BOTANICAL INFORMATION.

Notes on the VEGETATION *and general character of the* MISSOURI *and* OREGON TERRITORIES, *made during a Botanical Journey in the State of Missouri, and across the South Pass of the* ROCKY MOUNTAINS, *to the Pacific, during the years* 1843 *and* 1844; *by* CHARLES A. GEYER.

(*Continued from p.* 208, *Vol. V.*)

Mountain region.—Along the grassy slope of this valley grow a great number of plants of my collection. *Lathyrus* 624 is the most showy of the few *Leguminosæ* here, and of very rank growth. No *Lupinus* grows in this cool loamy soil. The most abundant is the *Hosackia Purshiana*, which fronts the inundated meadow valley, on rocky ground, joining the narrow Indian trail, on the other side of which runs a meadow a mile long bordered by *Clintonia elegans*, rivalling the bright azure above, (July.) With the diffuse dense *Hosackia* groups grow erect the *Crucifera* 234, in fine contrast with the deep blue flowers of *Gamassia esculenta*, appearing under the shade of some poplars, and with the aforesaid *Clintonia*. Here also I gathered the *Graminea* 320, which is very rare. On slight elevations grows the clustered *Trillium* 291, a curious species; sometimes there are a dozen or more from one joint of the rhizoma, all their stems in the ground. Here again grow profusely *Fritillariæ* 315 and 599, with *Erythronium* 601, lasting three weeks or longer in bloom, which is a rare occurrence in the flora of this region. Another somewhat rocky elevation, harboured three other rare little plants, the *Biscutella* 607, *Apargia* 292, and *Cynoglossum* 290, every where surrounded with masses of the white *Dodecatheon*, *Saxifragæ* 619 and 625, among which is seen now and then a bush of *Espeletia helianthoides* and *Batschia Torreyi?* (605).

By ascending the wooded terraced slopes of the moun-

tains, and following the course of a rivulet from the low meadow we step into one of the poplar groves, already mentioned; the dry parts of which bear shrubs of *Acer* 616, a small shrub-like tree with several stems from one base, or rarely simple, never averaging more than 15—20 feet high, and 4—5 inches diameter of trunk in that region. Under its shade grow *Pyrola secunda* and 427, and *Linnæa borealis* with *Viola* 602, *Asarum* 598, and *Claytonia* 321. In the muddy bed of the rivulet is seen the *Arum* 327 with its pale-sulphur-yellow spathas. Later in the season (August) appear its large ovate-lanceolate leaves from 12 to 18 inches long, resembling a full grown tobacco leaf, then the berries begin to ripen, taking a scarlet colour, as in many species of this genus.* Higher up, where the rivulet runs in rocks, the banks are dressed with *Smilacinæ*, as *Streptopus* 524 and 611; *Smilacina* 325, also with *Thalictrum* 622, and *Tiarella* 623, *Luzula* 318 and *Circæa alpina*.

Right and left we now find spacious, open, grassy woods, ornamented with the largest specimens of *Pinus ponderosa*, up to 180 feet high, and 8—10 feet diameter of trunk, so full of resin that they will burn in a moment from the foot to the top, if fire is set to them on a dry day. These localities are elegant natural parks; they bear a resemblance the more as they are crossed in every direction by narrow foot-paths, leading to the lodges of the Indians, hidden behind the large pine-trunks. Between grow thickets, each composed of a few shrubs of *Cratægus lucida*, *Spiræa ariæfolia*, *Cerasus* 288 and 496; or *Rhamnus* 522 and *Acer*, over which twines gracefully the two *Clematides* 615 and 617, the former blooming early in May, resembling the *C. gran-*

* This takes place towards the latter part of summer, when the brown and black Bear feasts on the many berries which this region affords. Then he also visits these shady cool recesses to partake of those of the *Arum* which he manages with great care; eating (according to the information derived from hunters and the Indians) every time, but little, and returns as many days as these berries last, using the same probably as a digestive. They have a very acrid and pungent taste.

diflora; the latter, late in August. A tall species of *Aconitum*, too, blooms 6—7 feet high among these thickets. The grasses, as every where on the west side of the Rocky mountains, consist chiefly of the two species, *Triticum* 192, and *Festuca* 356; both are called "bunch-grass"* by Anglo-

* It is erroneous to believe that these two species of grasses grow naturally so in separate tufts or bunches. The cause is a mechanical one, mainly owing to the annual fires, the great heat and drought during the latter part of summer, as well as to the deep snows, the wet in the month of March accompanied by severe bare-frosts. But the same causes again may also occasion part of that excellence, which these grasses possess in respect to feeding qualities, which surpass the best grain fodder. Yet, I am sure that great part is likewise owing to the kinds; for, in the lower regions, on the Upper Missouri River, where there is an elevation of only about 1000 feet, without these extremes of heat, and the destruction by fire, the *Triticum Missuricum* enjoys the same reputation as excellent fodder for horses and cattle. Two weeks are sufficient to fatten a poor horse, when the first blades spring out in March. There it grows not in bunches, but in dense carpets, suffering scarcely any other plant amongst itself, save a few *Opuntia* groups. Yet the *Festuca* 356, surpasses the *Triticum* by far, which grass I never recognized east of the Rocky Mountains. Horses and cattle, therefore, in Upper Oregon feed on the former, only in the absence of the latter, which occurs in such places where water remains long in the spring. The extreme heat in Oregon give to these grasses another great value, on which the importance of Upper Oregon, as a grazing country, depends. The heat commences about the 1st of July, when the parching rays of the sun, suddenly dry up the blades of the grass, and render it a wholesome hay. The centre of the tufts, however, remain green, waiting only for a little moisture to renew the growth, which also takes place about the middle of September, during a series of wet, foggy, cloudy days. Soon afterwards, frosts arrest its growing a second time, and a deep (2·3 feet) snow covers it for five months. I have convinced myself that these grasses, thus checked and excited, keep green and grow a little, even under the snow. The frosts and snow render the dry blades brittle, and the horses and cattle eat it with greediness, mixed with the young green parts which they find in the centre of the tufts; digging for it with their feet day and night, remaining fat through the winter; and poor ones will, if healthy, get fat notwithstanding that labour. This is the case in places where the fires do not reach; but when fires follow after the heat and drought, it will soon grow again and keep green under the deep snow. The soil is generally a heavy loam, mixed with fragments of granitic and basaltic rocks; getting very hard

American travellers. In these meadows, figures conspicuously the large-flowered *Phlox* 375; a suffrutex of about 1½ foot high, forming a globular mass of bright rose-coloured flowers, accompanied by *Delphinium* 600, *Compositæ* 309 and 297, *Myrrhis?* 610; together again with the above *Fritillariæ*, *Erythronium*, *Saxifragæ*, *Ferula* 314 and others, which fill every space, and one beholds with wonder the multitude of flowers called forth by two or three sunny weeks of April or May. A strawberry gathered here also (612) attracted my attention, as most specimens exhibited an appendicule on the petiole. In fruit also it seems to differ from those on the east side, which has, by cutting it lengthwise, a cordate outline; the seeds of the few berries I met with, were more superficial and fruit larger, of a deep red colour. I found it again on the foot of the snowy ridges on the high plains of the Saptonas, where it had the same characters.

