lately delivered at Cooper Institute, in this city, a lecture on the mole. He said in part: "If a man were placed in a damp, dark, subterranean prison, he would not like it a bit, but would make the best of his way, as quickly as he could, to the air, the light, and the warmth of the upper world. Moles do not agree at all with human beings, but prefer coldness, moisture, and darkness. The mole is a barrower, and in the natural pursuit of his vocation-devouring the pupa of caterpillars, and also ground worms-he is compelled to throw up those little mounds of fresh earth which are called mole hills. Farmers strongly object to them on this ground, because mole hills look untidy. Then they have a lurking prejudice that they also do damage to the crops, which is nonsense, because the mole is strictly insectivorous and carnivorous, and utterly disdains cereals or roots. He is really a benefactor, because he supplies the farmer with a top dressing of unexhausted earth.

"All burrowers must be cylindrical and pointed at the foremost end, and that is the shape of the mole. He is inter-

the victor "

The "After Glow."

The red sunsets noticed over a large part of the earth for many weeks form the subject of a careful essay by Mr. George W. Stewart, of Tulare, Cal. It is believed the phenomena cannot be attributed to density of atmosphere, effect of heavy sandstorms, or any local conditions, which would have no effect at such great distances above the earth's surface, the light appearing far above the uppermost stratum of clouds. The writer recounts some former phenomena in connection with eruptions at Honolulu and at Java, and concludes that the recent noticeable sunsets have been caused by finely divided volcanic dust or gaseous vapor from the great eruption in Java, which broke out August 26 last. It is pointed out that the volcanic dust of lesser eruptions has frequently been carried thousands of lation Italy makes more use of the telephone than any other miles, and that Mr. S. E. Bishop, of the Hawaiian Survey Department, as early as September 22 concluded that the General Italian Telephone Company, being an increase "some very light element among the vapors of the Java of 100 per cent in the last year.

THE TELEPHONE IN ITALY .- In proportion to its popucountry in the world. There are now 4,786 subscribers to

Asphyxia from Illuminating Gas.

Scarcely a week passes that we do not read of several deaths from gas poisoning, some of them the result of the soil will continue to flow into the houses, after the break tropical wells are dug so deep that the water within them, carelessness in turning out the gas, others from ignorance has been repaired, as soon as the aspirating process begins even in hot seasons, is as cool as that of a European spring. in blowing out the gas, and a few intentional cases of presumed suicide. In addition to these accidents in sleeping rooms, which affect only the individual or individuals occupying the room, there are the dangers of poisoning from the gentle but continuous escape of gas from leaks and the hitherto been confined to Munich and Leipsic, although applied to the surface of the body. Some persons, howlarger escape from broken pipes.

Dr. Von Pettenkofer, who gives special attention to all Berlin, in the course of which he treated the gas poisoning question as follows :

All kinds of illuminating gases injure the air in the same manner as it is contaminated by the respiration of persons; namely, by depriving it of its oxygen and loading it with carbonic acid, water, and heat. Gas does not contaminate the air any more than stearine candles do, if we remember their relative illuminating power and let one gas flame equal twelve such candles. Hence, a gas flame is to be considered in a hygienical aspect as a step in advance, and no particu- theory, and adds one more plea for the subway. larly injurious properties are to be assigned to it, since it injures the air only the same way as men do when crowded together in close rooms.

With unburned gas it is quite another matter, since the latter is a violent poison both for man and beast. It claims hundreds of victims annually, and whole families have been destroyed by escaping gas in houses where there were no gas pipes at all. Where there are pipes the gas makes its cocks are closed.

from breaks in the street mains, whereby the gas is enabled Soxhlet tube, and 10 per cent of saponin from the residue to enter the cellars and lower floors of houses.

