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UNIVERSITY OF WYOMING.

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WYOMING EXPERIMENT STATION,
LARAMIE, WYOMING.

BULLETIN NO. 1.
MAY, 1891.

The Organization and the Proposed Work of the Station.

The Bulletins and Annual Reports of this Station will be sent the residents of this State upon request.
WYOMING
Agricultural Experiment Station.

UNIVERSITY OF WYOMING.

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THE ORGANIZATION OF THE WYOMING EXPERIMENT STATION AND ITS EXPERIMENT FARMS.

REPORT OF THE DIRECTOR.

The United States of America, by an Act of Congress, passed March 2, 1887, gave to every State and Territory having an agricultural college $15,000 annually for researches by said college. By an Act of the Legislature of the State of Wyoming, approved January 10, 1891, the Agricultural Department of the University of Wyoming was authorized to receive the above appropriation. March 27, 1891, the Trustees of the University elected to the position of Director of the Wyoming Experiment Station, Dice McLaren, M. S., Professor of Agriculture in the University of Wyoming, formerly Professor of Natural History in the Maryland Agricultural College.

By the terms of the Act of Congress, the text of which will be found on page 23 of this Bulletin, the purposes of the Experiment Stations are "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." The act further states:

SEC. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manure, natural or artificial, with ex-
Experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese, and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

The last clause authorizes the Wyoming Experiment Station to adapt the various lines of research to the high altitude and arid climate of this State. Hence methods of irrigation, means of retaining the moisture in the soil and varieties of grass suitable for the non-irrigated lands will receive special attention. The culture of the sugar beet, the adaptation of varieties to our mountain climate and many other experiments which promise to benefit our agricultural and grazing interests will form an essential part of the station work. Some of these experiments are described in the accompanying reports of the Station officers.

That the possibilities of agriculture in all parts and altitudes of Wyoming may be fairly tested, the Trustees have established experiment farms in various portions of the State. The west-central portion and the altitude of 5,500 feet above sea level is represented by the Lander Experiment Farm of 137 acres under irrigation in Fremont County and donated by its citizens. The Laramie Plains and the altitude of 7,000 feet is represented by the Wyoming University Experiment Farm of 640 acres in Albany County, irrigated from the Pioneer Canal, and granted by the Wyoming Central Land and Improvement Company. The North Platte Valley and the altitude of 6,000 feet is represented by the Saratoga Experiment Farm of 40 acres, under the Hugus-Mullison-Beale Ditch and the Davis-Folsom Canal in Carbon County, donated
by the Saratoga Improvement Company and the Saratoga Land and Irrigation Company. The northern part of the State and the altitude of 4,000 feet is represented by the Sheridan Experiment Farm of 50 acres, under irrigation, in Sheridan County, and donated by its citizens. Northeastern Wyoming, with the greatest rain-fall and the altitude of 4,500 feet, is represented by the Sundance Experiment Farm of 49 acres, to be carried on without irrigation, in Crook County, and donated by its citizens. Southeastern Wyoming, the Sybille Valley, and the altitude of 5,000 feet is represented by the Wheatland Experiment Farm under Ditch No. 2, of the Wyoming Development Company, in Laramie County, being donated by that company.

As the report of the Governor of Wyoming for 1889 states that four-fifths of this State is between the altitudes of 4,000 and 8,000 feet, it is evident that the farming and grazing lands of Wyoming are now well represented. As soon, however, as the Station funds will permit, it is intended that other experiment farms will be established.

It being the duty of the Station not only to acquire useful and practical information, but also to diffuse the same among the farmers and grazers of Wyoming, there will be distributed each year a number of bulletins containing reports of the various experiments. It is hoped, also, that Farmers' Institutes will be held in different parts of the State so that the Station workers can talk personally with our citizens about the experiments.

The establishment of the Experiment Station in connection with the Agricultural College Department of Wyoming University is fortunate. The Station has not the funds to pay for the necessary trained Professors and well equipped Laboratories which the University is granting it. It is due these Professors to state that they
are now working on their former salaries, but that to facilitate the season's work and to secure an early issue of this publication, the work on the following reports, without exception, has been done free and in time that was almost fully occupied with other duties. This work has been cordially done, recognizing that in a new State each must help the other, and in the hope of a bright future for agriculture in Wyoming.

