ANNUAL REPORT

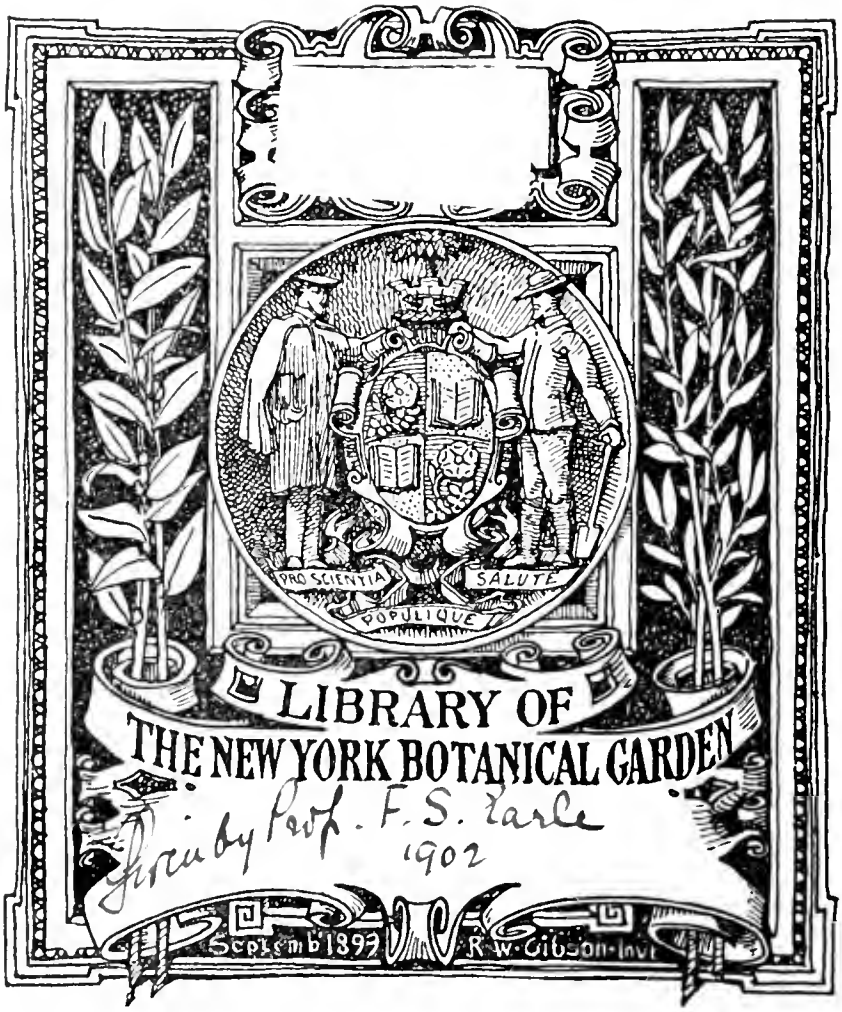
OF THE

STATE HORTICULTURAL SOCIETY,

NEBRASKA.

1896.

By JOSEPH H. HADKINSON.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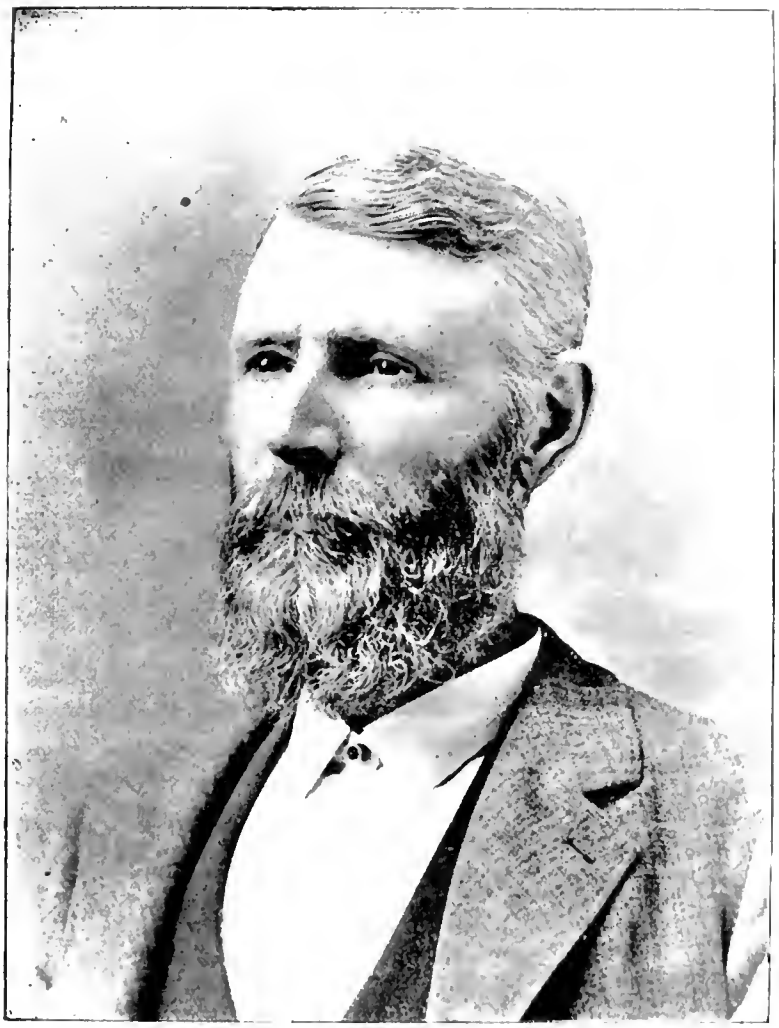

David Underwood Reed.