Why is illuminating gas so poisonous? he asks, and pro-iment it is soapy. ceeds to answer it thus: because it contains carbonic oxide. tions are hefore us, and from these it appears that the saponin is not quite pure, as it leaves 0.9 per cent ash. It is centage of it in the air. Air containing five parts in ten solution has a disagreeable odor. Its taste is at first sweetish, thousand can be breathed by men and animals for hours then bitter and disagreeable, causing a biting sensation in and even days without any injury to the health From the throat. It is hygroscopic, very soluble in water, freely twenty parts produce difficult breathing, loss of power, and insoluble in etber. An aqueous solution is precipitated by uncertainty of motion; with twenty to forty parts drowsi- barium hydroxide, by Fehling's solution, by basic lead ness begins, and when there is still more carbonic oxide in acetate in the cold, and by normal lead acetate and dilute the air the poisoning is attended with violent symptoms. hydrochloric acid when warmed; in the last case a glucose Brain and spinal column especially are affected; cramps remains in solution. When the aqueous solution is hoiled seize the victim, yet he may recover if brought quickly into with Fehling's solution, a slight reduction takes place. It fresh air. Breathing air heavily charged with carbonic forms emulsions with oils and chloroform ; and when it is oxide for a long time may likewise cause death.

In the cases of poisoning above mentioned, observation powder.-Pharm. J. Trans. showed that the quantity of carbonic acid in the air of the room varied at different times, though the source of the poison (the broken pipe) remained the same.

sult-that accidents resulting from the escape of illuminating almost every day in large or small measure, the use of pure gas from broken pipes were almost exclusively confined to water as a drink is not better understood than it is. Even the colder seasons of the year. Out of twenty-two cases now that the sway of temperance is well established, and reported last year in Munich, five were in October, two in continues to extend, we should be surprised to learn that a November, two in December, three in January, eight in majority of Englishmen do not habitually discard the use February, and two in April. The months of May, June, of the natural beverage for one or other in which it is com-July, August, and September were free from such occur- pounded with foreign ingredients. Yet its very purity from rences. Hitherto this peculiar circumstance has been ex- all but a solitary trace of mineral matter is what renders it plained in a general way as follows: Since breaks are capable of exactly satisfying, and neither more nor less known to be more frequent in winter than in summer, it than satisfying, the needs of thirsty tissue, and of assistmay be assumed that the frozen earth prevents the gas from ing by its mere diluent and solvent action, without stimulaescaping through the roadway; hence it is sucked into the ition or other affection of function, the digestion and excreneighboring houses and there does its mischief. The results tion of food. No other qualifications are necessary. Given of scientific investigation do not altogether substantiate digestible, solid food, and fair, that is normal, digestive this theory. It is true that frozen ground is harder than power, water alone is all sufficient as liquid. During the the unfrozen, but it is by no means air tight, and allows gas feebleness consequent on disease or overwork everything to pass through as well as when it is not frozen. What is is changed. There is blood, though impoverished in qualfar more important is this-that houses heated by the most ity, to receive and convey nutritive material, and there are improved methods and kept warm within act like cupping itissues to be fed, but the vis a tergo, the driving power of glasses on the ground air, by sucking it in and the gas with the heart, resides in a languid muscle, and the alimentary it.