THE FARM WORK IN PROGRESS.

REPORT OF THE AGRICULTURIST.

To facilitate the planting and measurement of crops and the keeping of accurate records, a forty-acre tract on each of the Experiment Farms has been divided into 36 one-acre plats, separated by cross-roads, which, with the surrounding road, occupy the other four acres. These 36 Acre Plats have the same numbers and sub-divisions as the 36 sections in a U. S. government township.

Each of the 40-acre tracts has been plowed and fenced with barbed-wire fence. The staple crops, in many varieties, have been planted on each. On the Wyoming University Experiment Farm, at Laramie, six acres are planted with cereals, one acre with potatoes, one with field peas, one with sugar beets, one with sorghum and corn, one with turnips and carrots and five with grasses and forage plants, all in many varieties, for tests and for distribution among the farmers of Wyoming. Similar crops are planted on each of the Experiment Farms. At the Lander Experiment Farm fruit and forest trees are planted. Aerial irrigation will be tested on the Saratoga Experiment Farm. At the Sheridan, Sundance and Wheatland Experiment Farms extensive trials of field corn are being made. The crops on the Sundance Experiment
Farm will not be irrigated, as that region receives the greatest rain-fall.

UNITED STATES GRASS EXPERIMENTS WITHOUT IRRIGATION.

On the 8th day of April the United States Secretary of Agriculture authorized the Wyoming Agricultural Experiment Station to experiment with grass and forage plants without irrigation under the direction of the United States Botanist. Three hundred dollars were appropriated to pay for seeds and expenses. It was recommended that at least five acres be planted; that as far as possible experiments be tried with the native species of Wyoming, and that the temperature and rain-fall during experiments be carefully recorded.

The aim of the experiments is to find species of grass or methods of treatment that will improve the vast grazing grounds of this State which are difficult to irrigate.

Ten acres of land were selected near Laramie which represent the average soil and climate of the Laramie Plains. Four of the acres were drilled into the unprepared prairie with an Havana press drill. One acre was sown broadcast on the prairie and harrowed in. The other five acres were plowed at different depths, part subsoiled, and all harrowed and clod-crushed. Four of the plowed acres were drilled and one sown broadcast and harrowed in. Strips of all the grasses planted were rolled, or top-dressed with manure or with land plaster.

The following grasses and forage plants were selected:

Poa nemoralis (Northern Blue Grass), Dactylis glomerata (Orchard Grass), Panicum virgatum (Switch Grass), Aira caespitosa (Northern Hair Grass), Trifolium incarnatum (Scarlet Clover), Trifolium hybridum (Alsike Clover), Medicago sativa (Alfalfa), Melilotus alba (White Sweet
Clover), Onobrychis sativa (Espartette or Sanfoin), Hedysarum coronarium (Northern Lupin), Galega officinalis, Anthyllis velueriana (Land Clover), Poterium sanguisorba (Burnet), Panicum miliaceum (Indian Millet), Bromus Schraderi (Rescue Grass), Bromus inermis (Wild Chess), Festuca elatior (Fall Fescue), Lolium perenne (Rye Grass), Phalaris arundinacea (Canary Grass) and Sorghum vulgare, var. cernuum (Guinea Corn).

For comparison and test three acres of prairie on the Wyoming University Experiment Farm is sowed with the same grasses and will be irrigated. Five other acres of prairie will be flooded to test the effect of irrigation on the natural grass.

RETENTION OF SOIL MOISTURE.

Recent experiments in the Laboratories of the Johns Hopkins University have shown that in one gram of loamy soil there are 3,740,000,000 particles. To the surface of each of these minute particles a thin film of moisture adheres by "capillary" attraction. The tips of the rootlets of plants have the power to absorb this hygroscopic water with the substances it holds in solution. The spaces between the particles of soil should be filled with air. If filled with water the plant will be killed by drowning. Soggy soil being rare in Wyoming, the thickness of the film of moisture on the soil particle is the vital problem. Further experiments in the above Laboratories have shown that certain alkalies have the power to thicken and retain the film of moisture on the soil particle. Experiments with these chemicals are being tried on the Wyoming University Experiment Farm and Grass Fields, in the hope of good results to our arid soils.