ANNUAL REPORT

OF THE

NEBRASKA

State Horticultural Society

For the Year 1896,

CONTAINING THE PROCEEDINGS OF THE ANNUAL MEETING HELD AT LINCOLN, JANUARY, 1896.

THE SMALL FRUITS.

THE BIRDS OF NEBRASKA.

By JOSEPH H. HADKINSON, Secretary.

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LETTER OF TRANSMITTAL.

To His Excellency, SILAS A. HOLCOMB, *Governor of Nebraska:*

In compliance with statute this report is respectfully submitted.

JOSEPH H. HADKINSON,

Secretary State Horticultural Society.

Lincoln, May 1, 1896.

CONTENTS.

PREFACE.

Continuing the policy of the Society in recent years, commenced by our past Secretary, Professor F. W. Taylor, certain special subjects are taken up and exhaustively treated in this volume.

The Secretary feels that some explanation should be made regarding the matter appearing in this report. Much of it had been arranged for by the late lamented Secretary, D. U. Reed, whose untimely death left the Society for some months previous to the winter meeting without an active Secretary. During that time the executive board, and members of the Society who were conversant with the details of the proposed volume, completed the arrangements for the matter needed. At the close of the winter meeting the newly elected Secretary took up the work as best he could, and wishes to thank his friends for their kindness in helping him, not forgetting his appreciation of the excellent planning which had been done previous to his coming into possession of the office, and begs indulgence for any errors or omissions which may have occurred in the work as the result of the change in officers during the preparation of this report.

PREPARATION OF SOIL FOR ORCHARD AND GARDEN WORK.

PETER YOUNGERS, JR.

As the two things most essential to plant life are air and water, so in the preparation of the soil the prime object should be to so prepare it as to retain all the moisture possible. All living plants contain a very large per cent of water. For instance, the potato contains nearly 75 per cent, while experiments have developed the fact that an ash tree cut down in January contained 29 per cent of water, maple 34 per cent, and fir 53 per cent. The same kinds of trees felled early in April contained 39, 40, and 61 per cent respectively. This water must come from the soil, and as the roots are the feeders that convey it to the plant or body of the tree, the most essential thing is the feeding ground of the roots.

The soil of a large portion of Nebraska is of a very refractory character, and in order to properly fit it for the orchard and garden it is very essential that it be loosened as deep as possible with the implements of the day for the purpose of storing the moisture necessary to plant life. We find by experiments conducted on our nursery grounds the past season that the preparation of the soil has much to do with the relative amount of water it will retain. We sent samples of soil daily to the Department of Agriculture at Washington, commencing on the 2d day of May and continuing until September 13. These samples were taken at 6 o'clock P. M. in brass tubes about eighteen inches long. The tubes were driven into the ground to the depth of sixteen inches, then taken up and tightly sealed with rubber caps, making them air tight, and sent to Washington. There each sample was carefully weighed, all the moisture extracted, and weighed again to determine the amount of moisture in each sample. The samples were all taken within a radius of ten rods, the ground having been se-

lected with a view to the experiment. Sample No. 1 was taken from prairie sod, No. 2 from land plowed eight inches deep, and No. 3 from land subsoiled sixteen inches deep in the fall of 1894. The average amount of moisture in each kind of soil for each month during the growing season was as follows:

	No. 1.	No. 2.	No. 3.
May	12.41	14.09	16.41
June	15.80	16.10	20.41
July	14.46	12.98	17.45
August	11.29	11.19	17.24
September (first 13 days)	10.82	12.35	14.37

Now using the land under ordinary cultivation as a basis, it will be seen from the foregoing table that the increase of moisture in the subsoiled land over that in the land under ordinary cultivation during the month of May was 16.18 per cent; June, 26.77; July, 34.43; and for August, 54.06, or more than half as much again. This is certainly a remarkable showing in favor of deep stirring of the soil, and I firmly believe that a large percentage of the failures in orchard and garden work are due to the neglect of planters in this respect.