The lecturer proved most conclusively, by presenting the receives what food is taken only to prove its incapacity to "don't drink whisky or rum or any liquor. The heat they results of experiments and observations of all sorts, that utilize it. Nature is flagging, and a stimulant alone will afford is short lived, and leaves you cold and weak. They there is, in fact, more gas in the earth in summer than in make ends meet in the circle of tissue-building processes. are worse than nothing. But drink a glass of ale and pepper vinter, when the draught toward heated houses is very As a general rule, however, abstinence holds the first rank, -new ale and common black pepper. It will not affect striking; thus the inflow of gas increases with the difference both in theory and practice. We do not assert that the man your head, but it will keep your blood warm in the keenest between the temperature of the heated room and the external who regularly, and in strict moderation, partakes of a light | wind and coldest rain." I never tried the pepper part of air, while on the other hand there is a decrease as soon as stimulant-claret, for instance-may not, especially if he is that prescription," said a Third Avenue car driver, "but ale the windows are kept partially open. equally regular in regard to out-door exercise, live comfort- is, I know, thought to be very warming. We car drivers Since gas that has passed through the earth is odor- ably to the full term of human life; but what we say is that have colder work than policemen do, I think, and the old less, so that the smell is not perceptible until the soil be the more simply the man fares, the more he employs such ones among us have tried every drink you ever heard of. A comes saturated with the gas, its entry into inhabited houses adventitious measures for actual physical necessity, the lot of us were talking the whole thing over the other night. is the more insidious and dangerous, because it does not more he will guin in health, in life, in working power, Hot rum, hot whisky, brandy and ginger, and all the cold appeal to the sense of smell. For this reason special pre- and in aptitude to benefit by stimulation when strength is clear alcoholic drinks were discussed. But the majority cautions should be taken in regard to cellars and ground failing from disease or from decay. But if water be the were in favor of hot coffee. That is the least hurtful, the floors, and when those living there suffer notably from drink, how shall it be drunk? The means must have regard most heating, and the longest lasting drink I know of."headaches, it is advisable to open the windows If the to the end required of them. To moisten food and prepare New York Sun. same occurs again after ventilating for hours, we may it for digestion it is hardly necessary to say that it should assume that there is an escape of gas somewhere in the be taken with a meal; a couple of tumblerfuls at dinner is **Expansion of Portland Cement.** not an excessive quantity for most persons. For thirst- Some interesting experiments on this subject have been neighborhood. When a broken pipe is found, it is not sufficient to merely quenching properties nothing can surpass this simplest of made by Mr. Bradlee, a Boston architect. Three glass botrepair the break; but it was most urgently insisted on by drinks, and all which approach it in efficacy owe their power tles were filled with cement and closely sealed. One burst the lecturer that the police should compel the inhabitants of almost entirely to it. As to temperature, there is no real in two days, one in eight days, and one in ten days, proving all the neighboring houses to keep all their windows open ground for supposing that one should not drink a sufficiency beyond dispute the expansive power of the cement.

for a long time. It is only in this way that serious acci- of cold water when the body is heated by exertion. The dents can certainly be prevented, for the gas that remains in inhabitants of hot climates have no such objection. with the setting in of cold weather.

Pettenkofer pleaded most energetically for the establishment shock which has to be avoided in all such states is not that of hygienic institutes in all universities, such as have Gottingen is now beginning the erection of such a one.

It is well known here that our streets are rarely ever torn questions of hygienic aspect, recently delivered a lecture in up for any purpose whatever without the smell of gas being find that they thus obtain a bland diluent and laxative, withvery apparent to the least experienced, and gas men know only too well that there is a continual waste through small leaks that cannot be easily found where pipes are buried calcareous matter in the previous process of boiling. This beneath the ground. In some towns this leakage is so great method, which is an accommodation to jaded stomachs, has that the gas is turned off during the day. Hence we see 'its value for such, though it is not great even for them; but how gas may and probably does enter every heated house it affords no noticeable advantage for those of greater tone. having an open cellar.

> A subway for pipes and wires would be the only effectual mark. In certain cases of renal disease it has been found to remedy for gas poisoning on Pettenkofer's very plausible assist elimination of waste by flushing, without in any way

.... Seeds of Camellia Oleifera.

BY H. M'CALLUM.

the seeds are gathered and the oil pressed out and used for enough has been said to show that health, happiness, and hair dressing and illuminating. The residue is made into work find stimulus enough in the unsophisticated well of cakes or powdered the powder being used for washing nature. purposes, especially for extracting grease spots ; an infusion presence known by its odor, and the gas meter is a very safe of it is also made for killing worms, grubs, etc., and even indicator whether any gas escapes in the day time, while the fish. The cakes are used with water as a hair wash. The

seeds contain a glucoside, saponin, as well as the oil. 44 Far more dangerous and insidious are the escapes of gas per cent of oil may be extracted by means of ether, using a by treatment with 84 per cent alcohol; even after this treat-

The oil is viscid, vellowish, scentless, with an unpleasant The invaluable results of Grube's very thorough investiga- after taste, and is not soluble in 84 per cent alcohol. The injury done by this gas does not depend upon the continu. a friable amorphous white powder, which irritates the ance of its action, but upon its concentration, or the per- nostrils; when dry it is almost odorless, but its aqueous seven to eight parts in ten thousand cause indisposition; in 84 per cent alcohol, sparingly in absolute alcohol, and shaken with mercury, the metal is reduced to a fine gray

Water Drinking.

