

acid with a slight evolution of carbonic acid gas, and this had caused it to be condemned as impure, by a customer to whom it had been sent. The quantity of carbonate present in it was, however, extremely small. In other respects it answered to the Pharmacopœia tests, excepting that the solution in nitric acid gave a precipitate with nitrate of silver indicating the presence of oxychloride. This is so frequently met with in commercial subnitrate of bismuth that its detection would not have excited much surprise. Its presence is excused by manufacturers on the ground of its making the powder more suitable for some of the purposes to which it is applied, so that for such purposes the powder would be unsaleable if it did not contain any chloride. The chlorine having been estimated, and the equivalent quantity of oxychloride calculated therefrom, a further examination rendered it evident that there was something else present besides subnitrate of bismuth. The residue left, after calcination, was in excess of that which theory indicated; and this residue dissolved in nitric acid, mixed with dilute acetic acid, and precipitated with sulphuretted hydrogen, gave an amount of sulphide much below the theoretical quantity. The cause of these discrepancies was found in the filtrate, which yielded an abundant precipitate of phosphate of lime.

While I was engaged in this investigation, my attention was directed to a paper in the '*Journal de Pharmacie et de Chimie*' for last March, by Mr. Roussin, in which he alludes to the adulteration of subnitrate of bismuth with phosphate of lime, and describes a very simple method of detecting it. Mr. Roussin says that in one case he found as much as 28 per cent. of phosphate of lime in a sample which presented the usual appearance and answered to the ordinary tests of subnitrate of bismuth. His process for its detection and estimation is as follows:—Dissolve equal quantities of the subnitrate and of tartaric acid in nitric acid slightly diluted with water, and add to this a strong solution of carbonate of potash until all effervescence has ceased, and the liquid is rendered strongly alkaline. "If the subnitrate of bismuth be pure the liquid will be clear, and will remain so even after it has been boiled, but if the sample of subnitrate submitted to the test should contain phosphate of lime, even to the extent of 1 or 2 per cent., this will form a white precipitate, which will not dissolve with long-continued boiling."

In applying this test, it is important to observe that the phosphate of lime, even when present in large quantity, is not precipitated in the first instance after the addition of the carbonate of potash, but its precipitation is immediately effected by boiling the solution. From the sample to which I have already referred, I obtained in this way 11 per cent. of phosphate of lime, and from another sample, which came from a different source, I have more recently obtained no less than 40 per cent. of the same adulterant.

I have reason to believe that both these samples were of foreign manufacture.

ON THE VEGETABLE PRODUCTS USED BY THE NORTH-WEST AMERICAN INDIANS AS FOOD AND MEDICINE, IN THE ARTS, AND IN SUPERSTITIOUS RITES.

BY ROBERT BROWN, F.R.G.S., ETC.

On ransacking my various journals and notebooks, relating to North-west America, I find scattered through them many notices of the economic plants of the aborigines of these countries. Though these memoranda can be of but little use to civilized art or medicine, yet I have thrown them together as contributions to the economic history of plants and the ethnology of a little-known

people. The country is, however, very extensive, and therefore much must be omitted, as there are numerous plants and vegetable products used by some of the tribes which I have never visited and of which I know nothing, except by uncertain hearsay. The following notes, therefore, principally relate to my own observations and chiefly to the Indians on the Pacific seaboard. These Indians are not much of a phytophagous people. The tribes in the interior live by hunting, and those on the banks of great rivers, such as the Fraser and Columbia, chiefly by fishing, so that they only resort to vegetable diet as an addition to their ordinary food, or as a corrective to the unvarying meals of flesh and fish, chiefly venison and salmon. It is only the miserable "Digger Indians"—the *gens de pitié* of the *voyageurs*—who can be said to subsist to any great extent on vegetable food, varying it with grubs, snakes, lizards, and grasshoppers, the latter of which they devour as eagerly as do the Bedouins of the Eastern deserts.

1. *Food*.—Nearly all of the tribes from the coast to the Rocky Mountains, use as food more or less of the blue lily,—the *gamass* or *la gamass** of the *voyageurs* (*Gamassia esculenta*, Lindl.),—which, in the spring, lends a characteristic aspect to the Western Pacific prairies and open grounds. In Vancouver Island the *gamass* comes into flower about the middle or end of April, and remains in bloom until June, when, just as it is fading, the roots are in a condition to be gathered,—until that time it is watery and unpalatable; if delayed longer, it fades away, and it would be impossible to find the *locale* of the root. The gathering is nearly wholly done by women and children, who use a sharp-pointed stick for the purpose, and it is surprising to see the aptitude with which the root is dug out. A botanist who has attempted the same feat with his spade will appreciate their skill. About this period the Indians come from their permanent villages, and encamp under the shade of trees in little brush camps. It is the time when, away from the filth of villages, Indian life appears in its most picturesque aspect, and the twinkling of the *gamass* camp-fires, as you pass through the woods at night, have a very pleasing aspect. To the *gamass* gathering come sober-minded young hunters and salmon-fishers to select a partner,—for the hard-working squaw is looked upon by an Indian of rightly constituted mind as a much more desirable acquisition than a mere gawky thing, gay in vermilion, brass wire, and hawk bells, or possessed of these meretricious graces so much prized by men civilized, and, if the truth must be told, by savage too. In Oregon I have seen the roots roasted until they became black; they are then pounded up and preserved in cakes. In Vancouver Island, and generally throughout the country, the roots are roasted (to convert the starch into sugar, though, of course, the Indian knows nothing of the *rationale* of the process) and preserved in bags for winter use. They are sweet to the taste, and appear to be a nourishing and far from unpalatable article of food. The roots of the *Sagittaria sagittifolia*, L., were at one time very extensively eaten by the Indians under the name of *wappattoo*, and, on the Columbia river, there is an island called Wappattoo Island, from the abundance of this plant. Since the introduction of the potato, the use of the roots of *Sagittaria* has much declined, and the name is now transferred to the potato. In the vicinity of nearly every village are small patches of potatoes; but the ground is merely scratched up, and the cultivation far from being properly attended to. Their innate laziness and hatred of any work out of the ordinary routine of their life—not consecrated by tradition and laws made and provided for—will not allow of their either properly attending to these patches or increasing their cultivation and their own material comforts thereby, to the boundless extent which they might, the land costing nothing; however, since the introduction of this useful tuber, the Indians