Arriving at the basaltic wall of the mountain, we meet again with *Mahonia aquifolia*, *Pentstemon* and *Peucedanum* mentioned before. The rock above is adorned with *Heuchera* 388 and *Sedum stenopetalum*, sometimes a shrub of *Amelanchier Canadensis*, *β*, *ovalifolium*, or a cherry shrub grows out

about the time when the seeds are ripe; hence they will burn up, as well as the borders of the tufts and their dry centres, separating one tuft into several. Seedlings which escape the fire, must either lodge in the tuft, or they will be destroyed by rot under the deep snow, or the wet and bare frosts in the beginning of spring. Sir Wm. Stuart, who, during his travels, became acquainted with these grasses, has raised already a great many from seeds, which he gathered himself many years ago. Even there (Scotland) they preserve a great deal of their primitive character, and will, no doubt, surpass expectations. Here I must remark, that I somewhat doubt the identity of the *Triticum* on the Missouri and that of Oregon. The former is the same Sir Wm. Stuart cultivates, the same which agrees perfectly with the description of *Triticum Missuricum*, Sprengel, (See Spr. Syst. Veget. Appx.). Drs. Torrey and Gray recognized it as *T. caninum*, and Prince Neuwied calls it a variety of *Triticum repens*. In my estimation it differs from the latter even in its creeping, but short, thick, and ramose root.

of the crests. Above we step again on a grassy but sloping terrace ornamented with *Espeletia helianthoides*, the large-flowered *Phlox*, *Geranium* 402, *Gymnandra* 230, *Ferula* 411 and *Helianthus* 34. At a distance we behold again pine-openings, including meadows, elevated and dry. No great variety of flowers marks these warm protected spots, but by closer examination, we find here the pretty *Liliacea*, *Calochortus* 299, very abundantly huddled in the thick grassy tufts, sending up its solitary erect leaf. *Orobus* 312 grows likewise here. From hence we direct our steps to a dense young thicket of spruce, clothing a steep slope of the upper part of the mountain, so dense that a bear would make a circuit to avoid passing through it. Difficult as the passage is, in the listless dark seclusion we find the elegant *Calypso*, and at the same time with it *Linnæa borealis;* here also did I find *Goodyera* 595, *Epigæa repens*, *Chimaphila corymbosa*, *Anemone* 606, and *Arctostaphylos uva ursi*.* These young thickets spring out of the remains of one of the forests of gigantic *Pinus ponderosa*, which was destroyed by fire, and consist of two or three species *Abies*, *rubra? nigra* and *balsamea*, the latter is seen only in moist places. On the somewhat level top of the mountain grow again large pines, encircled with *Populus betulæfolia*, *Acer*, *Spiræa ariæfolia* and *Cratægus*. With the last named I found *Ribes* 293 growing, a shrub 8—10 feet high, with handsome white conspicuous flowers, in deflexed racemes. As I did not see it in another place I returned to this spot to get seed, but was disappointed. The Indians told me that it bore a reddish-brown berry.

A view over this region from the top of one of these high mountains is truly sublime. The Cœur d'Aleine River, a placid deep stream, fringed with Poplar, *Salix* 636, 286 and 287, *Cratægus* and *Cornus*, divides the fertile valley, in its

* *A. uva ursi*, Spr. fills the surface of about one third of the woods of Upper and Lower Oregon. This is the famous tobacco ingredient, which the Indians use, mixing the same with one and a half of tobacco, which they get from the fur traders. For this purpose they select such as has grown.

serpentine course, into many indentations, which contain on each side a series of lakes, reflecting the towering Green mountains, whose bases they often reach, and harbour immense numbers of water-fowl, especially geese and ducks. In one place one observes the Indian, in his light frail canoe of *Thuja* bark, paddling noiselessly along to surprise the fowl behind the rushes; in another he is fishing with nets made of the twisted branches of the *Cornus;* or is busy in building canoes; gathering rushes for mats, &c. On the teeming meadows, graze or gambol herds of horses; children bathe in the river, or carry wood or roots to their humble homes, the smoke of which is seen circling over the tops of the gigantic pines. In short, it is as complete a picture of pristine nature as can be beheld under a northern sky.

These lakes are either permanent, filled with *Nuphar advena, Menyanthes, Typha* and rushes; or, they dry up to swamps in the summer months; in the latter case they bear *Phragmites communis* and *Alismaceæ*, their stony shores bordered and ornamented with *Clintonia, Calliopsis Atkinsoniana*, species of *Allium, Nasturtium, Claytonia, Cardamine, Lythrum*, &c. Deeper inside are large tufts of *Carices*, groups of *Typhæ*, so useful for the Indians who use the blades for making mats; with it also grows *Calamus, the* roots of which the Indians use but little. But on the borders of willow-shrubbery grows the *Scirpus maritimus?* for whose tubers the Indians dig every autumn as if for potatoes, which they also cultivate.* The former have somewhat of a pear-

* The Skitsoe Indians, about ten or fifteen years ago, got possession of some potatoes from some of the fur traders, which they since have cultivated in their own way, and brought to a remarkable degree of perfection. This may perhaps serve to show how much depends, in the potatoe as in every sort of vegetable, on the selection of seeds or sets. During my stay with the Skitsoes, in November 1843, the chief used to walk about every morning, two or three hours before daybreak, in the woods, where the Indians had built their lodges, singing out in a loud voice the orders for the day; amongst others he repeated every morning: "Eat the small potatoes, save the big ones for planting!" This his people did for a long period. The size of their potatoes (English white) was not so

shape, their size is that of a hen's egg. I found the taste to be very pleasant, but not so as to rival the latter.

The rest of the valley meadows are either low and moist, losing the spring waters rather late, or elevated as high as the banks of the river. The former change their verdure three times during the warm seasons. When the water has all gone away, the *Carices* die down, and divers species of *Aira* appear in their place. Towards September these have done and *Trichodium scabrum* with *Panicum capillare* give to these tracts a coppery and whitish mottled color, out of which rise the golden flowers of *Coreopsis Atkinsoniana*, *Helianthus Hookeri*. *Asterea* 473 and *Helenium* 589. The dry elevated parts of the meadows belong exclusively to *Gamassia*; one bulb close to the other for miles and miles. Three other showy kinds of plants only did I recognize: *Veratrum viride*, *Ranunculus* 308 and *Castilleja* 294. The latter seems to belong to that valley only.

We now traverse the river and visit one of the great Gamass-prairies on one of the great plateaux of Upper Oregon of about 3000 feet elevation, situate between the upper Columbia and Kooskooskee rivers, famous for variety of scenery and floral beauty. After crossing the river and a lake encompassed by mountains to the north, we ascend the latter and travel the same course.* Having ascended the

extraordinary, but in quality they surpassed what I before and afterwards tasted in potatoes. In planting they laid the potatoes whole, in rows a little elevated, filling them afterwards up with soil about a foot deep.

* Here I beg the indulgence of the reader, to give an account of winter travelling in this region; for it would leave the botanist in too enviable a light to pass over this, and describe summer excursions only, which are certainly delightful.