So good authority as The Lancet (London) thinks it is Medical statistics gave the following very surprising re- somewhat surprising that in a country in which rain falls

Some In fevers, too, the use of ice in quantities sufficient to allay Turning to the importance of hygienic investigations, thirst is a part of rational and legitimate treatment. The which cools the mucous membrane, but that of sharp chill ever, find it convenient and beneficial to imbibe a certain amount of warm water daily, preferably at bedtime. They out even the momentary reaction which follows the introduction of a colder fluid, and softened by abstraction of its The use of water as an aid to excretion deserves some reirritating the kidneys. Every one is probably aware of its similar action on the contents of the bowel when taken on the old-fashioned but common-sense plan of drinking a glass of water regularly morning and evening, without any The Camellia oleifera grows abundantly in China, where solid food. Whatever may be true of harmless luxuries,

Coffee and Tea.

Perhaps the most brilliant address which has yet been delivered at the Parkes Museum since the evening lectures have been inaugurated was that given by Dr. G. V. Poore on December 6. Sir Henry Thompson occupied the chair, and among the audience were to be seen Dr. Russell Revnolds, Mr. Berkeley Hill, Professor Corfield, and other distinguished medical men. The subject chosen by the lecturer was "Coffee and Tea." After stating his belief that stimulants, both alcoholic and alkalcidal, had their uses, and that we ought to be very sure of our ground before we attempt to override appetite by dogma-as the Mohammedans had done-Dr. Poore proceeded to contrast "coffee with tea." The cup of coffee, provided it were genuine, contained more alkaloidal stimulant than the cup of tea, and owing to the absence of tannin the action of coffee was more rapid than that of tea. The specific gravity of a cup of tea was about 1003, that of strong coffee 1009, and of cafe-aulait, sweetened, 1035. Tea was more of a pure beverage than coffee, and hence it was possible to use it as a mere luxury, for it required scarcely any digestive effort, and did not "cloy" the palate. The danger of excessive tea-drinking lay mainly in the large amount of astringent matter. This was a most potent cause of dyspepsia among women of the seamstress class, who frequently consumed tea which had been boiled. When the system stood in need of a stimulant, there was nothing equal to a cup of strong coffee; and if it were desired to wean the drunkard from his spirits a real stimulant must be supplied, and not the sickly, bitter, unwholesome stuff which was called "coffee" in this country. In order to make good coffee the berry must be fresh roasted and ground. There was no difficulty whatever in roasting coffee, and this ought to be part of the daily routine of every well regulated household. It was important to use enough coffee; one and a half to two ounces of coffee to a pint of water made a first rate beverage. Elaborate coffee machines for grinding were by no means necessary. If the coffee required for breakfast were put into a common earthenware jug overnight and cold water poured upon it, it might be heated to the boiling point in the morning by being allowed to stand in a saucepan of water over the fire. Violent ebullition was thus avoided, and the aroma was preserved. Chiccory and other allied bodies are in no way substitutes for coffee, for they possess no stimulant properties. Out of ninety samples of ground coffee purchased in London shops only five were found to be genuine.-London Lan-

What to Drink to Keep You Warm.

"If you want a drink that will keep you warm a whole canal, itself but poorly irrigated from that center of supply, night long out of doors," said an old policeman to a friend,

BUCKLE.