* A good account of this plant will be found in the catalogue of Geyer's plants, in Hooker's 'London Journal of Botany,' vol. v.

are much less subject to starvation and the uncertain privations of a savage life, and some of them excel in the cultivation of the plant, their potatoes bringing from the whites a higher price than any other. On Queen Charlotte's Islands is held a sort of regular "potato fair" every year, when tribes from all parts come to buy in exchange for the products of their countries and industries. Some of them have strange notions of the best method of cultivation. I once lived in an Indian village for some days, where, regularly every morning, as the squaws were lighting the lodge fires, and preparing the morning meal, the old chief would solemnly stalk through the village shouting in a stentorian voice, "Eat the little potatoes, keep the big ones for seed! Eat the little potatoes, keep the big ones for seed!" The bulbs or roots of *Lilium Canadense*, L., *Brodiaea grandiflora*, Sm., and *Endosmia Gardneri*, Hook. (Shah-gok of the Nisqually Indians), are all eaten in the parts of the country where they are found. The roots of *Eulophus ambiguus*, Nutt., are pulverized and baked into bread. Everywhere among the aborigines in Vancouver Island and the neighbouring country, the roots of the ordinary *Pteris aquilina*, L. (Slee-uk of the Tsongesth), is boiled and eaten as food; they look upon them as a great luxury. This food is no doubt nourishing, as the roots contain a considerable amount of starch. The writer of these memoranda well remembers when starving in a great north-western forest, and expecting every sun to be his last, how anxiously he and his companions sought, but sought in vain, for the bracken roots! The root of *Peucedanum feniculaceum*, Nutt., is also eaten, and by some the roots of *Aquilegia Canadensis*, L.,* *Erythronium grandiflorum*, Pursh,† *Fritillaria lanceolata*, Pursh, *Allium Canadense*, L., and *A. reticulata*, Nutt.) mixed with other food, etc. Douglas says that the root of *Lupinus littoralis*, Dougl., are eaten by the Indians near the mouth of the Columbia river (Chenooks). I have never known them do so, but I have seen the natives at the same place eat the roots of *Abronia arenaria*, Mennz., which he might have mistaken for the former plant.‡ Some of the miserable tribes in California, eat the roots of the tule§ (*Scirpus lacustris*, L.), which chokes up the lakes and swampy lands of some portions of Southern Oregon and California. Among the plants eaten by the Kootanie, Colville, and other tribes in that part of British Columbia and Washington territory, is the beautiful *Lewisia rediviva*, Pursh. The roots are gathered in great quantities, and boiled and eaten like *salep* or arrowroot. In this state they are not unpleasant to the taste, slightly bitter, but are highly valued by the Indians as a nutritive food for carrying on long journeys, two or three ounces a day being sufficient for a man even under great fatigue (Hooker, Fl. Bor. Amer. i. p. 223). These Indians call it Ptleem-asd-ilse-ne-mare, and look upon it as one of the great gifts from the Supreme Master of Life. The roots of *Phaca aboriginorum* (Rieh.), Hook.,—a plant of the eastern side of the Rocky Mountains, which, however, probably extends to the west of the range,—are gathered by the Cree and Stone Indians, in the spring, as an article of food. The root and young stems of *Hieracium lanatum*, Michx., are eaten by some of the coast tribes, and it is also used by the Crees of the eastern slope of the Rocky Mountains as a pot-herb. The seeds of many plants are used as cereals. Thus the seeds of various species of *Pinus* (*P. flexilis*, Torr., *P. Sabinaeana*, Dougl., and *P. Lambertiana*, Dougl.), are all eaten in the parts of the country where they prevail, and is accordingly the "nut-pine" of that part of the country, though the name is often thought to

* *Var. formosum*, Fischer.

† This splendid *Erythronium* is figured and described by Dr. Hooker in the June number of the 'Magazine of Botany and Kew Miscellany,' from specimens introduced by me into England. It is there called *E. giganteum*, Dougl.

‡ *Vide* also Cooper, Nat. Hist. W. T. Bot. p. 55.

§ Tule, tula, tulara, as variously pronounced; derived from the Mexican—*tulatl*.