"It was on the same road that I sat out from the Skitsoe village in the beginning of December 1843, to go to Fort Colville on the Columbia River, a distance of about 180 or 200 miles on the winter road. Not finding an opportunity to go in company, and finding also the prices the Indians demanded to guide me too high for my limited means, I, at last, came to the resolution to go alone, though utterly ignorant of the route and the country generally. Having exchanged a fine fat horse I commenced my journey under the auspices of a snowstorm, which increased, the higher

plateau, the path led us again into a grassy pine-opening, cor-

I ascended the wooded plateau. The third day in the morning, every vestige of a path had disappeared, the storm continued, and the depth of the snow made it impossible for me to proceed further onward, the more so as I had lost the path entirely, being in the midst of a lightly wooded plateau. To return was now the only alternative left for me, but to find my way back another difficulty. I now dismounted again and struck a camp, hoping that by waiting a day or so the snow storm might abate, that I might be enabled to see a little at a distance. I built myself a shelter of spruce branches, lit a fire, gathered wood for the long night, and finally worked two to three hours very hard to free a space of ground from snow to make grazing easier for my horse, who, moreover did not like this stormy climate and seemed impatient to return to the valley, which compelled me to 'hobble' him; that is, to tie his fore feet together with a leather strap. Two of the dullest days of my life did I spend in this wretched camp, on a bed of spruce branches, watching the fire and my horse, but the storm continued with unabating fury, the snow now averaging three feet in depth. On the morning of the third day, I resolved to return at any risk, striking an easterly direction by my compass. I took my horse by the reins, and with the hatchet in my right, I commenced marking the trees as I passed onward through the deep snow, avoiding defiles, till late in the afternoon, when I found myself at the verge of a sudden slope towards a narrow valley below, in which I recognized black spots indicating a rivulet; descending with some difficulty, I was much pleased to find a path a little above the valley, which I followed, and brought me to the crossing place of Cœur-d'Aleine River in the afternoon of next day. The snowing now changed to rain in the valley, which at last fell heavily, so I hastened to get myself across the river. No canoe being on this side, I had no alternative but to swim for one; to do that I had to break the thin ice with my hatchet on my way, which had filled the open space since my late passage. Cold soon drove me back to the banks to light a fire, which I did by discharging one of my pistols into a heap of fine dry Cedar or Thuja bass, which an Indian had hidden under a piece of an old canoe. At last, after several swimmings and landings, I made the whole distance and brought over a fine canoe; one of those frail things mentioned above, made of Cedar or Thuja bark and basket willows. First, I brought over my saddle and saddle-bags, returning again I took my horse on the line, and warming myself through, stepped in the canoe to swim my horse across, when he suddenly turned back frightened, upset me with my frail canoe. Now I had to swim once more, but this time with my clothes on; however, I soon managed to push myself on the other shore with the canoe, which

responding with the former, but more wet and traversed by

got broke against the ice by this operation. I now had to take my saddle and saddle-bags on my back, and travel five to six miles in rain and storm along the banks of the river, while my horse was trotting and neighing triumphantly on the other side, with head and tail upright. Patiently I marched on through meadows and morass, and arrived just at about dark, at the village. Rushing to the fire in one of the Indian lodges, I was laughed at heartily, for every one could easily guess what had befallen me. At last, an Indian woman having amused herself a long time, by my vain efforts, to free myself of my buckskin shirt, gave me a helping hand. The sensation of wet buckskin on the skin, can only be compared with that of taking a frog in the hand."

The foregoing account I could have omitted, was it not connected with the one following. To give it so that the reader may get at least some idea, I have thought proper to give every detail of the winter-excursion. Perhaps he may get impatient, on account of the length; but I am sure he will not envy me.

"One would think that this would have been sufficient to make me stay where I was, and at my return I thought so myself; but, after three days had elapsed I heard that some Indians were going to drive a number of horses to a certain good pasture, the road they had to go was partly the same as to Fort Colville. I concluded to join them, as they promised to bring me on the right track. Not in the least did I dream that this adventure would outdo the former; but, prepared for a journey of four days, crossed the river where I found the Indian who had caught my horse, where I saddled him, to join my party. They, however, had lost some horses in the woods, for which they were searching; towards evening they came, but as it was too late now, we had to camp at the crossing for the night; hobbling our horses we lit a fire, and resolved to start as early as possible next day. A stormy night set in again, accompanied by pelting rain, which lasted for three days. On the third day towards noon, our roads parted. I got my information from the Indians how to travel on, but I found that these Indians have not that aptness to describe a route, so as to understand it at once, which I so often admired with the Indians of the Plains. I understood what he marked on the ground; to follow it strictly, I copied it on a piece of paper. Accordingly, I had to take the second trail on the right, after following the path I was in for a short distance. This I did. Soon I found that I was ascending again a wooded plateau; this made me distrustful of my road, so I instantly returned, examining the way again; finding however that I was perfectly right, I resolved to travel on as fast as possible. The fifth day I was again on a crested high plateau, snowy stormy weather again set in, but this time

numerous rivulets. Large tracts of ground are covered with the

accompanied by a piercing wind; however, I kept my road steadily, it was one that led to a distant Gamass prairie or root-ground of the Indians, frequented therefore by numbers of pack-horses, who had, in passing with their loads, snatched the bark from the pine trunks, which marks helped me to find the path again when I lost the track. Soon I became uneasy again as to the right way, knowing that my course lay northward, I found by my compass that I had pursued a south-easterly direction for the last three days; so that instead of wide plains and rivers, I had met only small valley prairies with rivulets. I now returned again, convinced that I must be wrong. This was the eighth day since I started from the village, with provisions for four days only; consisting of dry buffaloe meat and Gamass bulbs; these I had to manage now well, so that a third part of a breakfast was now my ration for the whole day. I had no rifle with me to kill game, nor did I meet any, except a moose-deer, which by its lazy amble kept my tired horse soon out of shooting distance, both with rifle and pistol. The snowing had now ceased; but the ground was covered two feet deep, and the labour I had every evening to free a piece of grassy ground for my horse, was very tiresome. In the evening, when I struck camp, I had first to gather wood for a fire for the long night, which lasted from four o'clock in the afternoon to eight in the morning. Above three hours passed in labour, the other long part I passed in sleeping, smoking, stirring the fire, looking for my horse and so on. When hunger pinched me, I smoked tobacco; to allay thirst, I kept several snow balls near the fire in front of my bed, the latter consisted of spruce branches, which I licked when they were thawing. Here I cannot omit to say at least something in favour of smoking tobacco; and in no other way, I think, can smoking be excused as any thing like being useful or necessary. The most pinching hunger and that peculiar faint feverish sensation accompanying it, is at once removed, as well as the sharp appetite, by smoking tobacco. The luxury of a pipe of tobacco, in such cases, cannot be conceived by any smoker, if he has not experienced it. The excitement is naturally soon over, and increases the more the stomach is tortured by fasting. A frequent repetition is therefore necessary. True, that a certain debility of the stomach must be the consequence; but this cannot outweigh an expediency so great, when life is in the other scale. But little progress did I make in my return, owing to the snow and the feebleness of mine as well as of my horse. On the third day towards camping time, I noticed by the marks on the pine trunks, that a path forked off to the right. Striking my camp at the place, I walked a distance and convinced myself that it bore a north-westerly course. Next morning I followed it, and found, to my great