For the past nine years we have used the subsoil plow and tree digger to loosen up the soil. Our method is to follow the ordinary stirring plow set to run eight inches deep, with a subsoil plow also running eight inches deep. This plow does not throw the earth to the surface, but merely loosens it up in the bottom of the furrow. The next furrow of the stirring plow covers up the subsoiled land, and in this manner the rich surface soil is always retained on top. Every evening we harrow or plank down the ground plowed during the day, as it works down much better when harrowed before it dries out. Should the soil be dry and hard, so as to plow up in large lumps, we put on a disc harrow to pulverize the lumps and fill up the crevices, otherwise the wind and sun would soon dry out the ground almost as deep as plowed. After we have firmed the ground in this manner, we harrow it with a smoothing harrow and plank it, if necessary, to get it in good condition. After we have the reservoir ready to receive the moisture, the next thing is to keep the surface loose by frequent stirring, and success will crown the efforts of the orchardist and gardener.

DISCUSSION.

MR. WILCOX—Mr. Youngers, will you describe that float you use?

MR. YOUNGERS—It is made of three planks twelve feet long, spiked together. The teamster rides on it to weight it down.

QUESTION—Where you have a loose surface do you have any trouble from the soil drifting?

MR. YOUNGERS—We overcome that by ridging up with the cultivator over the seeds or whatever is planted. That will prevent the soil from drifting.

MR. WILCOX—How long do those plow points last? Is there any difference in the makes?

MR. YOUNGERS—We used the Mapes plow four years and had two points put on it in that time.

MR. BROWN—A season like last fall the Mapes plow would wear out on about thirty acres.

MR. YOUNGERS—The new plow that we have been using this fall is the plow manufactured at Topeka, the Perine plow. It is made on the same plan as the Grand Detour, but draws a whole lot easier.

PROFESSOR LYON—Have you made any tests of that ground plowed with the Perine plow to determine the amount of moisture in it?

MR. YOUNGERS—No, sir; we have only used it this last fall. We plowed about forty acres with it and find it does good work and is lighter draft than the old style plow.

QUESTION—Is it any lighter than a stirring plow?

MR. YOUNGERS—There is not much difference in the draft, though our teamsters would rather put their teams on the subsoiler than on the stirring plow, for the reason that the horse walking in the furrow has solid footing, while the furrow horse of the lead team has to walk on soft ground.

QUESTION—Which have you found productive of the best results, fall subsoiling or spring subsoiling?

MR. YOUNGERS—We have tried both fall and spring, and I would say fall for the reason that we then have a chance to pulverize the surface and retain all the moisture that falls.

QUESTION—What do these plows cost?

MR. YOUNGERS—About twelve dollars.

MR. HEATH—Can you go deeper than eight inches?

MR. YOUNGERS—Yes, sir; you can go down sixteen inches if you put on horse power enough.

MR. HEATH—Is it desirable to go very deep?

MR. YOUNGERS—We have never exceeded sixteen inches; I think we started in at about fourteen inches.

THE PRESIDENT—One word further in regard to the Perine subsoil plow; his latest and best plow has two points made from very excellent steel tempered hard. You can have your blacksmith temper them each time you have them sharpened, and by sharpening the points daily you can penetrate a very dry subsoil much more readily and to a greater depth.

QUESTION—How long will the effects of subsoiling last?

MR. YOUNGERS—It will last four or five years.

MR. BROWN—I believe the third year is better than the first.

SUCCESS WITH STRAWBERRIES.

L. O. WILLIAMS.

Success with most any business enterprise is accompanied with occasional reverses, and successful strawberry growing especially is not unmixed with more or less frequent failures. The failures, however, may be due to causes outside of our control, and our success must be largely measured, therefore, by the ability with which the grower performs his part of the work,—"Act well your part, there all the honor lies,"—let God and nature do the rest. It will be my aim then in this paper to name some of the conditions of success that lie within the range of man's abilities.

The first condition of success I would name is the selection of a suitable soil and location. The saying that any good corn land is suitable for strawberries I would amend by substituting garden soil for "corn land." Strawberries certainly appreciate good soil as well as good cultivation, and though corn land may be good, garden land is certainly better. Any soil that will grow good potatoes is very suitable, and there is no crop better than potatoes or other root crops to precede

the strawberry planting. In selecting the location for a strawberry plantation avoid, if possible, low wet land or narrow valleys where frosts form frequently. Second bottom land, reasonably well drained from both water and air, would be my choice.

Preparation of the soil is quite an important element of success. Fall plowing with subsoiling is the first step to be taken. If manure is needed, apply it lightly on the surface of the plowed land, using fine, well rotted—cow manure preferred. In the spring, cultivate the manure into the surface soil and finish with a thorough harrowing, clod crushing, and leveling. A disc harrow is an excellent tool for going over the ground for the first harrowing, and if manure is applied it will be the best tool for mixing the manure with the soil.

After ground is nicely smoothed, go over with a hand marker of three or four runners set three and one-half to four feet apart. If you have not young plants of your own growing, secure them of the nearest reliable grower, and if possible have them arrive at the proper time for planting. April is the best month for this important work, and the exact date will be determined by the nature of both the soil and the season. I would never set a plant when the soil is wet enough to pack about the roots, preferring rather to set in a dry time and water about the roots, dressing around the crown with dry earth.