apply to *P. Sabineana* alone,—a fertile source of error. The Indian climbs the tree and throws down the cones to the squaw beneath, who carefully secures them, otherwise the squirrels would make short work with them. The cones are then scorched to open them and destroy the troublesome resin, so that the winter supply of pine-seeds, which it has been thought would supply such a harvest to the botanist, is perfectly useless, the vitality being extinct in them. When I visited Oregon in 1865, I found that in *P. Sabineana*, as in nearly every other conifer, the "pine-seed harvest" had failed, and the Indians suffered much. One of these pines (*P. Lambertiana*, the "sugar-pine"), yields a sugar, which is occasionally eaten, though it has cathartic properties. It is only found on scorched trees, and in very small quantities. I have, however, heard of a man who devoted himself, for a few weeks, to the business of collecting it, and obtained 150 pounds. It can scarcely be distinguished from the manna of the shops, except by a slight terebinthine flavour. In times of scarcity the Indians will eat the liber of *Pinus contorta*, Dougl. Along both sides of the trail, in the passes of the Galton and Rocky Mountains, many of the young trees of this species are stripped of their bark, from a foot or so above the ground to a height of six or seven feet. This is done by the Indians during their annual buffalo-hunting expeditions from the Kootanie and Kalispelm country to the plains east of the Rocky Mountains, for the sake of the inner bark which they use as food, as well in its fresh state as when compressed into thick cakes, so as to render it portable (Lyll, Linn. Journ. Bot. vii. p. 141). I am not aware that the Coast Indians make any use of it for food. The seeds of *Vicia gigantea*, Hook., are also eaten. Many species of grass-seeds (e. g. *Elymus arenarius*, L.) are collected for food. They are ground in a mortar, or roasted and made into soup. The seed of the wild rye (*Hordeum jubatum*, L.) is especially held in request among the Shoshones of Southern and Eastern Oregon, and a staple article of diet among the Klamaths; near the Klamath Lake, in the same section of country, are the seeds of the yellow water-lily (*Nuphar advena*, Ait.), the gathering and preparation of which I described in one of my published letters.* "Chestnuts" (*Æsculus Californica*, Nutt.) are usually made into a gruel or soup. After being ground in a mortar, they are mixed with water in a waterproof basket, in which red-hot stones are thrown, and then the soup is cooked. As the stones, when taking out from the fire, have dirt and ashes adhering to them, the soup is not clean, and it often sets the teeth on edge. The acorns of several species of oak (*Quercus*) are eaten with perhaps as much avidity as they were by the ancient Britons,—only we are too familiar with the process as practised by the "Digger" to throw any shade of romance around it. The acorns of the Californian oaks are mostly large, and the trees in general produce abundantly, though some years there is a great scarcity, and much misery ensues among the poor natives. They do not, however, contain, in proportion to the bulk, an equal amount of nutriment with cereals. The acorns are gathered by the squaws, and are preserved in various methods; the most common plan is to make a basket with twigs and rushes in an oak-tree and keep the acorns there. The acorns are prepared for eating by grinding them and boiling them with water into a thick paste, or by baking them into bread. The oven is a hole in the ground, about eighteen inches cubic. Red-hot stones are placed in the bottom, a little dry sand or loam is placed over them, and next comes a layer of dry leaves. The dough or paste is poured into the hole until it is two or three inches deep; then comes another layer of leaves, more sand, red-hot stones, and finally dirt. At the end of five or six hours the oven has cooled down, and the bread is taken out, in the form of an irregular mass, nearly black in colour, not at all handsome to the eye or agreeable to the

* 'Farmer,' Nov., 1865 (Horticultural Department), etc.

palate, and mixed with leaves and dirt. For grinding the acorns a stone pestle and mortar is used.* The nuts of hazel (*Corylus Americana*, Walt.) are also extensively gathered as food in some parts of the country where they are found. The fruit of the crab-apple (*Pyrus rivularis*, Dougl.) are prepared for food by being wrapped in leaves and preserved in bags all winter; when they get sweet, they are cooked by digging a hole in the ground, covering it over thickly with green leaves, and a layer of earth or sand, and then kindling a fire above them. The fruit of the *Cerasus mollis*, Dougl., is also eaten. All of the edible berries of the country are eagerly collected by the Indians, and either eaten fresh or preserved for winter use; indeed, the "berry sun" is a great season with them, and all throughout the lovely summer weather of North-west America, you ever now and again come upon parties of women and children, in the woods, engaged in this agreeable pursuit. Equally so is it with the frontier white women and children, who get up parties of this nature for days and even weeks together, into the mountains. I used to come across these marooning parties in my wanderings, and some of the pleasant remembrances I have of my wild north-western life, is the kindness I received from these little-polished but good-hearted people,—acts which I can never return, save by this general acknowledgment in a circle of my fellow-botanists, and I assure you I gladly embrace the opportunity of so doing.† Some of the berries, such as the strawberries (*Fragaria vesca*, L., *F. Virginiana*, Ehr., and *F. Chilensis*, Ehr.), will not admit of being dried, and are accordingly eaten fresh or brought down to the frontier settlements and towns and there sold to the whites. Nearly all of the others are dried and pressed into cakes for winter use. During the latter end of the summer and autumn, all around Indian villages, but chiefly on platforms and on the flat roofs of the houses, vast quantities of these berries may be seen drying and being superintended by some ancient hag, whose hands and arms are dyed pink with them. When required for use, they are boiled, and form an agreeable dessert to salmon, beaver, or venison diet. The berries thus treated are various species of *Vaccinium*,‡ *Gualtheria shallon*,§ Pursh, *Amelanchier Canadensis*,|| L., *Rubus Nutkanus*,** Moc., *R. spectabilis*, Dougl.,†† *R. leucodermis*, Dougl., *Ribes divaricatum*, Dougl., *R. niveum*, Lindl., etc.,—in fact, all the edible berries of the part of the country where the particular tribe lives. One of the *Vacciniums* (*ovalifolium*, Sm.) is well known to all north-western travellers (at least those who have been much among the northern Indians) as the *le brou* plant, being used to make a dainty of that name. The berries are gathered in the autumn, before they are quite ripe, and, after being pressed into a firm cake, it is dried and wrapped in bark and laid by. When it is to be used, a quantity is put into a vessel among cold water, and then stirred rapidly round with the hand, which must be free from grease, until it assumes a paste-like form. More water is then added and more stirring applied, until it assumes a form not unlike soapsuds. In this frothy state it is supped with long wooden spoons, made of *Pinus monticola*. It is pleasant to the taste, with a slightly bitter flavour, and is often prepared in Hudson's Bay forts as an Indian dish, which no traveller ought to leave the North-west without tasting. At their high feast the Indians will sup of this until they are ready to burst, and then waddle to the water, drinking of which seems to allay the distention caused by the other. The Indians (and grizzly bears) of Southern Oregon and California eat the berries of the *Manzanilla* (*Arctostaphylos glauca*, Dougl.), but I have never

* Hittel's 'California,' p. 392; vide also Paul Kane's 'Artist's Journey' for some other methods of preparing acorns for food.