two low species of *Vaccinium* and the *Arbutus uva ursi.* In

satisfaction, that I descended considerably. Already at noon, the snow began to disappear, my path became plainer, and at last brought me to a narrow rocky defile, when after another descent I observed a wide plain stretched before me, with but little snow and plenty of fine grass. The afternoon was beautiful, and my horse trotted on briskly along a woody seam of basaltic rocks. About sunset, I observed four horses grazing in the plains, which made me believe that I must be near an Indian village. Believing that some of the people might come and see after these horses, which they commonly do every two days, I resolved to camp on the spot; and to be easily recognized I put fire to a dry pine, covered with resin which burnt the whole night like a torch. A bright beautiful night ensued, which I enjoyed, feeling some hope of being now near the end of my trying excursion. The sun rose beautifully above the snow towering mountains next morning, when my horse came to my camp-fire voluntarily, having had an excellent grazing night. The four other horses also were only a short distance off. Mounting and proceeding onward I met several paths forking off from the main, and while I checked my horse, not knowing which one to take, my eyes caught at the distance an object which turned out after a minute or two, to be an Indian on a white horse, galloping over the plains towards the smoke column of my burning pine tree. At once I put the heels to my horse and dashed up to him. A short parley in words and signs ensued, of where we came from and where we were about to go to. I understood from him that I was on the direction both to Fort Colville and the Spokan Mission station. He was an old, coarse and wild-looking fellow, but agreed, and was willing at once to bring me to the crossing place of Spokan River, for which he asked seven balls and powder, a high price in that country for a two hours' ride. The passage through the river was rather difficult, the crossing place being immediately below a high water-fall. After I had paid off my guide, and smoked a pipe with him, he turned very civil, and accompanied me a short distance further, showing me the road afterwards to the nearest Indian village. For this additional trouble, he again asked to be paid by some flints and a piece of tobacco, which I did. He returned to fetch his horses. Trotting along a series of trap rocks, covered with scanty pines and tracts of sandy woods for three or four hours, I found myself at once on the brink of a precipice, overlooking a small river in a narrow valley below, and discerned an Indian village on an elevated bank opposite. To my right, I recognized Spokan River in a rather broad valley. Both rivers joined a short distance below, and enclose a point of land of classic reputation in Oregon; namely, the place where the trading-company led by the great pioneer Wilson P. Hunt, of St. Louis, built their first trading post, which was the first that was surprised by the British North West

such woods, but on sunny spots grows the rare and robust *Swertia* 335, with many litmus-coloured flowers, the panicle

Traders. Nothing remains now but a little elevation of the place where the chimney stood.

"Seeing so many paths I made directly for the village, which looked pretty neat; the lodges were constructed of thick poles, covered with new rush mats in the shape of our house-roofs. A great number of men, women, and children surrounded me as soon as I had dismounted in the village, but contrary to what I was used to, the tone in which I was spoken to, by two or three saucy-looking young men, especially by a half-blooded ferocious youngster, did not please me at all. When I asked for the road to Colville, he said he did not know, demanding in the same harsh voice sundry things, especially tobacco with every possible ill grace. At my refusal he changed his language to a still more offending manner which brought me a little in harness; the more so as the rest not possessing the same boldness, joined in a kind of sneer peculiar to the Indian only. I leaned on the neck of my horse, holding the reins in my hand, keeping myself quiet, when the former insolent fellow under took to examine my saddle-bags, not daring, however, to take them down; while the others felt the mane of my horse, whose fat condition seemed to excite their appetite for horse-flesh, which these Indians are very fond of. This was too much for me; I lifted up the bear-skin that covered my pistol-holsters, took out the pistols, and placed them in my belt. This manœuvre succeeded, and brought them at once to better grace. They imagined me to be, in their own saying, 'a poor fellow without a gun.' The insolent half-breed lost more of his tact than the others; he stepped back amazed, crying out 'Stem!' (what!) pleading some ignorance to hide his fear. For this, I took out a pistol, levelling it at him with a doubtful laughing mien, imitating suddenly the sound of the report of a gun with my full voice. At this he shrunk visibly; he was now laughed at by some boys. Without looking at any one I swung myself into the saddle to be off. Three or four came forth now to show me the road, for which I gave them a little tobacco.

"I was glad to find myself alone again. The afternoon was beautiful, and I enjoyed the picturesque scenery along Spokan River, the path leading right above along the high banks of the same. At sunset I struck camp under a gigantic(a) *Abies balsamea* near the river. I made a shelter of a blanket, and stretched on my bear skin, I mused over the changes of the day, and

(a) In this tree were sundry marks hewn and cut. Amongst others, I found the initials (D. Dgls.), which I take to be those of the late Mr. David Douglas, who made a summer excursion to this place.

developing only after the flowering is over, when the plant attains a height of two to three feet.

Open moist meadows, adjoining to these woods, are traversed by small rivulets, which in their course pass through thickets of *Willow*, *Cornus* and *Symphoricarpus*, filled up with the tall fronds of *Pteris aquilina*. In the woods, these rivulets are bordered by *Abies*, *Populus*, *Acer* and *Alnus*; here grow abundantly *Ribes*, 313, with *Pedicularis*, 422, the latter is seen also in the meadows, but is quite a rare plant. *Carices*, *Aira* and *Gamassia* form the capet of these wet spongy meadows; of conspicuous plants are *Veratrum viride*, *Valeriana*, 237* and 308, besides *Thermopsis*, 365 near

over past times, for it was Christmas Eve. While I was so sitting and smoking a pipe, another Indian came up on a white horse; riding up to my fire he bent himself over his horse's neck, looking at my saddle, at myself, and the fire, for several minutes—this with an air of nonchalance which all North American Indians possess—at last I motioned him to dismount, which he did. He was a half naked youngster with a dejected countenance, who soon let me know his ill-luck, that he had lost every thing, gambling with the Sayelpies at Fort Colville. He also told me, that to go to the Mission establishment I had to cross a high snowy mountain. He stirred the fire, and fetched more wood for the night, watered the horses, so that I offered him a smoke, which he greedily accepted. After it I got out the small remains of the provisions, which I shared with him. Again we had a smoke, during which I made him the proposition, to guide me to the Mission next morning, which he promised. The pay was a saddle-blanket. Early in the morning of Christmas day, I followed the Indian over the mountain, the top of which was wrapped in a snow storm; towards noon we began to descend, and soon arrived in the valley Tshimakain. Soon I shook hands with Messrs. Eells and Walker, and accepted the permission joyfully to make myself at home in their residence.

"In my 'Preliminary Remarks' to these notes, I have already spoken of these kind gentlemen, and I state here, that I shall remember their kindness throughout the whole of my life. The sudden exchanges from hunger and cold in the wilderness, for the comforts of civilized life were not without a reaction on my health; but in three days the revolution was over, and I could enjoy the luxury again of sleeping under a roof, of which I had not had an opportunity for eight long months in succession."

* This is the "Racine amare" of the Canadian voyageurs. A robust, glaucous, and somewhat succulent plant, with cruciate entire and pinna-

the borders of the woods, and the delicate rare *Ferula*, 302, with *Arabis ?* 305, on or between the tufts of the *Carices*. With the intention to return once more in July, we close this description of the *Green mountain*, or *Grassy region* of Upper Oregon. Passing down a northerly defile, through a shrubbery of *Prunus, Sorbus, Cornus, Myginda, Lonicera*, 304, and others, we arrive at last below, to overlook the

II.—Sub-region; Level Region of Upper Oregon: having before us,

1*stly*. *The fertile grassy and Gamass prairies*, of about 3000 feet general elevation.

2*ndly*. *The arid basaltic plains*, mostly to our right, of about 2000, and

3*rdly*. *The high, cold, grassy Ferula prairies*, of about 4000, to our extreme left.