Gypsum and many other crystals have the property of absorbing and retaining vast amounts of moisture. It is probable that the rootlets of plants have the power to
H. C. HI(/flllil-Pro/Joscd Hortlm/Hur!ture IVorA,. 9
absorb this water of crystallization. Researches on this point are in progress at the Station. One of the substances used is the Ground Gypsum (Land Plaster) and Calcined Gypsum (Plaster of Paris), prepared by the Rocky Mountain Plaster Stucco Manufacturing Company, at Red Buttes, Wyoming, and furnished by Wm. Lawrence, of Laramie. In moist climates this gypsum is used as a reagent to set free the potash, nitrates and phosphates in the soil. In this climate gypsum may be found to have the further merit of absorbing water in wet times and of retaining it for the use of plants in dry times. In this connection experiments will be tried with our many native phosphates, nitrates and other fertilizers and with the waste products of the glass and soda works.

PROPOSED WORK IN HORTICULTURE.

REPORT OF THE HORTICULTURIST.

Horticulture may be divided into: 1, Landscape gardening; 2, Olericulture, or garden vegetables; 3, Floriculture; 4, Pomology, or fruit culture; 5, Seed culture, the selection and propagation of seeds, vitality of seeds, etc.

Only a short account of the work in progress is given and this is largely prospective.

LANDSCAPE GARDENING.

This is being carried on upon the University campus. Laying out drives and walks, preparing the ground and planting lawns, setting out trees and shrubs for hedge is well under way.

The question of what to plant must be determined by experiment. The rigors of our climate almost make the distinction of different trees for different purposes fade into
insignificance. Any that we can make grow will find a place. The cottonwood, despised in some localities, on account of its hardy character has a first place with us for all but lawn decoration.

The following are the trees and shrubs that are on hand for trial:

**TREES.**

From O. D. Shields, Loveland, Colo.—Green Bark Cottonwood (Populus angustifolia), White Ash (Fraxinus Americana), Carolina Poplar (Populus sp. ?), Mountain Ash (Pyrus Americana), Russian Olive (Olea).

From Mr. Allyn.—Native Cottonwoods (Populus sp. ?), Evergreens (six varieties).

From D. Fisk.—Balm of Gilead (Populus candicans), Russian Mulberry (closely allied to Morus nigra), Honey Locust (Gleditschia tricanthos), White Willow (Salix alba).

**SHRUBS.**

From Dr. Finfrock and Cold Spring Seed Farm.—Buffalo Berry (Shepherdia argentia).

From Colorado Agricultural College.—Barberries (Berberis).

From Mr. Collins.—Lilacs (Syringâ).

From D. Fisk.—Snow Ball (Viburnum Opulus).

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**GARDEN VEGETABLES.**

Test of varieties of potatoes, peas, beans, onions, etc. Non-saccharine and saccharine sorghums. Corn, rhubarb and root crops. Yield on new land.

**FLORICULTURE.**

In this connection and economic Botany a green house is needed. All that can will be done with wild and tame flowering plants for decoration.
The small fruits, wild and tame. Hardy varieties of Russian apples, pears, plums, cherries, etc.

SEED CULTURE.

Comparative vitality of northern grown (Minnesota) and Colorado seeds. Practical tests on the farm.

Seeds have been donated by the Department of Agriculture at Washington, Colorado Agricultural Experiment Station, Johnson & Co., of Richmond, Va., and Cold Spring Seed Farm, Big Horn, Wyo.

THE GRASSES OF WYOMING.

In Wyoming the importance to every stockman and farmer of a bountiful supply of grass on his land is apparent. In no State is the question of how to produce good pasture and hay land of greater moment. Being one of the newest and most progressive of States, and lying west of the 100th Meridian in the great arid district with elevations above sea level of from 3,000 to 10,000 feet, and consequent diversions of climate, the writer doubts if there is a commonwealth on the globe in which the study of, and experimentation with, grasses and forage plants promises to bring forth greater or more startling results, both from remunerative and scientific standpoints.

As yet the wealth of Wyoming depends largely upon the thousands of cattle, sheep and horses which exist on her broad pastures. "Grass is flesh," a statement so far-reaching it needs no further comment.