† A portion of this paper was read before the Botanical Society of Edinburgh, May, 1868.

‡ "Huckle-berries."

§ "Salal."

|| "Service-berry."

** "Thimble-berry."

†† "Salmon-berry."

seen the northern tribes make the same use of the berries of the allied species (*Arctostaphylos tomentosa*, Pursh). The tender shoots of various plants are eaten in the spring, such as the shoots of *Rubus Nutkanus* (canoe loads of which can be seen, in the season, on the way to Indian villages), *Rosa fraxinifolia*, Bork., the green stem of *Ligusticum Scoticum*, L., and *Peucedanum leuocarpum*, Nutt., which are peeled and eaten, as well as the stem of *Erodium cicutarium*, L'Hér. = the *alfilerilla* or "pin-grass" of the Californians, and some other plants of that sort. They seem to make use of no species of lichen for food, but make compressed cakes of a *Rhodymenia* for winter use. Capt. Mayne, R.N. ('British Columbia,' p. 256), however, says that they boil and compress into cakes "*L. jubatus*." I never saw them do so, though the statement is not at all improbable (see also Lauder Lindsay, Journ. Linn. Soc. Botany, vol. ix. p. 413-14). Grass and clover the Digger Indian (little elevated in his dietary above the lower animals) looks upon as great blessings, and eagerly eats them and grows fat on them too. The Californian white clover is, however, very sweet, and, I dare say, to these poor people forms, either raw or boiled, a very agreeable salad to their grasshoppers. Beyond the potatoe, they have no cultivated plant. Some of the Indians in Oregon used to grow a little wild tobacco, but they now buy the ordinary *Nicotiana* from the whites. I have seen some of them, when tobacco was scarce, in order, as they thought, to get the full benefit of it, inhale the smoke, gulping it down until it comes out at the nostrils and ears. They would repeat this once or twice, then hand the pipe to another, and lie down, almost senseless, to sleep off the stupor. In times of scarcity they will smoke the twigs of *Thuja gigantea*, Nutt., and the bark of *Cornus sericea*, L. (the *bois rouge* of the Canadian *voyageurs*), is usually mixed with tobacco even in times of plenty,—a habit the fur traders have learned from them. The leaves of *Arctostaphylos Uva-ursi*, L., are also extensively used among the Indians and frontier men all over the American continent, either alone or (more usually) mixed with tobacco under the Ojibway name of *Kinikennick*. Luckily for them, though passionately fond of intoxicating liquors, they have not acquired the art of preparing any. The stem of *Acer macrophyllum*, Pursh, contains much juice, but the north-west Indians have never attempted to make sugar from it as in the case of *A. saccharinum*, L., in the eastern provinces; indeed, neither have the whites. The Crees, however, make a sugar from *Negundo fraxinifolium*, Nutt., which probably extends over the Rocky Mountains.

(To be continued.)

JURIES.

The Commons' Select Committee on the summoning, attendance, and remuneration of special and common juries have concluded their labours. They recommend that the sheriff should have a larger discretionary power to increase the special jury lists, and that the system provided by the Common Law Procedure Act for the summoning of special jurors should be adopted in the metropolis as well as the country, not taking away from the parties the power of having "a special special-jury," as at present, if a judge should think fit. The Committee state their recommendations as follows:—"1. That the jury lists ought to be prepared with greater care, and to contain the names of many persons who are now either legally, or through negligence, omitted; and in order to ensure these objects the Committee recommend—That the overseers should be paid for their expenses in the preparation of the lists; that the lists should be revised by the guardians of the poor before being sent to the justices; that the overseers should be liable to a penalty for negligence in the preparation of the lists, as well as for wilful misconduct; and that the present exemptions from serving on juries should be carefully considered; that many of them ought to be abolished, and those retained should be

flayed is mossed over, and is soon replaced by renewed layers of bark of greater value than the preceding." Mr. Thomson speaks very hopefully of the estimated results as regards Jamaica; and in the circular to which we have before referred he thus puts the matter:—

"After the sixth or seventh year the yield is estimated not to fall short of one pound of bark per plant; the number of plants contained in an acre is, say 400, the bark of which valued at 2s. per lb. (a low price), gives £40 per acre per annum. At about the tenth year after planting, each intermediate tree is thinned out, about 200, in order to make room for the extension of those left. The 200 trees per acre thus cut down are each expected to yield 5 lbs. of bark, or £100. The annual production for the next few years of those remaining in the plantation, will give at least the aggregate of the previous 400 plants per acre, in consequence of the increasing size of the tree now about thirty feet in height, consequently the yield must be largely augmented. Each tree, on arriving at maturity some thirty years of age, gives 400 to 500 lbs. He further notices the advantage possessed by cinchonas over every other cultivation in the great difference between the market value of the produce, and the cost of production. The average market price of Peruvian bark, produced by the best species, may at present be estimated at five or six shillings per pound, while judging from the progress the plants have made in Jamaica, the cost of production of this quantity of bark cannot possibly exceed threepence."