All these plains incline eastward on the Green Mountains; the first and last on the Blue Mountains, westward; the second bordering both the latter, and preceding, by following and including the Columbia River, down to the Cascade Mountains.

1*st*. *Fertile grassy, or Gamass plains*, of about 3000 feet general elevation;

They are traversed by rivulets of secondary size in every direction, running swiftly along on a bottom of gneiss rock; overflowing, during the spring, the vast rich prairies, and leaving behind pools and ponds, drying up about July. They are further characterized by naked barren hills, ridges, or even mountains, to more than 1000 feet elevation above the

tifid leaves. The root is somewhat parsnip-shaped, thick and firm, brown and with a bright orange under epidermis. Raw, it has a somewhat pungent and spicy taste; but properly prepared, I am told by Sir Wm. Stewart, of Murthly Castle, Scotland, it is a very agreeable and wholesome dish. Sir Wm. Stewart cultivates this plant already for many years, and with great success, in his kitchen garden, where I saw it in the greatest perfection. The Indians dig it throughout the year, and boil it in the same manner as Gamass; by that process the root assumes a texture like that of boiled beet, a brown colour, and an odour with somewhat of the taste of chewing tobacco. Hence the Canadian name, "Tobacco root." The flowering panicle is a glomerulus, but the seed bearing elongated and 2-3 feet long.

plains, composed of soil, rarely topped, or walled, with granite or gneiss; void of vegetation, save the scanty grasses scattered over them, their chief vegetation being some inconspicuous *Boragineæ*. These mountains serve as landmarks to the traveller; one of them, more than 1000 feet high, was pointed out to me, as having a spring on its top. Stripes, or tongues of pine forest, on sandy elevated lands, give to these wide flat Gamass prairies a pleasing interruption; some of the most colossal trees of *Pinus ponderosa* are also found in these limited forests. This completes the general outlines of these plains; we will now say something about the Gamass itself.*

A deep blue covers these extensive plains when the

* *Gamassia esculenta*, Dougl.? *Narthecium Squamash*, Pursh., *Phalangium Squamash*, Nutt., is an *Asphodelea* much resembling a common blue Hyacinth, the bulb likewise of about the same size, in texture and shape more like that of *Narcissus Tazetta*. The Gamass of Oregon seems to differ from the same in Missouri and Illinois; the former being more robust, has a bulb twice as large, shorter, stiffer leaves, and longer racemes with larger and more oblique flowers, of a light or deep indigo blue, rarely pure white. The pale blue faded colour of the Gamass on the east side of the Rocky Mountain I did not meet in Oregon.

The digging of the Gamass bulb is a feast for old and young amongst the Indians; a sort of picnic which is spoken of throughout the whole year. The different neighbouring tribes meet on the same plain and mostly at the same time, at the same spot where their forefathers met. Here the old men talk over their long tales of olden times, the young relate hunting adventures of the last winter, and pass most of their time in play and gaming; while on the women alone, young and old, rests the whole labour of gathering that indispensable food. They, especially the young women, vie with each other in collecting the greatest possible quantity and best quality of Gamass, because their fame for future good wives will depend much on the activity and industry they show here; the young men will not overlook these merits, and many a marriage is closed after the Gamass are brought home. I saw a young woman at the Skitsoe village, who had collected and prepared sixty sacks of good Gamass, each sack containing 1½ bushel; she was spoken of in the best terms throughout the village.

As soon as the Indians have returned from gathering the "Biscuit root," of which we shall speak afterwards, they begin to prepare for the Gamass grounds. The whole village is active in collecting the horses,

Gamassia is in full bloom, agreeably variegated with sundry

getting sacks ready, which are mostly of *Thuja* bass, or *Helonias* roots; and at last family after family leave the village, chatting merrily, and group after group arrive at the plains, where there all is bustle and activity. After dismounting, they strike their camp in the groups of tall pines; the boys take care of the horses, while the older people pay their visits from lodge to lodge. Hunters return with game, or some young men bring the first salmon from the distant river, to have something to feast the visitors. All is merriment and joy, when the numerous large pine-wood fires illuminate the wide classic plain in the evening. The digging of the Gamass takes place as soon as the lower half of the flowers on the raceme begin to fade, or better, when the time of flowering is entirely passed. For that purpose, the Indian women use a stick two feet long, curved like a sabre, of hawthorn wood, which is provided with a cross piece of elk-horn on the top, serving as a handle. This instrument they use with astonishing dexterity, so that they very seldom strike the point twice after the same bulb. Four or five sacks of raw bulbs is a common day's labour, which dwindle to about two after baking and drying. With the first dawn of day the industrious women and mothers start from the camp, which is frequently a little distant from the Gamass plains, on account of wood and water. They are generally accompanied by a little girl or boy to take care of the horses, and they return every evening loaded to the lodge. As soon as they have gathered a sufficient quantity of bulbs, they prepare for baking. For that purpose, they dig or scrape a hole in the ground of three or four feet in depth, make a fire and throw in a good layer of red hot stones, then a layer of clean grass over those, and now a layer of Gamass, the latter having before been cleaned from the adhering soil. This is repeated until the hole is level with the ground above. The fire is now moved on the top of the pit, and kept burning for about twenty-four hours or longer.

The raw Gamass bulb resembles in its substance, the common Squill. By baking, it acquires a sweet taste, and when boiled the taste is not unlike the syrup of Squills, but not so sweet. Those accustomed to that food, like the Indians, remain strong and fleshy; but a European falls off very soon if he has nothing else. Eating a great quantity produces flatulence, as has been observed by travellers before.

As soon as the first Gamass are baked, the Indians, young and old, pass from lodge to lodge to eat Gamass: every where is plenty and content. The stranger is offered Gamass as soon as he steps into the camp. But this is only part of the feast: the whole is perfect when the salmon begin to be plenty in the rivers, when the gathering of Gamass comes to an end. Nothing can make the Indian recollect that he, with his family, hungered and nearly starved for two months. His natural carelessness and improvidence return with the abundant seasons, he

species of *Ranunculus*, especially R. 306. Of the many species of plants that here and there exist among the dense Gamass, but few come to perfection; generally one sees the panicles of *Trichodium* and *Aira* above the dry stalks, mixed with a few *Compositæ*, as *Aster*, *Solidago*, *Calliopsis*, &c. On the margin of ponds I found *Myosurus minimus*, *Isoëtes lacustris*, with *Alopecurus geniculatus*. The Gamass plains become more and more limited on approaching the Koos-Kooskee, or the Columbia River, where the rivulets become larger, the elevation less. Then again they take the shape of the small fertile meadows, included in such forests as we just left on the Green Mountain plateau. These meadows harbour abundantly divers species of *Trifolium*, but none of the involucrate species, which only grow on stony soil. Here I gathered *Trifolium*, 379 and 450; the former I did not meet again; further, the elegant *Polygonum*, 405, with *Iris Missuriensis*. The low gneiss ridges, clad with pines on top, are the habitat of *Erysimum*, 399, *Saxifragæ*, 619 and 625, and divers *Ferulæ*, 301, 298, with *Phlox*, 371, and *Phacelia*, 463. Sunny protected situations are inhabited by the pretty *Pentstemon*, 515; and *Poterium*, 467; joined below by *Clematis*,* 313; surrounded by *Phlox*, 375;

speculates away for trifles, or squanders, in gambling, night and day, the greater part of Gamass and other provisions, and imparts profusely of what he has, to those even who are too lazy to lay in provisions for winter. For this they have to suffer severely, particularly in the months of February and March; when they are compelled to fell trees, to gather the long moss from the pines, which they bake in the same manner as above, mixed with a few Gamass if they have any left. This composition is of a greenish-brown colour, like Confervæ, has a wild acrid taste, like tan, so that one would think it would reduce a living man to a mummy. But the stoical Indian eats this now with the greatest complacency; remains strong and vigorous, and it is possible that the absence of tannin in our victuals, renders our stomachs so feeble; and on the contrary those of the Indians so indestructible by not removing those acrid particles.