The buckle and fastener may he made complete in one solid piece, and consist of a frame composed of side bars united at one end by a raised cross bar, c, having a straight tongue, d. projecting from its inner side, an intermediate depressed cross bar, e, having a curved tongue, f, projecting in an outward and opposite direction relatively to the tongue, d, and an inner cross bar, g, and outer cross bar, h, at the opposite ends of the sides. To apply the buckle to a breeching strap, one end of the strap is looped over the bar, e, and a hole in it engages with the tongue, f; the end portion of the strap is then passed back under the cross bar, c, from whence it is passed through a ring and is then run to and under the bar, c, and engaged by a hole with the tongue, d, and from thence it is passed over the har, e, and between the bars, hg. The construction and arrangement will be readily understood from the engraving, Fig. 1 being a perspective view, and Fig. 2 a longitudinal section. The buc



MITCHELL'S IMPROVED BUCKLE,

kle forms a very perfect self-fastener which may be cast in one piece without joint or tongue, and which, applied to a breeching strap, precludes all possibility of the horse's tail catching in it.

This invention has been patented by Mr. William F. Mitchell, of Williams, Ind.

LOCKING NUT.

The locking dog or block is fitted in a recess at the under side of the nut, the recess opening into the central aperture of the nnt, and being formed on its outer face curved or in, clined eccentric to the central aperture, so that the dog has two bearings--one against the surface of the bolt and the other upon the inclined side of the recess. The recessis extended at one side in a backward direction to receive a spring (shown in Figs. 1 and 2) that bears upon the dog so as to retain it in place and assist the locking movement. The dog, as represented in the engravings, is of angular form, the inner end being formed with thread sections to fit the thread of the bolt, so as to avoid injury to the thread and locks by a rocking movement. For the purpose of releasing the dog the nut is formed with a hole entering the recess at one side through which a key, as shown in Fig. 2, can be entered, and the dog pressed back into the wider part of the recess, when the nut can be turned backward. Fig.



3 is a section longitudinally through the bolt and nut. As will readily be seen, the dog holds the nut from any backward movement, but does not prevent its being turned forward for tightening or taking up wear.

This invention has been patented by Mr. General W. Sampson, of Springfield, Iowa.

which exactly the same compensation was received.

The first railway post office forced itself into use nineteen years ago. The previous system of distributing offices did not meet the necessities of the service. Experiments with railway or traveling post offices were therefore begun, and its economy has fully justified the new system. Taking the expenses of last year on the old hasis, the cost of maintaining the distributing offices would have been \$8,000,000, or diastatic matter; and the phenomenon of its drying is due \$3,100,000 more than the new system, which is of immeasurably greater convenience, and avoids the delays of the old one. Forty years ago the mails sent out of New York in seven days weighed in the aggregate 19,000 pounds; now 19,000 pounds of mail matter on the average are sentoutof that city by railroads every two hours, or about 150 pounds per minute.

Japanese Lacquer (Urushi). HIKOROKURO YOSHIDA.

Urushi is the milky secretion of Rhus vernicifera, and is the material for the well-known Japanese lacquer varnish. The tree is cultivated in many parts of the country, throughout almost all latitudes, e.g., at Dewa, Aizu, Hiroshima, and in many places about Tokio; the best urushi, however, is obtained at Yoshino. The tree is very similar in aspect to the ordinary wax-tree, and attains the height of 9 to 12 feet; trees about fifteen years old yield the largest amount of the juice. Two sorts of the juice are generally obtained from a tree, and by different processes ; they are distinguished as ordinary "ki-urushi" and "seshime-urushi."

Ki-urushi (or raw lacquer) is the better of the two, and is collected best in June by making shallow cuttings in the stem of the tree, when it exudes as drops from between the outer and inner barks. A single tree yields on an average about 21/2 grammes of this kind of juice. Branches and twigs of the tree, some of which are usually cut down each year, when steeped in water for some months and afterward warmed in the fire, give out an inferior kind of juice ; this is seshime-urushi, which is used as under varnish after being mixed with some drying oil.

The juice is never sent to market in the form in which it comes from the tree, but is usually mixed with more or less of what is called "mokuyiki" (literally wood juice), e. g., what is ordinarily called Yoshino. Urushi consists of 60 per cent of the gennine juice with 40 per cent of mokuyiki, while the inferior quality contains as much as 70 per cent of the latter substance. Further, in the hands of varnish makers, some quantity of linseed oil is generally added to the already mixed juice, which, if excess is avoided, does not much impair the drying power of urushi.