The Government experiment has been so successful, and there would seem to be no possible doubt in this respect, that it will be a matter of surprise if the owners of land in Jamaica do not take the matter up, and work it to their own decided advantage. Plenty of young plants are now obtainable. It is to be hoped, too, that the executive will do their utmost to make cinchona one of the important products of the island. In England the course of events will be watched with anxiety.

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BY ROBERT BROWN, F.R.G.S., ETC.

(Concluded from p. 94.)

2. *In the Arts and Domestic Economy.*—First I should rank the tree I have before spoken of,*—"cedar" (*Thuja gigantea*, Nutt.), of which the Indians make many articles for domestic use; for instance, lodges, canoes, salmon-weirs, fishing-poles, etc., are made of the wood; "tow," ropes, blankets, mats, cloaks, etc., of the bark; of its tough twigs, withes to sew the canoes together; and Mr. G. M. Sproat seems even to think that it has had a powerful influence in forming the present and past habits of the race who use it so extensively.† Though the canoes of the natives are chiefly built of this wood, in other parts of the country where it is not found "cotton-wood" (*Salix Scouleriana*, Hook.) is used, and the rude "dug outs" of the Indians in Southern Oregon and California are made of the trunk of *Pinus ponderosa*. There is no birch in North-west America which could produce bark to make these beautiful crafts of, as on the eastern side of the Rocky Mountains. The bark of the white pine (*P. monticola*) is in like manner used for weaving blankets and cloaks. The maple (*Acer macro-*

* Trans. Bot. Soc. Edin., May, 1868.

† Trans. Ethnol. Soc. Lond. 1866-1867, and 'Scenes and Studies of Savage Life.'

phyllum) is used for making paddles; hence, the Cowschans call it *kammal-celp* or paddle-wood. The vine maple (*Acer circinatum*, Pursh) in like manner, when it can be procured, is used for making bowls, and *Pinus monticola*, for spoons. The yellow cypress (*Cupressus Nutkaensis*, Lamb. = *Thuopsis borealis*, Fisch.) is also among the Tsimsheans used for that purpose, and for making boxes, the sides and bottoms of which are hollowed out of one piece. The roots of *Abies Menziesii*, Dougl., are used for making hats. I have seen a pack of cards ingeniously imitated on the barks of *Pinus monticola* and *Thuja gigantea* for gambling purposes. The gambling disks and polished sticks used by many tribes are generally made of *Acer macrophyllum* and *Cupressus Nutkaensis*. Yew (*Taxus brevifolia*, Nutt. = *T. Lindleyana*, Murr.) is often called in various languages "fighting wood," being used to make bows from. Much of this yew grows near Mount Shasta, in California, and among the Oregon Indians a bow of "Shasta yew" is as much prized as in Europe used to be a "coat of Milan steel," or "a Toledo blade." The arrows are made of cedar and various species of reeds, though north, the former is almost universally used. They have, I may mention, no arrow poison, but I have known some of the California Indians get a rattlesnake (*Crotalus lucifer*, Baird), and irritate it until it had struck repeatedly into the liver of some animal, impregnating it with its virus; they would then dip their arrows into this poisoned mass. All wood is used for fuel, but principally *Abies Douglasii*, Lindl., because it is most common, the branches of which are, in common with other trees, put into a canoe when it is leaking to keep the loads, or the paddlers from the water. At their great winter feasts bark is often used as fuel, it affording a stronger heat. *Pinus contorta*, Dougl., from being full of resin, is used as a torch by the Indians in salmon spearing at night, and at their feasts and dances. The leaves of *Philadelphus Gordonianus*, L., and *P. Lewisii*, Pursh, are used by the natives as a substitute for soap. The amole (*Chlorogalum pomeridianum*, Kunth), or "soap plant," has a bulbous root, which, when rubbed, makes a lather like soap, and was much used for washing by the Indians and native Californians, prior to the American possession of the country. It is also used, among other things, for making mats for saddlecloths. In California the aborigines make hats and vessels from a grass known as the "wire grass," and coarse mats of *Scirpus lacustris*, and other rushes. Bottles are, as I have mentioned in a former paper,* made of the bulbous stem of *Macrocystis pyrifera*, Ag. The textile plants of the Indians are few, the bark of *Thuja gigantea* supplying the place of most fibrous plants. They can extract a fibre from the stem of *Urtica gracilis*, Ait., the native nettle, and I saw a fishing-net made of it, which the owner, a Seshaaht Indian of Barclay Sound, Vancouver Island, valued at \$100. Some of the Indians on the Columbia river used to make salmon-fishing nets of the twigs of *Cornus sericea*, L., and the more southern tribes still use the native flax (*Linum perenne*, L.) to make nets, twine, and ropes. Near the Klamath Lakes I saw it growing in such abundance as to suggest the idea of a cultivated field, and only recently the following extract appeared in the San Francisco (California) 'Bulletin' on the subject of the native "hemp," which doubtless refers to this, or an allied plant:—"A morning contemporary calls attention to the fact recently verified, that large quantities of native hemp grow in the valley of Humboldt river, in the State of Nevada, which is gathered by the Indians, who strip off the bark from the dried wood, and make from it very fine and strong nets. The fibre is said to be longer, finer, and stronger than common hemp; longer than flax, and more easily separated from the wood than either. It is said 1100 tons of the stripped fibre can be collected

* "Observations on the Medicinal and Economical Value of the *Oulackan*," etc.—Pharmaceutical Journal, June 1868.