As the population increases the land must be made more productive. At present where a ranch of 10,000 acres will support 250 head of horses (such a ranch has been visited and the stock, while in fair condition, are by no means fat after coming through the winter), it ought to be made to support twenty times that number, or 5,000
head. One-half of this increase would make prosperous Wyoming ten times more prosperous.

The problem presents many difficulties, and to obtain the desired results will take years of patient and careful investigation.

GRASS GARDENING.

Under irrigation small plats of each of the varieties of grasses and forage plants, of which we can obtain seed this year, will be sown on the farm. Sods of the native grasses also will be set and conditions and progress carefully noted. Later, if they can be obtained, seeds of the native grasses will be sown in separate beds and some experiments tried by mixing different varieties.

The native grasses, on account of their property of winter-curing and nutritive qualities, are valuable for pasturage. There are few if any more nutritive hay grasses than our native Blue Stem, Agropyrum glaucum and violaceum. One of our most valuable grasses for pasture, the Buchloe dactyloides (Buffalo Grass), is being exterminated by civilization. Its patches of matted sod on the plains are, to all appearances, growing smaller and wider apart. In view of these facts the study of, and experimentation with, the native grasses, to improve and perpetuate them, is of first importance.

NATIVE GRASSES.

In connection with this subject a brief report of the grasses indigenous to the Experiment Farm at Laramie, and others which have been determined, may be of interest. Only three species have been recognized on the farm, viz: Buchloe dactyloides (Buffalo Grass or Mesquite), Bouteloua oligostachya (Gramna Grass) and Agropyrum glaucum (Blue Stem). These are the principal grasses of the plains and clothe them in their characteristic green in spring and early summer. Others found on the river
bottom near Laramie were these: Sporobolus airoides Torr. (Bunch Grass or Salt Grass), not valuable for hay but relished by stock and makes good pasturage; Stipa spartea (Porcupine or Anon Grass), cut young it makes a good hay but when the seeds are ripe their long awns and sharp beards make them irritable, sometimes penetrating the skins of animals; Alopecurus sp? (Fox Tail), of no value, when fed to stock the sharp awns cause sore mouths.

A specimen of Panicum amarum, Ell, was found in bloom in the hills east of Laramie. Its value is unknown.

Mr. Peyton, of Saratoga, Wyo., through the Director presented the Station with about a dozen species of grasses and sedges, collected near that place, and of which the following have been identified: Alopecurus alpinus, Sm., (Fox Tail), probably of no value; Beckmannia erucaeformis, Host., (Water or Slough Grass), stock are said to be fond of it; Elymus Canadensis, L., (Wild Rye, Lyme Grass or Terrell Grass); the specimen sent is nearly four feet; when used for hay should be cut young, as with age it becomes coarse and harsh.

Elymus condensatus, Prest., (Grant Rye Grass), one of our coarsest grasses growing in damp soils from six to twelve feet high. Unless cut young is of little value for hay. Phleum pratense, L., (Timothy, Herd's or Cat's Tail Grass), known by everyone; is a native of the South and Eastern States and is said to have been cultivated as early as 1720. Phleum alpinum, L., found in high elevations; small and not vigorous.

Spartina cynosuroides, Willd., (Cord Grass); readily recognized by its coarse stems and one-sided spikes. The latter, 5 to 10 on the stalk, much resemble those of the Grama Grass in general appearance. Leaves long. It is of little value, as stock will not eat it. Besides these there were represented two species of Sporobolus, one
Alopecurus, Panicum and Poa. The others being dry and imperfect, it was impossible to determine them.

There are several species of the Rush Family [Juncus] and the Sedges which are called Wire Grass by stockmen. These are valuable and form a large portion of the hay in some sections. Only one has been found in blossom and determined. It is closely related to Carex rupestris, All., only differing in having two instead of three stigmas. It comes up abundantly and blossoms quite early in the spring; looks very much like a grass. It grows from 1 to 5 inches high and has a brown colored spike, less than one-half inch long, at the top of the stem.

In this short article I have not attempted to give descriptions only in a general way. It is hoped that a thorough botanical survey of the State may be made and an herbarium of all the plants represented built up for reference.

IRRIGATION.

In connection with the subject of irrigation I give a short report of what has been done on the farm.

Opposite the highest point on the farm a headgate was placed in the main canal and a lateral constructed from it to the large weir-box, through which it is expected all the water used will run.