* The Saptona Indians use the root of this plant as a stimulant, when horses fall down during their excessive races. They hold a scraped end of the root into the nostrils of the fallen horse. The effect of this is

Espeletia helianthoides, Potentillæ, Geum, 296; and again, *Gamassia, Veratrum, Polygonum,* &c. On dry shady hill sides I found the two *Carices,* 332 and 333; the former quite remarkable for its very large tufts, woody root, and long perennial hard leaves. Here, also, on some dry sunny gneiss rock, did I meet again with the *Draba Caroliniana!* which I have found before on the saline loamy plains of Upper Platte River; as ought to have been noticed in the description of that region.

This closes the description of the interesting Gamass plains, poor as they are in select plants, for the purposes of a botanist. We now change our course eastward; traverse a spur of the Kallispell; a part of the Green Mountains, to arrive in the:

2nd. or Arid basaltic plains of Upper Oregon, including great part of the territories of the Spokan, Sayelpi, Okanagan, Kallispell, Saptona, and Wallawalla Indians, as well as the rivers of the same names; besides great part of the Columbia, and other rivers. General elevation, about 2000 feet.

These plains comprise so great a part of Upper Oregon, that it will be necessary to treat the same as one vast region. Moreover, as they are of the greatest interest to the botanist, and possess a flora of the first order, we shall give the general character of the vegetation, after describing its surface, and consider the same under different subdivisions.

Surface and geological features.—This extensive region is generally characterised by an uneven, broken, stony, rocky, or sandy surface. Level, heavy, clayey, stony plains are surrounded and intersected by high precipitous piles of broken, or entire shapeless basaltic masses, alternating with sloping piles of gneiss, rarely granite. The basaltic masses are surrounded with deep sandy elevations, or separated by such ravines

instantaneous, it produces trembling; the animal springs up, and is led to the water to refresh its limbs. I have been told that it never failed, nor produced bad consequences. The scraped root leaves a burning sensation for half a day, if touched with the tongue.

from the level loamy plains. The sand, for the most part, covers solid basalt, which appears as if cast over immense tracts of land, but is for the most part naked. On the sand some scanty pines scarcely maintain life, except in ravines, and towards rivers, as well as in the immediate neighbourhood of the basalt masses. A basalt of a closer grain, but likewise shapeless, appears in series of low, rounded, conic heaps, as if baked, its surface scaling off in small conchoïdal fragments, like flints. These range parallel with the great masses, and generally protrude out of the sand. Towards the Columbia River these plains become more wooded as the elevation lessens, and their sides are sometimes again walled with the before-mentioned pseudo-columnar basalt; the more so as they approach to the côtes (several thousand feet high) of the Columbia River. The most western portion of this region is again saline sandy desert, borne on coarse gravel, and in part again on pseudo-columnar basalt.

General characters of the vegetation:—Scanty woods of *Pinus ponderosa* on the sandy rocky tracts, but large trees are found in depressions and plains of less height, and in narrow river-valleys! *Celtis*, *Rhus*, and *Corylus* first appear on the west side! —*Sambucus* and *Symphoricarpus* abundant in river-valleys!—*Ribes* and *Philadelphus* on rocky banks!—Brilliant colours characterize the flora of the herbaceous plants!—Chief habitat of *Clarkia pulchella*, *Lewisia rediviva* and *Collomia elegans*, characterizing the whole of this region!—Small-flowering *Onagreæ*, abundant in the genera *Epilobium*, *Clarkia*, *Eucharidium*, *Œnothera*, and *Gaura*!—*Umbelliferæ* abundant, chiefly in the genera *Ferula*, *Eryngium*, *Osmorrhiza*, and *Peucedanum*!—*Borragineæ* abundant in *Pulmonaria*, *Rochelia*, *Onosmodium*, *Cynoglossum*, *Hydrophyllum*, *Phacelia*!—*Polemoniaceæ* in *Polemonium*, *Collomia*, *Cantua*!—*Lewisieæ* in *Lewisia*! *Pediculares*, in *Orabanche*, *Orthocarpus*, *Castilleja*!—*Cichoraceæ* in *Hieracium*, *Lygodesmia*, *Troximon*, *Crepis*, *Sonchus*.—*Inuleæ*; *Pyrrocoma*, *Gnaphalium*, *Antennaria*, *Espeletia*, *Chrysopsis*, *Inula*? *Calycadenia*!—*Astereæ*; *Erigeron*, *Diplopappus*, *Chrysocoma*, *Aster*, *Solidago*!—*Helianthеæ*; *Hymenopappus*,

Helenium, Gallardia, Calliopsis, Blepharipappus, Bidens, Helianthus !—Anthemideæ; Cotula Artemisia, Achillæa !—Ambrosiaceæ; Xanthium, Iva, Ambrosia !—Berberideæ; Mahonia! —Rosaceæ; Poterium, Potentilla, Geum, Rubus, Rosa, Spiræa, Purshia, Cratægus !—Leguminosæ; Lupinus, Hosackia, Vicia, Psoralea, Homalobus, Glycirrhiza !—Amentaceæ; Populus, Salix, Corylus, Betula, Alnus !—Coniferæ; Pinus, Abies, Larix, Juniperus !—Saxifrageæ; Saxifraga, Heuchera ! — Rhamni; Rhamnus, Ceanothus ! — Polygoneæ; Eriogonum, Rumex, Polygonum !—Ranunculaceæ; Delphinium, Anemone, Clematis !—Single representatives of families ! Abundant is *Lewisia* of *Lewisieæ !—Mahonia* of *Berberideæ !—Philadelphus* of *Myrtaceæ—Comandra* of *Thymeleæ !—Clintonia* of *Campanulaceæ !—Fedia* of *Valerianeæ ! — Sambucus* of *Sambucineæ !—Hedyotis* of *Hedyotideæ* (rare)—*Arceuthobium* of *Loranthеæ !—Cleome* of *Capparideæ ! — Sida* of *Malvaceæ !— Turneraceæ; Bartonia !—Sedum* of *Crassulaceæ !—Rhus* of *Terebinthaceæ !*

No *Papaveraceæ ! Urticeæ ! Violaceæ ! Vitex ! Solaneæ ! Jasmineæ ! Amaranthеæ ! Eleagni ? ! Oxalideæ !*

Cactus ! Cnicus ! Euphorbia ! Fremontia ! Galium ! Gentiana ! Hypericum ! Plantago ! Ribes ! Symphoricarpus ! Marsilea, and *Allionia !* are all single representatives of families not very abundantly met with.