in Humboldt Valley this season, and its prospective value as a cheap substitute for cultivated hemp, is suggested to our cordage and cotton factories. We may add to this interesting statement a fact within our own observation, that a native hemp is found in many parts of California, especially in the moist bottom of the Sacramento and San Joaquin rivers. The early Spanish colonists mention that it grew about the Tulare lakes, and was used by the Indians to make their fishing-nets. Its use for this purpose has always been common to the Indians of every part of the State. Some years ago, it was quite abundant along the Upper Sacramento. The fibre was long and fine, and easily stripped from the stalk, as it dried on the earth, and very light coloured. We have seen the Indians twist it into very fine and strong thread, with which they made not only small fish-nets, but nets twenty, thirty, and forty feet long, and nearly as wide, with which they caught wild geese, while feeding on the plains. Setting their stuffed geese as decoys, the nets are arranged flat, behind them, with wooden springs, and are sprung over the live geese when they alight, by concealed Indians. As many as twenty geese were sometimes caught in this way by a single haul. As they struggled to get loose, the Indians rushed forward with sticks and knocked them senseless when they poked their heads through the meshes. The nets required for this use were of course very strong. When a large net was made a number of Indians assembled to assist in its completion, the women being excluded from the sacred circle, though allowed to sit and gossip on the outside. It was enough for them that they were permitted to strip and dress the fibre, sometimes to pound the pinola (pine seeds) and acorns, and to carry in conical baskets, steadied on their backs, bound about their brows, the burdens imposed by their lords and masters. All the work of thread-and net-making was done with the fingers, assisted by sticks, something like modern crochet-needles; and this does not seem at all strange when it is remembered that the exquisite cotton fibres of the Hindoos are all made by manual appliances. In the same manner the Indians made from the native hemp some very fine, small nets, in which they bound their thick massy hair behind, in a like manner and with much the same effect as the fashionable *chignon* of our own day. These hair-nets were variously coloured, ornamented with beads, and pierced with feathers or long sticks, covered with snake skin. The despised Digger Indian of California may therefore claim to be the inventor of that most astonishing article of head-gear now in use among civilized women. We do not know if it is to be found anywhere in its old abundance; perhaps not, since so large a portion of the bottom lands, where it flourished so luxuriantly, but not exclusively, has been occupied for cultivation. If it can still be obtained in sufficient quantities, it would certainly be valuable for manufacturing purposes. The excellence of its fibre, for many inferior purposes at least, entitles this suggestion to consideration; and the fact that we have a native hemp of such fair quality warrants the inference, that the cultivated staple could be grown here to advantage. Possibly Indian labour on the valley reservations could be turned to profitable account in gathering and preparing the native production."*

3. *Medicine and Superstitious Rites.*—All medicine with the Indian is superstition, and all superstitions have a bearing more or less on medicine. Medicine is with them a mere piece of pagan empiricism. It is emphatically Napoleon's axiom, more trite than true,—putting what they know little about into a body about which they know still less. I would have you to guard, however,

* The writer of this extract, though styling this fibre-plant "hemp," apparently, for the most part, refers to *Linum perenne*, L., while curiously enough, both Pursh (Fl. Am. Sept. i. p. 210) and Douglas (Hooker, Fl. Bor. Am. i. p. 106) expressly state, though erroneously, that it is never used by the Indians of North-west America for economical purposes.

against the notion that the "medicine men" are equivalent to the "doctors,"—not so; they are mere sorcerers, and though practising medicine, in so far as sorcery and superstition are concerned, yet the healing art proper is in the hands of old women, who are supposed to be skilful that way, and large fees are sometimes exacted from their patients. Surgery they know little or nothing about. I know a very celebrated (and also a very brave) chief, who had rheumatism of the knee-joint. He diagnosed it to be caused by dirt getting in, and accordingly he absolutely proceeded to bore a hole through the patella, in order that he might get a stream of water in, to wash out the foul joint! For fractures they use, as we do, splints. On one occasion I was travelling in the mountains, my only companion an Indian boy, who, at a distance of several miles from the nearest abode of man, fell and snapped the femur; luckily it was not displaced. With the aid of cedar (*Thuja*) bark,—used as pasteboard splints,—and tearing the boy's shirt into bandages, I managed to reduce the fracture; I then raised the boy as well as I could on my back. In this manner the north-western surgeon and his patient took their way through forest and through swamps, over fallen trees, and crawling along cliffs, and fording swollen mountain-streams until we reached an Indian village, where I committed him to more skilful nurses. Aided by a good constitution and wonderful good luck, the boy recovered, and when last I visited that part of the country, I found him perfectly well, and that my fame had grown very great in the land. The liber of *Abies Mertensiana*, Lindl., is sometimes used as sticking-plaster. Their knowledge of the virtues of plants are, as I have said, merely empirical, but nevertheless they are used sometimes in acts "more honoured in the breach than in the observance." No crime is more common among Indian women than that of procuring abortion. They generally accomplish this by mechanical means, but some species of plants are also used, such as a species of orchid. From the plant, root, leaves, and stems is formed a decoction which is drunk by the women several times a day, until the effect is produced. It is said to be very effectual. The scrapings of a human skull are used in the same way, and some species of shells are looked on as what old Master Pomet would call "the sovereignest remedy on earth," for the same purpose. The infusion of the young cones of various species of pine and fir is thought to be very useful in preventing women bearing any children. The roots of a geranium are also used among the Lilloets in British Columbia, for the same purpose. Among the Ponderelle Indians the rattles of a rattlesnake are thought to ease labour. I have heard much from the Hudson's Bay officers about the virtues of a species of *Valeriana* (?), called "kunko," by the M'Leod's Lake and other Takali tribes in British Columbia, as a specific in rheumatism. The berries of *Symphocarpus racemosus*, Mich., are used about Lilloet for colds. *Berberis aquifolium*, Pursh (the "Oregon grape"), the juice of a *Betula*, *Echinopanax horridum*, Sm., and an infusion of leaves of *Abies Douglasii*, or other fir, under the name of "spruce-tea," are all held in great estimation among the Indian and frontiers-men in venereal diseases.* A decoction of the roots of the *Berberis* has long been held in great esteem among the Indian tribes in the north, and is equally well known and valued among the back-woodsmen and frontier-miners, hunters, and others accustomed to mingle much among the native races. It is an excellent tonic, and there seem to be some good grounds for this universal appreciation of its properties as a curative in syphilitic and other venereal diseases, now becoming so rife among the Indians and on the frontier. I saw the roots of some species of *Umbellifera* (*Archangelica peregrina*, Nutt.?) employed with manifestly good effect as a poultice to inflammatory swellings. A decoction of *Achlys triphylla*, DC., is used as