In order to accurately measure all the water which runs on the farm for irrigating purposes and all that which runs off as waste water, to find the "duty" of water, two large weir-boxes were made.

I have adopted the Cippoletti form of weir, which is so constructed that it eliminates the co-efficient of contraction in the formula and consequently makes the computations much more simple and easy. [For a description of this weir see Bulletin No. 13 of the Colorado Agricultural Experiment Station.]
The dimensions of the weir-boxes were determined by the conditions necessary to the most accurate measurement for the size of weir needed. They were made 8 feet long, 6 feet wide, one 3½ and the other 3 feet deep in the clear. The weirs are made in separate boards to fit the front of the box, and are interchangeable. The depth of the water flowing over the weir will be determined by a self-registering apparatus, the Wyoming Nilometer, designed by State Engineer Mead, a cut of which is given in his Second Annual Report.

The slope of the Laramie Experiment Farm is such that irrigating it will be comparatively simple and easy. Ditches have been plowed on each side of the drives, which will allow each acre to be irrigated separately if desired.

On the lower side of the farm, in a distance of about 650 feet there is a fall of 5.8 feet nearly, but it is thought that the soil is of such a nature that it will not wash badly.

Irrigation in all its forms will be applied—surface, furrow and bed irrigation at the Farm, and sub-irrigation at the University, for which purpose about 900 feet of pipe is now laid.

GEOLOGY OF THE LARAMIE PLAINS.

REPORT OF THE GEOLOGIST.

In giving the geological horizon of the Wyoming University Experiment Farm, Grass Fields and Garden, the writer is at variance with the United States geological maps which place the Laramie Plains in the Dakota Group.

From a study of excavations made in the city of
Laramie, and of the red sandstone quarries to the north, it is certain that Laramie and the Grass Fields are in the Triassic formation. The red sandstone strata dips about 30 degrees to the west, passing beneath the Big Laramie River, at the Experiment Garden, and must be several thousand feet beneath the surface at the Experiment Farm two miles to the west. In this locality the Jurassic does not appear to rest upon the Triassic. The position of the formation overlying the Triassic can only be determined by the fossils which are not yet studied. In digging the irrigation ditches on the farm a thin layer of yellow sandstone was found. W. H. Reed, formerly a collector for O. C. Marsh, of Yale College, informs me that there is an out-crop within a few miles of the farm of a similar sandstone which contains fossils. This will be studied in due time.

Some middle or upper Cretaceous fossils are found 25 miles north of Laramie, and also in the Laramie Group, 20 miles to the northwest. At the latter point a stratum of coal dips northwest toward the foot-hills. The crest and southeast side of the mountain, of which the Laramie Group was once the northwestern slope, seems to have been carried away. This mountain must have extended to within a few miles of the Experiment Farm, at which point another mountain probably rose to the east, the west slope of which was covered by the Laramie Group, conformable with the Cretaceous and Triassic beneath. The latter mountain has also been torn down by the hand of time, laying bare the Cretaceous formation whose crumbling and disintegrated rocks mixed with local drift gravel form the soil of the Experiment Farm. This is the most noted of all the geological formations for its great variety of soils.

The Triassic is the lowest formation of Mesozoic
Time, and in this vicinity does not exhibit the marked volcanic or eruptive origin of the Palisades of the Hudson or of Mounts Tom and Holyoke in Massachusetts, nor have reptilian foot-prints, so characteristic of the Connecticut Valley sandstone, been found here. The next formation above the Triassic in Europe is the Jurassic, but in the Rocky Mountain Region of America the two generally are so blended together as to be called the Jura-Trias, but near Aurora, sixty miles from Laramie, Ammonites are found which separate the Jurassic from the Triassic. The Cretaceous is the upper of the three sub-divisions of Mesozoic Time, and in Europe is divided into Upper; Middle and Lower Cretaceous.

The corresponding sub-divisions of the Rocky Mountain region are:

\[
\text{Cretaceous.} \begin{cases} 
\text{Upper,} & \text{Fox Hill,} \\
& \text{Ft. Pierre.} \\
\text{Lower,} & \text{Niobrara,} \\
& \text{Fort Benton,} \\
& \text{Dakota.}
\end{cases}
\]

The Jurassic and Cretaceous formations in Wyoming are exceedingly rich in fossils and have furnished Professors Marsh, Cope and others with an immense quantity of gigantic bones of huge Reptiles and Saurians that once basked in the sunshine upon the shores of the Cretaceous and Jurassic Seas.