Of *Gramineæ,* and other endogenous plants: are abundant: Of *Festucaceæ; Festuca, Kœleria, (Bromus) ;!—Hordeaceæ; Hordeum, Triticum, Elymus !—Asphodeli; Gamassia, Allium, Brodiæa !—Liliaceæ; Calochortus, Frittillaria, Erythronium! —Irideæ; Sisyrinchium, Iris !* — Single representatives of their respective families are the genera *Alisma ? Panicum ! Agrostis !* and *Narthecium !—Cyperoideæ* very abundant, but only one species of *Cyperus !*

Vivid colours mark this region.—Blue and purple eastward; and scarlet with golden-yellow westward. A glaucous green reigns in the herbage over the plains; a deep saturated green in the valleys.

We now divide this whole arid basaltic region into subdivisions or regions, as follows:

I.—*Subdivision; level, loamy, stony and grassy plains,* encompassed by sandy and scanty pine woods and basalt masses. As soon as the ground-water has disappeared in the early spring, these plains are at once clothed with the beautiful wine-red flowers of the handsome *Sisyrinchium*, 311; and almost at the same time appear the different tuberous *Ferulæ* in the adjoining sandy woods; the yellow former species, as well as the famous "Biscuit Root,"* mentioned before. The *Pulmonaria*, *Hydrophyllum*, tuberous *Claytoniæ*, *Frittillariæ* and *Espeletia helianthoides* are here all together, to live and die away in less than four weeks. The grasses are, as before mentioned, *Triticum* and *Festuca*, thriving well in the clayey soil, with a half-paved surface. This is the favourite soil of the robust *Espeletia*, 395; which often invests such plains, and especially their depressions. The whole plant has a strong turpentine odour, and the Indians cannot eat the thick sub-

* By the first rays of the warm sun in March or April, this humble useful plant emerges from the sand. In about two or three weeks, the plant is in bloom. This is the time when the Indians, especially the Saptonas and Spokans, turn out to gather its delicate tubers; which are commonly of the size of a small walnut, somewhat bread-shaped, but then they are at least three to four years old, far inferior to the thin spindle-form two year old tender tubers. The substance is farinaceous, snowy-white, and in the young tubers not entirely insipid. Like many of the tuberous plants in Oregon, this also has a very short time for vegetating above ground, for in three weeks after flowering, the wind sweeps already the dry stalks over the plains. These tuberous *Ferulæ* are to the Indians here the same as the *Cymopteri* on the Platte are to the Pawnees in Missouri territory. Another and more remarkable species of *Ferula*, is the "Pooh-Pooh root" of the Spokans, which I never met growing myself; and only know from what I could see from a few dried leaves, I found that it must be more than twice the size of the former, and according to all descriptions a rare plant. The tubers are of the size of a small potatoe, but somewhat bread-shaped, and contain, as the former, a white farinaceous substance, which has a rather strong, but pleasant aromatic odour and taste, resembling citron, which they keep for more than a year. The Indians gather them in but small quantities and file them on strings. It would be well for future botanists to get tubers and seeds for planting, as it would be a great acquisition for our kitchen-gardens.

fusiform root of this, as of the other species of *Espeletia*. Not much of interest can be seen in these plains after the *Sisyrinchium* has done flowering; a few plants of *Gymnandra*, 230; *Geum*, 296; with *Potentilla effusa*, and the *Pyrrocoma*, about June, are the lone, yet interesting plants, and we leave therefore these extensive plains to visit the

II.—*Sub-division*: *the adjoining sandy plains and woods!*

Extensive level sandy pine woods; resting on basalt, fronting with their sides the river-valleys, and a lower terrace of level sandy pine forest or gravelly sandy extensive plains. Here reigns the greatest diversity in the vegetation, which is by far the most interesting of Upper Oregon. All the early spring flowers of the other plains, with few exceptions, are here met with and many that I found nowhere else. Early in April blooms here a beautiful *Erythronium*, probably E. *grandiflorum*, of a deep golden yellow, which I did not meet on the left bank of Spokan river, but in its stead found the *Erythronium* 601. Soon after follow numbers of small spring flowers, all of them mentioned before, except *Vesicaria didymocarpa*, growing on dead sandy slopes, which I did not see again, since I passed the Sweet-water rocks on Missouri territory. A very rare plant is the *Hedyotis* 460, which I picked on the rocks at the Kettle-falls, near fort Colville, and of which I found only one specimen; in the same locality grow *Arabis aurea*, *Delphinium* 600, *Mahonia* and others. On the Gneiss rock slopes, grows *Rhus glabra* with shrubs of hazel and hawthorn, and under the pines above grow myriads of *Ferulæ*, tuberous *Claytonia*, *Espeletia*: further *Comandra* 634, *Stellaria* 324; *Stellaria*? 629; *Sisymbrium canescens*, *Veronica peregrina*, and a number of small alpine plants. Open tracts of these woods and the gravelly plains without, are the chief habitat of the remarkable "Bitter-root plant,"*

* Description of the "Bitter root" plant, or Racine amare, *Lewisia rediviva*, Pursh, (*Spatlum*, *Aboriginorum*).

Planta perrennis vernalis colorata subsucculenta. *Radix*, tuber farinaceum amarum, cuticula exteriori nigro-fusca, interiori rubro-auriantiaca. *Tuber* plantæ annuæ verticale, fusiforme; plantæ maturæ partitum,

the " Racine amare" of the Canadian voyageur. As it is, to my knowledge, not as yet accurately described, I shall sub-

ramis caudatis divergentibus fibrosis. *Rhizoma* incrassatum squamatum partitum, partibus congestis. *Scapi* numerosi erecti pollicares nudi teretes, basi foliorum cyclo circumdati, superne nodo unico ochreato; ochrea elongata appressa 5-fida membranacea, laciniis tenuissimis. *Pedunculus* solitarius uniflorus, in ochream scapi impositus; teres, superne incrassatus. *Calyx* pedunculo concretus, persistens, squamis imbricatis, 7, interioribus majoribus, appressis, amplis, planis; ovalibus obovatisve, rotundatis vel emarginatis, nervosis, membranaceis, viridi-purpureis, post anthesin scariosis. *Corolla* conspicua, roseo-alba vel purpureo-kermesina. *Petala* in cyclo continuo squamarum receptaculo affixa, solubilia, circ. 17, obovato-lanceolata acutiuscula, interdum obsolete emarginata; interiora majora, post anthesin in operculum calyptræforme contorta, fructus obtegentia. *Stamina* in fasciculos 7-14, unguibus petalorum adnexa, corollam subæquantia. *Filamenta* tenuia incurvata albo-rosea. *Antheræ* biloculares, erectæ, lineares, utrinque truncatæ, flavo-roseæ. *Ovarium* solitarium ovatum, uniloculare; stylus unicus. *Stigmata* sub 7 filiformia; ovula plurima funiculis longis filiformibus in conum congestis suffulta, stamina subæquantia rubra. *Fructus* carpellum convexo-conicum, operculo calyptræformi petalorum contortorum obtectus. *Semina* lenticularia, nigra, nitida, albuminosa.

Observ.—Root flexible; caudex capitate; scapes and peduncles succulent; leaves green, dying soon off; segments of the ochrea long and lax; peduncle dilated to a receptacle; nerves of the calyx, sepals radiating; petals remaining tender, membranaceous till they twist themselves spirally together, as in *Malva*; stamens remain with the petals; seeds resemble those of a large *Claytonia*, situated on long fascicles; receptacle flat with a fringed circle of a spongy mass from which the fascicles arise; colour of the flower that of *Cereus flagelliformis*, lighter or darker; colour of the scapes and peduncles, with the calyx sepals bright brick-red or paler.