* The roots of *Aralia nudicaulis* are said to be used by the Crees in venereal diseases. They also apply the bruised bark to recent wounds (Hook. l. c. *vide* Richardson, i. 274).

a remedy for pain in the breast. The leaves of *Parolea physoides*, Dougl., are used as a poultice. The leaves of *Heuchera cylindrica*, Dougl., are applied in a bruised condition, to boils, by the Nisqually Indians. *Brunella vulgaris*, L., is mixed with grease and applied to swellings. The roots of *Trillium ovatum*, Pursh, are used as a poultice; and an infusion of the roots of *Polypodium vulgare*, L., being sweet, are used to be drunk with the decoction of *Berberis Aquifolium* formerly referred to. One would think that *Conium maculatum*, L., would be a dangerous thing to meddle with, yet the Indians of some tribes use an infusion of the plant, it is said with good effect, in diarrhoea. The juice, so classically known as a poison, is not used, and the infusion is mild, so that I never heard of any evil effects ensuing.

Like all superstitious people, they have "medicines" to produce mental effects, or to make them skilful in their employments. The notion is a very old one, and is not yet extinct in Europe, while in Africa and other savage countries it is one of the canons of superstition. Shakespeare referred to it in his day. Thus, in 'Henry IV.' (part 2) the following passage occurs:—

"I am bewitched with the rogue's company. If the rascal had not given me medicine to make me love him, I'll be hanged, it could not be else, I have drunk medicines."

A belief in "love philtres" is very common among the Indians. The Tsongeisth girls rub themselves with the roots of the orchid mentioned to gain the affection of their sweethearts. The roots of *Erythronium grandiflorum* and *Ranunculus* (*R. reptans*, L., *R. occidentalis*, Nutt., etc.) are also used with a view to the same end. The roots of a species of *Umbelliferae* (*Conioselinum Fischeri*, Weim. and Grab.?) are also used in this superstition by the Tsongeisth. The roots are dried, and then pounded or mixed with some others, put on the garments of the person on whom it is desired to operate, or kept in the mouth of the person who is employing this piece of witchcraft. They have even a plant which is used to make a *man* cry! Indian girls look upon this as a great triumph, but I could never learn what plant produced this lachrymo-potent medicine. They have a medicine to help them to be skilful in killing whales, and even one to simulate virginity! I do not think that the northern Indians know anything of the action of poisons; though I have heard of some individual who had a box buried near his lodge which contained "medicine" with which he threatened to poison the whole family of an unwilling bride, if they did not yield to his marriage with her. The infusion of the roots of *Megarrhiza Oregona*, Torr. and Gray, put into little ponds in the woods is said to be used to stupefy deer, which come down to drink, and thus fall an easier prey to the Indians. There used to be a scandal in San Francisco, that it formed the chief ingredient in "Stoughton's bitters!" Pine gum is continually chewed by the northern Indian women; to the use of it may be attributed their beautifully white teeth. The natives make no turpentine, but much is now manufactured in Oregon and California, and an experiment was made in Vancouver Island which promised success. The "poison oak" (*Rhus toxicodendron*, L.) grows abundantly in many parts of Southern Oregon and California. There are several species, but the present one is the most common, and as the effects of all the others are similar, these may be considered under its description. It thrives best on a moist soil, and in the shade. In a thicket in the shade, with other bushes, it sends up many thin stalks, eight or ten feet high, with large, luxuriant leaves at the top; in the shade the leaves are green. In the open ground, exposed to the sun, and without support from other bushes, the poison oak is a low poverty-stricken little shrub, with a few red leaves. If it can attach itself to an oak-tree, it becomes a parasitic vine, and attains a thickness, though very rarely, of four inches in the trunk, and climbs to a height of forty feet.*

* Hittal's 'Calif,' 103.