The Laramie Group, in which the coal of Wyoming is found, is considered by some as the lowest of the Tertiary, but it is more generally considered as the transition period between the Cretaceous and Tertiary, partaking of the nature of both, but differing enough not to be classified with either, but is a connecting link between the two. It undoubtedly once overlaid the region of the Farm, but has been worn and washed away, leaving the Cretaceous
as the foundation of the Experiment Farm of the University of Wyoming.

NOTE ON SOIL ANALYSIS.

BY THE CHEMIST.

A future Bulletin will contain detailed descriptions, and a tabulated statement, of the soils from each of the Experiment Farms, so far as analyzed.

There is enough alumina in the soil at the Wyoming University Experiment Farm to give it body and a good consistency. It is a light sandy loam, possessing enough of the essential ingredients for the native grasses to thrive well under irrigation alone. On a neighboring ranch, in similar soil, the blue joint Agropyrum glaucum has produced one and one-half tons per acre. Time and space will not permit any further statement concerning our soils for the present.

A PRELIMINARY REPORT ON THE FLORA INDIGENOUS TO THE WYOMING UNIVERSITY EXPERIMENT FARM.

BY THE BOTANIST.

As a matter of record, and as indicating to some extent the climate and soil of this part of the State, viz., the Laramie Plains, it is has been thought advisable to insert in this first Bulletin a list, briefly descriptive, of the plants found growing in the natural soil and without irrigation on the land used by the Experiment Station.

From this list the grasses are omitted, as they will be treated elsewhere in this Bulletin by the Horticulturist. The list is necessarily quite incomplete, as it includes only
those plants found to date [May 20th] this season. An effort will be made to complete it by adding to it the plants that shall successively appear throughout the year. In these lists no attempt at systematic arrangement has been made.

1. *Townsendia sericea.*—The earliest plant to blossom, and that at once attracts the attention of the collector, is this compositae. It is low, depressed, apparently acaulescent, and bears one to several rather large heads, closely sessile among the clustered, linear-spatulate leaves. Rays numerous, narrow, white varying to purple.

2. *Phlox caespitosa.*—

3. *Phlox Douglasii.*—These two species both grow very abundantly, the former appearing earliest, growing in large dense mats; the latter less densely tufted, flowers larger and leaves narrower but longer.

4. *Echinocactus Simpsoni.*—This species of cactus is quite common on the Laramie Plains. It is globular in form, sometimes three to four inches in diameter, usually growing half buried in the sandy soil.


6. *Leucocrinum montanum* [Mountain Lily.].—A beautiful flower, the white perianth of most delicate texture and appearing just above the ground.

7. *Plantago cripoda*—?—[Plantain].—This species of Plantain is found sparingly on the farm. It seems to thrive best in dry and sandy but rather low situations.

The following list comprises those plants not yet in blossom, but readily identified by other characteristics:

1. *Opuntia Rafinesquii.*—A common, tufted, prostrate, flat-stemmed, many jointed cactus. An exceedingly annoying plant in many unbroken plains pastures.
2. *Cleome integrifolia* [Rocky Mountain Bee Plant.]—This plant grows in great abundance in many parts of the plains, the long racemes of large, showy, reddish-purple flowers being visible for a long distance.

3. *Malvastrum coccineum.*—Low and hoary, with pedate leaves, bearing showy pink-red flowers throughout the season.—Common everywhere.

4. *Achillea Millefolium* [Yarrow.]—A weed common everywhere in the northern hemisphere and known by its finely dissected leaves and corymb-like cyme of numerous small heads with white rays.

5. *Bigelovia graveolens, Var albicaulis* [Goldenrod.].—Very common both in the mountains and on the plains. It grows in small, dense clumps, the numerous branched stems covered with a dense white tomentum, and bearing numerous small crowded heads.

6. *Cnicus scariosus* [Thistle.]—Stems a foot high or more; leaves white tomentose on the under side; lanceolate in outline with long, prickly lobes; flowers almost white.