The common method of planting is with the spade, a man handling it, while a boy places the plants in position. My plan, which I like better, is in the use of a broad dibble for making the hole, the man setting the plant without any boy assistant. These dibbles I have made to my order by a blacksmith. They consist of a steel plate three inches wide and eight inches or ten inches long, tapering to a broad round point at lower end, and with a wooden handle set at a right angle to the upper end. With this sort of a tool a competent man can set 1,500 plants in a day, and do the work well. The plants should be carried, 100 or 200 at a time, in a dish holding enough water to cover the roots. Opening the hole with my dibble in the right hand, I take a plant in my left and place in position, holding it by the crown while I fill and press the earth about the roots with the point of the dibble. The pressing of the earth about the roots is a very important matter and one quite generally neglected by careless planters, who simply press lightly about the crown of the plant, leaving the roots with an air space about them. Where watering is given

at setting time, it answers well for setting the dirt about the roots and the final pressure will need be only lightly given while filling up around the crown.

The distance apart in the row will have to be determined largely by the vigor of the plants and the varieties. All free running varieties, like Crescent, should be set two feet apart, if the plants are reasonably well rooted and otherwise good, while the varieties which throw out runners less freely, like Parker Earl and Bubach, should be eighteen inches, or even closer if plants are not vigorous. Some southern growers advocate setting the free growing sorts three feet apart in rows four feet apart. With good plants, good weather, and other things being equal, I have no question but that this would be a proper distance. It is easier, however, to thin out than to thicken up, and if runners become too matted near the close of the season, spare not the knife in thinning them. Usually the drouth, careless hoers, moles, or grub worms do all necessary thinning, and frequently more.

Cultivation follows planting next in importance, and should begin about as soon as the former ceases. It should be continued at intervals of every two weeks throughout the growing season. Every cultivation with the horse should be followed as soon as possible with the hoes. I use the Planet Jr. horse hoe and cultivator with a narrow one and one-fourth inch shovel during the early summer. Later in the season I use the broad three sweep shovels. These tend to ridge the rows lightly, which, I believe, is an advantage in drainage. Of all the hoes I have ever tried, both new-fangled and old-fashioned, there is nothing I like better for doing good honest work than the common garden hoe. I prefer a light hoe, however, for strawberries —one that has been worn down by one season's filing is all right, and this I sharpen on three sides or edges, so that I can use the hoe for cutting weeds, or stirring the soil by either a right or left side stroke, as well as by a straight forward stroke. It is an easy matter, comparatively, to get suitable tools for my work, but not so easy to secure the right kind of workers—they are neither custom made nor easily made to order. It requires a man of mind as well as muscle to skillfully guide a hoe in a strawberry bed.

Varieties.—Though this topic is the last in the order of the conditions named for successful strawberry growing, it is not the least in importance. Some of our eastern growers catalogue and describe as

high as fifty or more different varieties, and with the advent each year of the growing number of highly praised new sorts, it is a puzzling question for the amateur to make proper selections. My advice to such is, stand fast by the old time-tried varieties and let the other man do the buying of the new varieties, though this work should properly be given to our state and local experiment stations. There are enough of the old varieties that are known to succeed in nearly all soils and climates, so that it should not be difficult to select a list of a half dozen varieties for either the table or market. For the family garden in either Iowa or Nebraska, I would name the following as the best six varieties:

Early—Warfield, fertilized with Beder Wood.
Medium—Bubach, and Haverland fertilized with Parker Earl.
Late—Mt. Vernon, a self-fertilizer.

For the commercial plantation I would plant Crescent, Warfield, Beder Wood, Bubach, Parker Earl, Mt. Vernon, and Gandy. This list may be profitably extended to include the Capt. Jack, Haverland, Gov. Hoard, and some newer varieties. A long list of varieties can be better employed in a strawberry plantation than in an apple orchard.

PROFITS OF STRAWBERRY GROWING.

The following estimates on one acre of strawberries are made from the basis of an average crop for ten years, or more, actual experience, but does not take into account an occasional total failure, resulting from severe drouth or late frosts:

Expense.

7,000 plants, at $3	$21 00
Planting the same	7 00
Cultivation, man help	30 00
Cultivation, horse help	3 00
Covering, three loads of hay, at $1	3 00
Covering, hauling, and spreading	3 00
Rent of ground	7 00
Preparation	5 00
Total cost of production	$79 00

Picking 3,200 quarts, at 2 cents	$64 00
Boxes and crates (filled crates at 15 cents)	20 00
Marketing, 10 per cent commission	32 00
Grand total	$195 00

Cost of packing boxes, etc., $116.

Proceeds.

3,200 quarts, at 10 cents each	320 00
Net proceeds per acre	$125 00
Cost of production per box (about)	$2\frac{1}{2}$ cents
Cost of picking, marketing, etc., per box	$3\frac{5}{8}$ cents
Total cost of production and marketing, per box	$6\frac{1}{8}$ cents

Net profits per box, $3\frac{7}{8}$ cents.

DISCUSSION.

MR. BELTZER—Is it not a detriment to the plant if the roots are very long to cut them off before setting?