It affects the skin of most people in a very painful manner, and the inflammation speedily spreads from one part of the body to another. Some people are so affected that their faces could not be recognized, and others (like the writer of this paper) are not affected by it; but instances are not uncommon of persons who have supposed themselves proof against the poison, but have at last been affected. After having been once injured they are ever after very susceptible to the poison. Even passing to the leeward of a bush on a windy day, or through the smoke of a fire in which it is burning, will "bring the poison to the surface" again. In some parts of California cattle are there affected by what is known as the "milk sickness." On breaking a stem of the *Rhus* a milky fluid is exuded which is exceedingly poisonous, and if applied to the skin, will produce effects like that of nitrate of silver. A black welt is produced which, in a few hours, becomes sore, destroys the cuticle, which sloughs off, and upon healing leaves a circular cicatrice. So poisonous is it that it pollutes the air where it grows. Children, and even grown-up people, who are gathering berries, or otherwise approaching its vicinity, are often badly poisoned. Their faces are frequently swelled until their eyes are shut; the neck, hands, and arms covered with inflamed vesicles, the cuticle highly inflamed and not unfrequently constitutional symptoms are observed, resembling those of "milk sickness." The nostrils of cattle grazing amongst it are often covered with pustules. Indeed its effects are described as almost approaching the fabulous Upas-tree, which that "Puck of Commentators," George Stevens, invented, and Erasmus Darwin handed down to posterity in the stately verses of the 'Botanic Garden.' Though well known for a long period (there is a paper on it in the 'Philosophical Transactions' of last century) it has never yet been thoroughly investigated.* The Indians seem rarely to be troubled by it, and the native Californians look upon an infusion of *Grindelia hirsuta*, Hook. and Arn., a composite plant, as a cure for its noxious effects. There may be said to be no rattlesnakes west of the Cascade Mountains, at least, north of the Columbia river, though they are sufficiently abundant to the eastward of that range, as far north as Frazer river, where I have known several Indians to be bit by them. Their usual plan is to brand the wound, having previously tied a ligature between the heart and the bite, or to push the wounded limb among mud immediately on receiving the poison. It is said that by this means the poison is washed off, and that the person often escapes death. The only effectual cure I have found is drinking immoderately of spirits, until, indeed, no more can be drunk. I know a gentleman who was bit, once by the well-known copperhead snake of the Western States (Missouri), and twice by the rattlesnake in Oregon, and recovered by this treatment. The country people have innumerable specifics for their bites, but I cannot learn that any of them are reliable. The Indians of Central America have several remedies from the vegetable world, and all the tribes north to British Columbia are said to possess some herb or other, but I have generally found them to adopt the treatment I have given above. In California, the leaves of *Daucus pusillus*, Mich., the *yerba de la vibora*, or "rattlesnake herb" of the Spaniards, are said to be a cure for the bite.†

* Vide Dr. Isaac Mendhall, in 'Cincinnati (U. S.) Lancet and Observer,' March, 1861; Chase in *Ibid.*, May, 1861; article in 'Chicago Medical Journal,' June and July, 1861; Canfield, in 'Edinburgh Botanical Society's Transactions,' 1859; and Bigelow, 'Medical Botany.'

† Pigs have a peculiar antipathy to snakes of every description, and particularly to the rattlesnake. Instantly on seeing it the pig will rush towards the venomous reptile, place its foot on its head, and most adroitly kill it. A few pigs will soon clear a district of snakes. At one time the Dalles of the Columbia was perfectly infested by these disagreeable neighbours. They would even enter the houses and crawl under the beds. Since the introduction of pigs, consequent on the country being more settled up, not one can be seen for miles around. The pigs are said not to be affected by the poison. The snakes likewise seem to dread the pigs, and this is so well known to the Indian women that they will often beg a piece of the skin to wrap round their ankles, when gathering berries in the bush, in order to protect them from snakes.

I will conclude these stray notes by an account of the extraordinary effects of the roots of *Clematis Douglasii*, Hook., on exhausted horses. It was at a horse-racing of the Nez Perce Indians that it was witnessed. One horse was seen which had fallen down. The Indian put a piece of the root (the outer coat scraped off) into the nostril of the animal. The effect was surprising. The creature sprang up under convulsions, and was then brought to the river and bathed, and "I found several which had been so treated, afterwards grazing with the herd apparently without having sustained any injury."*

What I said in the introduction to these fragmentary notes, I may now repeat in conclusion, viz. that they are by no means complete, especially in the latter section. Often you see vegetable products in possession of the Indians, when either through want of opportunity, season, or inclination on the part of the possessor, it is impossible, even should the plant yielding grow at that season and in that part of country, to discover the botanical name of it, or obtain a specimen. Again, an Indian sorcerer, doctor, or "wise woman" will search for a whole day for the proper plant, and however ridiculous we may look upon its virtue, they think otherwise, and naturally are in no way willing to ventilate the secrets by which they earn large fees.† The present memoranda may, however, serve as examples of the superstitions of a fast dying off race.

ON THE PRESENT STATE OF PHARMACY IN IRELAND.

TO THE EDITORS OF THE PHARMACEUTICAL JOURNAL.

Gentlemen,—I read with no little astonishment Mr. Monaghan's letter in the July number of your deservedly popular Journal. He has misrepresented the facts, and as a result arrived at the most erroneous conclusions.

The law, coming into force before the Pharmaceutical Society was in existence, very properly confined the dispensing of prescriptions to apothecaries. Doubtless, had there been Pharmaceutical Chemists at that time, their claims would have been duly recognized. Persons are not by law prevented selling medicines.

The Apothecaries' Society has never rigorously enforced the powers vested in it. I know several unqualified persons keeping apothecaries' establishments, and several apothecaries who keep apprentices that have not passed any preliminary examination. Mr. Monaghan seems to think that knowing by rote the "national Pharmacopœia" is enough to constitute any person a dispenser of medicine. A deal must be learned before the Pharmacopœia can be thoroughly understood, and a great deal, more especially of a practical nature after it is understood, before a man can be said to be fit to compound medicine. An Irish apothecary is justly something more than a "pure pharmacien." Surely, the course required for the apothecaries' licence entitles the possessor of it to practise medicine. If not, what course of study does? The licence of the Apothecaries' Society is one of the most difficult to obtain in Ireland; and will always be recognized as such by unprejudiced medical gentlemen, notwithstanding the jeers of some physicians and surgeons, more especially those who, being unable (from the amount of learning they possess) to graduate in their own kingdom, take a trip to North Britain, pay £25, have a *special examination*, and return full fledged surgeons and

* Geyer, Hooker's Journ. Bot., vol. vi. p. 66.

† I have known one woman get five blankets, valued at £2. 10s., for allaying a very simple swelling.