Different colors are imparted to urushi by the addition of body pigments, such as lamp-black, vermilion, indigo, orpiment, etc.; thus red lacquer is prepared with 20 parts of linseed oil, 70 parts of urushi juice, and about 10 parts of vermilion, etc. Such is a rough yet general account of the extraction and preparation of urushi juice for varnishmaking. The pure and unaltered urushi is a thick grayish fluid of dextrinous consistence, which under the microscope is found to consist of minute globules, some of darker, the others of lighter color, mixed with small particles of opaque brownish matter, the whole being held mixed in the form of intimate emulsion. It has a characteristic sweetish odor, and specific gravity 1.0020 (20° C.); some specimens, such as that obtained from Hachioji, contained a good deal of bark dust and other imparities, which raise its specific gravity as high as 1.038. If the juice be exposed to moist air in a thin layer at about 20°, it rapidly darkens in color and dries up to a lustrous translucent varnish. It contains a small quantity of volatile poison, which acts terribly on some persons, producing very disagreeable itching.

A peculiar acid, which I now call urushic acid, is the main constituent of the original juice, as well as of the portion soluble in alcohol. The juice also contains a very small quantity of a volatile poisonous body, which also passes into alcoholic solution, being almost completely driven out during the drying of the acid at 105° to 110°. It is a pasty substance of somewhat dark color, having the characteristic smell of the original juice, readily soluble in benzene, ether, carbon bisulphide, less easily in fusel oil and petroleum of high-hoiling point, completely insoluble in water. Its specific gravity taken at 23° is 0.9851; it remains unchanged at 160°, and above 200° decomposes slowly with carbonization. Exposed to the air, it neither dries up, nor shows any ign of change as the original juice does, and in other respe it is a very stable body. From the alcoholic solution of the acid many metallic salts can be produced, most of which are slightly soluble in alcohol, but almost insoluble in water. Gum is another normal constituent of urushi, and forms 3 to 8 per cent of the original juice. As gum is insoluble in alcohol it is conveniently separated hy treating that portion of the original juice insoluble in alcohol with boiling water, filtering, and finally evaporating the aqueous solution of gum over the water-bath till the weight of the substance remains constant. In this way a friable light colored substance is obtained, tasteless and inodorous; this is the anhydrous gum.

least weight per day by any one road was 367 pounds, for to keep the constituents of the juice in a state of uniform distribution and intimate emulsion. It may also act as a binding material, and assist the adhering power of the lacquer when laid upon any surface.

> The results, so far arrived at, may be summed up in the following statement:

> Urushi juice (lacquer) consists essentially of four substances, viz., urushic acid, gum, water, and a peculiar to the oxidation of urushic acid, C14H18O2, into oxyurushic acid, C14H18O3, which takes place by the aid of diastase in the presence of oxygen and moisture,

Action of Dilute Hydrochloric Acid upon Starch. BY DR. F. ALLIHN.

Starch cannot be entirely and completely converted into sugar by dilute sulphuric acid, but this can be easily accomplished, as Sachsse has shown, by dilute hydrochloric acid; and, besides, the latter does not decompose the grape sugar so easily as sulphuric acid. The author has recently made a series of investigations upon the saccharification of starch with hydrochloric acid to ascertain the conditions under which the largest quantity of starch should be most rapidly and completely converted into sngar with the least quantity of acid. In all these experiments twelve grms. of starch and 100 c. c. of dilute acid were employed, the acid containing from 11/3 to 10 per cent of real acid. The reactions were made at the boiling point of each liquid over an open flame, with a return cooler. When the action was stopped the solutions were diluted and a solution of caustic soda added until it was but faintly acid. It was then made up to two liters, and 25 c. c. were taken out and the sugar estimated in this. The process of analysis was that devised and previously described by Allihn (Chemiker Zeitung, vii., 1193), namely, by using an alkaline solution of copper in excess, then filtering out the reduced cuprous oxide and reducing it to metal with hydrogen and weighing, then calculating it into sugar.