MR. WILLIAMS—No, sir; I advise trimming the roots to a certain extent. There is very little advantage to the plant to have the roots longer than three inches.

MR. BELTZER—What are the advantages of trimming?

MR. WILLIAMS—You are more liable to get the roots down straight; then they will throw out new roots in a very little while, and it is these new roots that the plant depends on for feeders. It is especially desirable to trim back the roots if the plants have been packed or have lain for sometime, as in that case the lower ends of the roots will become somewhat wilted.

MR. HARTLEY—Can you figure on ten cents a box throughout the season? Is not that estimate a little high?

MR. WILLIAMS—No, sir; I think they will average more than that.

MR. HARTLEY—Berries are shipped in from the south generally for about $2 a case for the season, which would only be eight and one-third cents a quart.

MR. WILLIAMS—I realize that very well, but as a rule I have been able to get as much for my berries at wholesale as the berries that are shipped in retail for. There is just that difference between home

berries and those that are shipped in. The first year—ten years ago the coming spring—I got fifteen cents a quart on an average at wholesale for every berry I grew. Of course, I had the expense to pay out of that, which would still leave the average considerably above ten cents. The second crop I raised brought me an average of twelve and one-half cents a quart, and the third year about ten and one-half cents.

A MEMBER—Which variety gives the most berries?

MR. WILLIAMS—The Warfield. I regard the Beder Wood as the best fertilizer, from the fact that it is a good bearer itself as well as a fertilizer.

GROWING STRAWBERRIES BY IRRIGATION.

J. W. STEVENSON.

I commenced growing strawberries in 1882 in the Platte valley at North Bend, Dodge county, Neb., and fair success crowned my efforts whenever the rainfall was sufficient during the year. The soil here is rich clay loam, with slight mixture of sand, and beneath this there is about eight feet of blue clay or gumbo, interspersed with veins of sand. When we bore through this clay we strike the gravel and quicksand and the water rapidly rises within eight feet of the surface when the water is low in the river. This supply of water is inexhaustible. Well points are driven down twenty-two to twenty-five feet below the surface, and cylinders are usually placed four feet below the surface or four feet from the water.

I commenced irrigating about August 1, 1894, using two ten-foot windmills with three and one-half-inch cylinders, one and one-fourth-inch feed pipes and points, and one and one-half-inch discharge pipes, but should have used one and one-half-inch feed pipe and one and three-fourths or two inch discharge pipes. I used the longest stroke these mills would allow, which was seven inches. The water was lifted above the surface ten feet and discharged into a barrel, into the bottom of which was attached a one and one-half-inch pipe eight feet long, to which connection was made with two lead pipes one inch in diameter. The discharge pipe is two feet higher than the spout, attached to it to

prevent the water slopping over. I let these two mills and pumps run night and day, and they would pump 200 to 800 barrels each in twenty-four hours. They cost me about as follows:

Two ten-foot mills and towers	$100 00
Cylinders, pipes, and points	25 00
400 feet of one-inch gas pipe	22 00
50 feet of one-inch hose	6 00
	$153 00
Value of labor spent in applying water in 1894	50 00

I did not derive the benefit from these irrigation plants I would have if I had used them earlier in the season of 1894, but they saved me five acres of plants, which, notwithstanding the destructive frosts of May, 1895, yielded me 4,000 quarts of strawberries and $500 worth of plants. The plants wintered through the past dry winter in a very healthy condition, and in digging and counting plants we seldom found a dead plant.

The past year I have thoroughly irrigated seven acres of strawberry plants and about three acres of other plants and trees with the two ten-foot mills and three pumps. The third pump was located about three hundred feet from one of the mills and was attached to it by quadrants and wire. The mill did not have sufficient power to run both pumps at same time, as the distant pump had a six-inch cylinder. I have remedied this by erecting over this larger pump a twelve-foot heavy mogul mill, which allows a twelve-inch stroke and will run the smaller pump with the quadrants and wires. This smaller pump will have four-inch cylinder, allowing a twelve-inch stroke, and will pump about 1,600 barrels in twenty-four hours. I am satisfied that this twelve-foot mill will operate the six and four inch pumps at the same time, and with a brisk wind will pump 3,000 to 4,500 barrels in twenty-four hours.

This twelve-foot mill and tower cost	$100 00
Cylinder point and pipe	35 00
200 feet of one and one-fourth-inch pipe	20 00
35 feet of one and one-fourth-inch hose	8 00
	$163 00
Estimate of value of labor in irrigating, 1895	100 00

I expect this mill and two pumps to irrigate fifteen acres of land in 1896. I could spare two million of plants, of value of $5,000, and have plenty of plants left to yield me 25,000 quarts or more of strawberries.

APPLYING THE WATER.