The Indians, especially the Flathead tribes, value this root highly, and it is with them prepared with the marrow of the bison, the most dainty dish. It has also acquired fame among Europeans, and travellers generally use it in those regions as a very wholesome food, and it is prized in spite of its strong bitter taste, which resembles the bitter of the China-bark. The root is dug during flower-time, when the cuticle is easily removed; by that it acquires a white colour, is brittle, and by transportation broken to small pieces. Before boiling, it is steeped in water, which makes it swell, and after boiling it becomes five to six times larger in size; resembling a jelly like substance. As it is so small a root, it

join my description taken on the spot where it grows. So abundant is that plant, that those localities during the flower-

requires much labour to gather a sack, which commands generally the price of a good horse. Indians from the lower regions trade in this root by handfuls, paying a high price.

This plant was first collected by the great pioneer, Captain Meriwether Lewis, whose attention was probably directed to it by the Indians, who brought some of such roots to him. The collection of plants formed by Captain Lewis, came under the examination of Pursh, who named this plant in honour of the collector with the fitting cognomen "*redivivus*; because that specimen revived and grew again at Kew Gardens, after having been about three years out of the ground, between paper. I also myself, brought a great number of tubers with me, which doubtless would all have grown, had it not been for the excessive heat they had to sustain, by passing twice through the aequatorial regions on my way home. The heat caused them to throw up leaves, which weakened the tubers too much. However, two plants were growing well at Kew Gardens, but did not show any flowers as yet when I last saw them.

Six weeks at most, is the period during which the *Lewisia* vegetates above ground, for the whole year. At first the fascicles of leaves show themselves, soon after the scapes; as soon as the first flower begins to open, the leaves die away. The flower is only open during sunshine, and when fructification has taken place, droops down, or lays down on the ground. When the seeds are ripe, the peduncle and calyx become dry, the former separates from the joint of the scape, the calyx sepals spread wide open, serving as wings, and now the wind whirls it about, to plant the seeds, which as yet were covered by the cap formed out of the dried contorted petals, and which are held by means of the claws being forced against the inclining inner sepals.

The *Lewisia* occurs sparingly on the plains of the Upper Platte; quite abundant however on the Upper Clarke or Flathead River, which is, on that account, denominated "Rivière aux Racines Amares," by the Canadians. Far more abundant is the same on the above plains; generally pale in colour on rocky ground; but a very elegant plant in the sandy woods.

A chemical analysis of this root will shortly be given by my friend Mr. Crusius, here at Dresden, which will complete the history of this interesting plant, standing alone, to my knowledge at least, as a family in the natural order as well as genus and species.

(The above excellent description made from the living plants, will serve to correct some errors in our account from dried specimens published in the Botanical Miscellany, v. 1, p. 344 t. 70; and in the Botany of Beechey's Voyage, p. 344, t. 86.—Ed.)

ing time are clothed with a crimson or purple carpet. About this time begin the immense masses of small flowering *Onagrarieæ* to grow up, such as *Epilobium* 380, 229 and 231 in moist places; *Oenothera*, 546 and 547, *Epilobium* 545, with *Eucharidium*? 658. About this time begins the flowering of the *Clarkia pulchella*, clothing the whole region, far and wide in its purple. It is far prettier on its native ground, the largest plants forming a panicle from the base, covered with flowers, but the mass of them are one or few-flowering plants not more than 2 or 3 inches high. Wherever there is a nut-shell-full of soil on a rock, there blooms a little *Clarkia*; the next characteristic plant of this region is the *Collomia elegans*, following soon after the *Clarkia* has begun, and now are seen flowers and beautiful colours in every direction, as: *Pentstemon* 515; *Silene*? 519, *Ceanothus* 526, *Gnaphalium* 536 and 542, *Phaca* 562, *Aster* (*Eurybia*)? 586, *Hieracium* 598, *Calochortus* 618, *Pentstemon* 641, *Gnaphalium* 643, *Phlox*? 480, *Erigeron* 478, *Townsendia* 479, *Homalobus* 475, *Pentstemon* 477, (very rare), *Cynanchum* 449, *Aster*? 447, *Lygodesma* 440, *Ipomopsis* 434, *Chrysopsis villosa*, *Silene* 385, *Crepis* 336, and several others; here also grow the *Gramineæ*, *Kœlera*? 537, *Hordeum* 542, with *Triticum* and *Festuca*, 356. Another sort of flora is found in the gravelly and sandy plains, though occasionally are found some plants from the woods in them, as the *Lewisia* and several *Onagrarieæ*. Generally they exhibit fine groups of *Eriogonum*, of which each small district seems to have another species, as I have observed from the Platte hills to the Columbia. The most conspicuous of the genus is perhaps *Eriogonum* 425; as other species do, this also forms a brushy mat on the coarse gravel or basalt-rock, sometimes three or more feet in diameter, showing its cordate-hastate woolly leaves during the winter. In the time of flowering one observes that each plant or mat bears flowers of a different tint, from cream-white to a deep gamboge yellow, in large regular cymes, which are often 8 to 9 inches in diameter, and with the scape near a foot high. Those on naked basalt in the next sub-

region, produce all deep yellow flowers. This plant has a very pertinacious parasite, the *Orobanche* 369, growing copiously on its roots. It is further very abundant on the stony valley of the Koos-Kooskee River, where I found it growing with *Eriogonum* 396, the latter being thoroughly covered with a silvery tomentum. I never met with it again afterwards. There remains a cymous-paniculate species, like the rest, covered with a woolly hair, but with a colour between white and rose: it forms large groups in the sandy valleys, this is *Eriagonum* 590. On stony exsiccated places I collected *Ambrosia* 551, *Cynoglossum*? 260, *Cantua* 544, *Rochelia* 548, *Delphinium* 420, and *Lythrum* 591, growing with masses of *Hosackia Purshiana* and *Gratiola Missuriensis*. The finest plants in these plains grow in the gravelly sandy central parts, and near rivulets. Among them is the delicate *Gypsophila*? 535, *Orthocarpus* 465, with tricoloured bracts, tinged with pink; further, *Orthocarpus* 540, very rare, *Pentstemon* 464, *Poterium* 467, *Anemone cylindracea*, *Hosackia* 553, *Calycadenia* 408, 409, *Erigeron*? 478, 571, *Stenactis speciosa*, *Gallardia* 35, *Galium septentrionale*, *Dianthus*? 466, *Helianthus* 34, *Hypericum*, *Lupinus* 390, *Sida* 404, and *Sida* 410, with the different small involucrate *Trifolium*, grow along the rivulets, with *Ranunculus flammula*, and *Spiraea Douglasii*, Roses, etc. In the few pools grows the *Claytonia*? 531, and on the border besides masses of *Gratiola*, the *Alisma* 439, *Carex* 190, 416, 417, 491, 492, 516, and 573, the latter a rare species here; also the *Juncea* 208, 498, 499, 500; further *Aira* 342, 555, and *Agrostis* 572, with *Allium* 584, *Polemonium* 530, and *Aster puniceus* 587 and 633, together with many more; but as we have had a view of it sufficient to show its character, we will reserve part, and only notice those with fixed localities at the end of the next subdivision.

(*To be continued.*)