In his experiments the author employed potato starch, which contained 98.6 per cent of pure starch, 0.9 of ash, and 0.3 of insoluble residue. The results are given in the following table :

No. Starch used,		Time.	Time. Sugar formed.		Strength of acid.	
1	12 grms.	2 min.	92.55 per cent.		10 per cent.	
2	44	5 "	92.14	"	**	**
3	**	15 "	91.74	44	46	14
4	"	30 "	89.55	**	44	44
5	44	50 "	87.37	**	**	**
6	16	10 "	96.60	46	5	46
7	**	30 "	94.33	**	**	**
8	**	50 "	93.27	**	**	**
9	**	30 **	93.27	44	316	**
10	**	60 "	94.65	**	**	**
11	"	90 "	94.49		2	
12	**	30 **	84.94	**	46	
13	£4	60 **	93.68	**	**	**
14	**	90 **	95.05	44		44
15	44	105 **	94-89			15
16	**	1 hr	87.85	44	11.6	"
17	44	116 "	92.87	66 -	4.	**
18		2 "	93.84	**		
19		21/2 "	94.65	**	**	**

These results show that when the ten per cent acid is employed the percentage of sugar obtained decreased with the time, as the acid decomposes the sugar to a considerable extent on long boiling. Similar phenomena were observed with five per cent acid when the boiling exceeds half an hour. With three and one-third per cent acid the maximum quantity of sugar is obtained at the end of one hour, and with two per cent acid in one and a half hours, while one and one-third per cent acid takes two and a half hours, and no decrease is noticed then.

The best results were obtained with two per cent acid, which produces 95.02 per cent of sugar in an hour and a half.

Although hydrochloric acid, in spite of its great saccharifying power, may be for commercial purposes too expensive to get rid of after the sugar is made, this acid is very suitable for the preparation of pure glucose on a small scale in the laboratory, as the acid is easily removed by means of caustic soda or sodic carbonate. The crude grape sugar may be purified by recrystallization from methyl alcohol having a specific gravity of 0.810.-Chem. Zeitung.

Hunyadi Janos. H. Fresenius analyzed the Hunyadi Janos water and found

The U. S. Railway Mail Service.

A recent report to the Postmaster-General reviews work in this department from 1842 to the close of last year. In 1842 the miles of railway mail service were 3,000, and the cost \$400,000; last year the mileage was 110,000, and the cost \$13,800,000; while at the present rate of growth, in the year 1900 it is estimated the mileage will amount to 200,000. at a cost of \$25,000,000. The ratio of cost to mileage has been nearly constant, but the speed has been greatly increased, it requiring 16 hours to take the mails from New York to Washington 40 years ago against 6 hours now. In 1839 the service was divided into three classes first class \$300 per mile per year; second class, \$100; third class, \$50, with an extra allowance of 25 per cent in all cases if onehalf the service was performed at night. In 1867, when the

A mixture of gum and urushic acid (and with water) in the proportion in which they exist in the juice, does not undergo any change whatever, even when exposed to the condition railway mails were subjected to the process of weighing, as- most favorable for the drying of the lacquer. Moreover, part tonishing inequalities were discovered. On fifteen routes of the gum can be extracted in an unchanged state from the where the pay was \$200 per mile, the greatest weight per once perfectly dried lacquer; and since it exists in the origiday carried by any one road was 19,183 pounds, and the nal juice in the form of aqueous solution, it probably serves magnesia and sulphate of soda.

it to contain the following salts:

Sodium sulphate	19.662123
Magnesium sulphate	18.449451
Calcium sulphate	1.321953
Potassium sulphate	0.132943
Sodium chloride	1.424068
Magnesium carbonate	0.731347
Iron carbonate	0.002059
Silica	0.011218
Carbonic acid (semi-combined)	0.383868
" " free	0.012683
Lithium	Traces.
Strontium	**
Nitric acid	
Boracic acid	**
Bromine and iodine	**
Nitrogen	44
Phosphoric acid.	45

The carbonates are calculated as simple monocarbonates, and all the salts are anhydrous, i. e., without water of crystallization. The cathartic properties are due to the salts of