I have used one-inch and one and one-fourth-inch gas pipe for lead pipes to conduct the water to points most convenient for distributing it. I lay them temporarily on the surface of the ground, and move them when needed elsewhere. One and one-fourth-inch pipe is about as large as one man can conveniently take apart, move, and screw together. A few short joints of rubber hose are very convenient for varying the direction of the pipes, instead of using elbows or Ts. Twenty-five feet of hose at the end of the extension of pipes is quite necessary for applying the water. I also use ditches and wooden troughs as far as practicable. Swales and other irregularities of the surface have been a great hindrance.

I usually apply the water between the rows of plants, and if it has had sufficient time to soak in, only half the rows need water between them. If only rapidly flooded, apply to each row and dam the water so it will come even with the plants. Once in a week is often enough for a thorough watering in summer. In the spring, when the mulching is on the ground, the waterings need not be so frequent. I commence watering in March before frost is all out, and before the mulching is off the plants and continue it till November. I aim to have the ground well moistened before it freezes and soon after cover with mulching. The rows of plants should run in the direction most advantageous for conducting the water, but should have a very moderate incline. I have not tried to use earthen reservoirs or large lumber tanks, and do not care to use them. I have been informed that some who have tried earthen reservoirs on this bottom land have not been successful with them. They will leak, and moles bore holes in the banks, etc.

RECOMMENDATIONS.

The windmill is the cheapest power we have, but often in the hottest, driest weather in July and August the wind fails to do its duty and the supply of water is short also. A horse power or engine

to assist at such times would be a great advantage. Would recommend mills of ample power to pump when the wind is very moderate. If water is only eight to ten feet below the surface, use a six-inch cylinder to a ten-foot mill or an eight to ten inch cylinder to a twelve-foot geared mill. If water is conducted through pipes, the reservoir at the pump should be elevated eight to twelve feet, for when pipes are extended 300 to 400 feet the pressure is greatly neutralized by the friction.

If you have plenty of water use it abundantly, warm or cold, and do not slack irrigating if a light shower has fallen. Farmers who have windmills and plenty of water might, as well as not, use the surplus water for irrigating a patch of strawberries and other fruit. Often a few waterings at critical times will be all that is needed. Often another pump could be used for this purpose and worked by quadrants and wires, attaching it to the mill several hundred feet distant. A few dollars thus invested might afford a garden bountiful in fruit and vegetables in the driest seasons.

I would recommend that the land intended for strawberry plants be subsoiled eighteen to twenty inches deep in the fall, if it can be done then, or early in the spring, and then filled with water. If watered in the fall or winter, the frost will leave it in fine condition for early spring planting, and will retain moisture a long time.

For subsoiling I have used a breaking plow minus the mould board or rods, but now use a tree digger such as is used to cut one side of a row of trees. I can go as deep as I want to with it and I like it full better than the subsoil plows now used. After irrigating, cultivate the following day and do not allow the ground to bake and dry.

BENEFITS OF IRRIGATION.

When I commenced irrigating in 1894, the ground was very dry, the weather extremely hot, and my plants were perishing. They rapidly revived when the cold water direct from the well was applied to them. I was told by many older and more experienced men that such watering would ruin the plants; that the water should first be warmed in a tank or reservoir. I had not the time to build tanks or reservoirs, so tried the direct application of the water to the plants whenever the pump and mill furnished it, and was pleased to observe that where the plants received the most water they flourished the best. The plants near a leak in the pipes were especially benefited.

The chief difficulty in successfully growing strawberry plants without irrigation has been the dry weather from August till May or June. The plants would suffer with drouth in August, September, and October, not making sufficient growth; then freezing up dry, many of the plants would be killed outright, and the balance would be so feeble in the spring they were almost worthless for planting out new beds, or for bearing fruit. Another difficulty has been that often in the spring, when the fruit was growing, the weather was too dry to nourish and mature a crop, and one good shower or irrigation would have increased the yield 100 per cent. By irrigating, the plants can be continued in vigorous growth till the last of October. They root deeply, and freezing up in moist soil they are sure to come out of winter keeping in healthy condition, and maintain a vigorous growth till fruiting time. Such plants are of double value for planting in the spring over those that have been stunted and injured in growth by a long fall and winter drouth.

I have no special recommendation to make of varieties of strawberries best adapted to irrigation. I have not noticed that irrigation had any injurious effect on any variety. Varieties whose fruit stems lay on the ground might be injured near fruiting time if flooded too much. The careful grower could guard against such danger.

GROWING SMALL FRUITS.

R. D. M'GEEHON.

There are a few things essential in the successful cultivation of all small fruits:

First—The first is fertility of soil. I mean such a soil as is commonly called a good garden soil.

Second—If the ground is not naturally well underdrained, it must be done artificially.

Third—The ground must be deeply pulverized with plow and harrow, or spade.

Fourth—The plants must be healthy and such as have made a vigorous growth the season before. Never plant an old plant.

Fifth—In moving the plants care must be taken not to mangle and break the roots, nor allow them to become dry or frozen while out of the ground.

Sixth—In planting, the roots must be spread and placed as near as possible in the way they grew.

Seventh—Transplant as early in spring as soil is in good condition for cultivation.

Eighth—Use cultivator, and hoe freely and often. Don't allow a weed to show its head, if possible.