7. *Artemissia pedatifida*?—[Wormwood].—A small very dwarf sage-brush with dissected leaves, crowded in tufts on the woody root-stock, flowering presumably later in the season. Strong scented.

8. *Delphinium azureum* [Larkspur.]—Stem slender, branching and slightly pubescent; leaves cleft, the lobes linear; flowers in a raceme, sky-blue, the spur curved.

9. *Lichens.*—It may be well to note that Lichens are found in great abundance everywhere on the farm.

**PROMISING PLANTS FOR CULTIVATION.**

The following is a list of the shrubs and plants native in the foothills near Laramie which, on account of their fruits, it might be well to try on the Experiment Farm.
It seems probable that the cultivated varieties would do well here where the native species seem to thrive.

1. *Fragaria vesca* [Strawberry.]—Strawberries thrive exceedingly well in the moist places and along the streams in the mountains, and if properly protected and irrigated would bear abundantly anywhere in the State.

2. *Rubus strigosus* [Red Raspberry.]—This is the common red raspberry of the mountains, known to all as very prolific. Cultivated varieties, if well protected through the winter, would probably pay richly for the trouble.

Blackberries, being so closely related, ought likewise to do well, though they are not found native, I believe.

3. *Ribes oxyacanthoides* [Gooseberry.]

4. *Ribes floridum* [Currant.]—Both the gooseberry and the currant ought to prove perfectly hardy here, judging by the appearance of the native species.

5. *Shepherdia argentea* [Buffalo Berry.]—In the buffalo berry we have a shrub perfectly hardy in other parts of the State, and is certainly worthy of trial.

6. *Berberis repens* [Barberry.]—A cultivated variety is grown successfully at Fort Collins, Colorado.

7. *Amelanchier alnifolia* [Serviceberry.]

8. *Prunus demissa* [Wild Cherry.]—The last two, while themselves valueless, may suggest species worthy of trial.

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**WEATHER REPORT FOR APRIL AND MAY, 1891.**

**BY THE CLIMATOLOGIST.**

The Weather Instruments of the Experiment Station were not adjusted for records until May 15th. Upon request Dr. L. S. Barnes, Local Observer at Laramie for the
United States Signal Service, has kindly permitted the publication in the Bulletin of the following tables prepared by him:

**WEATHER REPORT FOR APRIL.**

**TEMPERATURE.**

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**TOTAL AMOUNT OF RAIN.**

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| 2.50 |
## WEATHER REPORT FOR MAY.

### TEMPERATURE.

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### PRECIPITATION.

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### AN ACT TO ESTABLISH AGRICULTURAL EXPERIMENT STATIONS

In connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

Be it enacted in the Senate and House of Representatives of the United States of America in Congress assembled: That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges of agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled “An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts,” or any of the supplements to said act, a department to be known and designated as an “agricultural experiment station.” Provided, That in any State or Territory in which two such colleges have been or may be so established the appropriation hereinabove made to such State or Territory shall be equally divided between such colleges, unless the Legislature of such State or Territory shall otherwise direct.

Sec. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic
questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

Sec. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this act. It shall be the duty of each of said stations, annually, on or before the first day of February, to make to the Governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture and to the Secretary of the Treasury of the United States.

Sec. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster General may from time to time prescribe.

Sec. 5. That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the Treasury proceeding from the sales of public lands, to be paid in equal quarterly payments, on the first day of January, April, July and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty-seven: Provided, however, That out of the first annual appropriation so received by any station an amount not exceeding one-fifth may be expended in the erection, enlargement or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended. Sec. 6. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

Sec. 7. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

Sec. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiment at stations so established by such States; and in case any State shall have established, under the provisions of said act of July second aforesaid, an agricultural department or experimental station, in connection with any university, college or institution not distinctively an agricultural college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the Legislature of such State may apply in whole or in part the appropriation by this act made, to such separate agricultural college or school, and no Legislature shall by contract express or implied disable itself from so doing.

Sec. 9. That the grants of moneys authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants; Provided, That payment of such installments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its Legislature meeting next after the passage of this act shall be made upon the assent of the Governor thereof duly certified to the Secretary of the Treasury.

Sec. 10. Nothing in this act shall be held or construed as binding the United States to continue any payments from the Treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend or repeal any or all the provisions of this act.

Approved March 2, 1887.