STRAWBERRIES.

The land is best to lie nearly level, as hillsides will wash. A clover sod, or old pasture, plowed in the fall and a crop of potatoes grown on it the next season and kept perfectly free from weeds; fall plowed again after potatoes are dug; then disc harrowed thoroughly in spring, just before you are ready to plant. After the disc harrow has done all it can to pulverize the soil, follow it with a good smoothing harrow and roller or planker. This makes about as good a bed for strawberries as anything I have tried.

I have raised good crops of strawberries on land that had grown a crop of apple seedlings and grape-vines the previous year, by cultivating with disc and smoothing harrow just before planting them, and making three to four inches of top soil perfectly mellow,—the seedling plow had been run fifteen to sixteen inches deep to take up seedling, and the rows only twenty-eight inches apart. The ground was almost perfectly subsoiled, and it held the moisture better than spring plowing.

If your ground needs manure, put well rotted stable manure on your fall plowed ground and harrow it in with the disc and smoothing harrow, in spring just before planting. When you have got your ground perfectly mellow and smooth, you are ready for your marker. I use one made like a hand-sled with three runners placed three feet nine inches apart, marking three rows at a time. Mark your rows as straight as possible, as it is easier to cultivate straight rows than crooked ones. Have your plants trimmed and roots cut back to four or five inches in length, and be sure they are kept out of the sun and wind. Let a boy take a bucket with three to four inches of water in it. Put in as many plants as is convenient. Then a man takes a bright, sharp spade. The man stands on the right-hand side of row, boy on

the left. The man sinks his spade in the ground about six inches deep, right in the row, back of spade towards the boy. When spade is thrust in the ground, he shoves the handle from him, then draws it back to him. This makes an opening behind the spade. The boy takes a plant out of bucket in his right hand, holding it by the crown, puts the roots down in the opening behind the spade, and holds it there with the crown level with surface of ground until the man draws his spade out, and with his left foot tramps the soil up against the plant. This may be a little awkward at first, but in a half day any smart boy and man can learn to do it well and speedily. I frequently have had a boy and man plant from one-half to three-fourths of an acre in a day, and do the work well.

Within a week or ten days at farthest after planting start your Planet Jr. cultivator, or eleven-toothed cultivator, and hoes. Cultivate shallow. Use small shovels, one and one-fourth inch, on cultivator. Keep the ground as level as possible. Keep cultivator and hoe going through them once every week to ten days, until about the middle of August. By that time your plants ought to cover about half the ground, and that is all you want.

Distance Between Plants.—A wet or a dry season makes a great difference; also the different varieties makes still more difference. B. Wood, Warfield, Crescent, Robinson, and C. Jack, two feet apart, an ordinary season, with good soil and cultivation, will make all you want and generally more than you want, especially if you have plenty of rain in July and August. You will have to destroy many runners or your plants will be so thick your fruit will be small and poor quality. When your rows are twenty to twenty-four inches wide, you had better destroy all runners that start out between rows. Parker Earl, ordinary seasons, has to be planted from twelve to fifteen inches between plants to make a fair fruiting row. The first B. Wood and Warfield I ever grew I planted about four and one-half feet between plants, and by September had perfect rows two feet and over wide and plants as thick in row as they ought to be to bear the best quality of fruit. I generally pinch off the first runners that start out, and all blossoms,—this gives the plants a chance to grow strong and send out two or three runners about the same time, and the runners are not in your way so much in hoeing. When runners start out freely, you can fasten the first ones in the row between plants. Get them

started in the direction you want them to run and they will not trouble you so much afterwards.

The first freezing weather that comes, mulch the entire ground over with prairie hay, or straw. If you have some coarse stable manure free from timothy, clover, or weed seed, it makes good mulching. Corn-fodder, cut in four to six inch lengths, is excellent. I use at least three good two-horse wagon loads of straw per acre. As soon as freezing and thawing is over in spring go over the field and loosen up the mulching on the plants. If too thick for them to come through easily, remove some of it into the space between rows.

The varieties to plant depends much upon what you want to do with them, as well as your soil and location. For all purposes, so far as I have tested them, the Warfield, Crescent, Wood, and Robinson come about as near filling the bill as anything. The Haverland and Bubach are both large and productive, but too soft to ship. The Woolverton, Lovett, and Saunders are all good berries and good shippers, but not generally as productive as some of the first named. We have some new varieties on trial that are claimed to beat any of these, but I have not tested them long enough to say so, but will say that Bissell and Gardner, as well as Brandywine, all promise to be valuable.

The strawberry's great want from the time it commences to blossom until done fruiting is water, water, and where irrigation is practical, the crop is almost a certainty. It takes from thirty to thirty-five days from the time the blossom appears until the fruit is ripe. If you have all the water you want during these thirty-five days, and know how to use it, you have the result in your own hands.

You may want to know how many quarts I got per acre. The frost in May, 1894, and May, 1895, destroyed my crops both seasons. With these exceptions the smallest crop I have had for fourteen years previous was 2,000 quarts, the largest, 6,000, that I picked, and from one to two thousand that a heavy rain storm destroyed, which we let the pickers take, as they were so soft and price so low it did not pay to pick them after the storm. My soil is part upland prairie and part second bottom, about sixty miles east of the Missouri river.

BLACK RASPBERRIES.

The same soil and preparation for these as strawberries. I use a single shovel plow for making a furrow for planting these, running it

about as deep as I can, making rows seven feet apart, planting the plants not over three feet apart, placing plant in bottom of furrow and covering it two and one-half to three inches deep above the crown. Make the soil firm on the plant; then, as your plants grow, gradually fill up your furrow. Give thorough cultivation with cultivator and hoe all summer. When canes get twelve to fifteen inches high pinch off the top; after that let them grow at will. The next spring trim all laterals back to within ten to twelve inches of main cane. Cultivate the same this year, and when the new canes get from twenty-four to thirty inches high, pinch them off. This will cause them to throw out a lateral at about every leaf. Let these grow at will. The next spring cut these laterals back to twelve or fifteen inches. Clean out the rubbish and start cultivator again and keep it up until fruit commences to ripen. This year you ought to get about a full crop. I usually grow potatoes or sweet corn between each row of raspberries the first year, which will pay for the cultivation of entire plat.

VARIETIES.—Palmer is first to ripen. Kansas comes about two days later. Older commences about five days after Palmer. Nemaha and Gregg eight to ten days after Palmer. Were I planting for family use only, I would plant Kansas and Older, because I would then have early, medium, and late, as Older will last to the very latest and is the best quality of any of them, especially for canning. Were I planting for market, I would plant some of all named above except Gregg. The Nemaha will fill its place and, in most respects, is preferable. The Older will stand more cold, heat, and drouth than any of them.

SMALL FRUITS AND THE AVERAGE FARMER.

GEORGE A. SLAYTON.

After many years of observation, and a no less extended experience, I am thoroughly convinced that the average farmer has fallen far short of his privilege in appropriating the manifold blessings which may so easily be placed at his disposal in that small plot of ground, the small fruit garden. If calling attention to this fact, and if possible emphasizing the loss so often unconsciously sustained, shall be of any avail

in encouraging the aforementioned average farmer to seek an improved condition, the object and excuse of this paper will be attained.

Farmers, like most other men, have one of two incentives to effort, pleasure, or profit, and, as to the latter incentive, generally the view is limited to the pecuniary sense. What does not bring in ready cash is seldom thought of as profitable. To this mistaken view I attribute much of the neglect of small fruits so noticeable on the farm. The one who makes a business of raising the various small fruits for market purposes, whether on a limited or more extended scale, seldom fails to find the operation profitable, if he has had intelligent forethought as to varieties and market opportunities. Too often has the general farmer been induced to believe that similar success might be his if he would devote a portion of his acres to fruit culture, and so with all his other multifarious duties and plans of work sufficient to employ all his time and ability he concludes to try fruit raising, and very generally he makes either a failure of the fruit or the farming. Though I would not be dictatorial, yet I firmly believe that as a rule the average farmer should not attempt raising small fruits for market purposes, but I would no less strongly urge the importance and real value of a well selected small fruit garden on every farm. This garden should not be large. A small plot, well prepared, well cared for, filled in with a few choice varieties of every kind of small fruit generally cultivated in the locality, will bring more of health and happiness, consequently profit, than ten times the amount of ground devoted to any of the general farm uses. I said this little plot should be well cared for; if it is not so cared for, then realize in your own disappointment and vexation of spirit what occurs everywhere throughout our land among the average farmers who have neglected this choice bit of earth as the broad fields of corn or wheat have engrossed their attention.

The trouble with this family garden generally is, that the farmer does not give it a place in his plans of work. This is the fatal mistake, as it will not bear neglect, and there the work must be timely, never delayed to "a more convenient season;" neither is it wise or safe to delegate the care of the small fruit garden to the already overburdened wife and children, as is too often done with the vegetable garden. Many a resident of the city or village with only a spare lot has proven the profitableness of the small fruit garden and been the

envy of his country cousin, the average farmer who had a better opportunity in every way to be the possessor of that well tilled, health giving, hope inspiring, happiness producing plot of ground. If the farmer owns the land he tills, or has a lease of several years, he will find no part of his work pays a better dividend on the investment than that little thicket of plum and cherry trees, and those few rods set in strawberries, and the few rows of raspberries, gooseberries, blackberries, dewberries, and grapes arranged along beside the vegetable garden, and enclosed by the everywhere now so common picket fence, so, at certain times of year at least, he may exclude the pigs and farm poultry from its sacred precincts.

It is not necessary here to specify varieties to plant. They will vary somewhat with the locality, and any one may obtain the fullest and best information on these points in the published annual reports of the State Horticultural Society. Suffice to say, it will be much wiser to accept the varieties recommended in these reports than to seek information from the all knowing tramp tree peddler, who always has some very highly recommended novelties of recent origin or introduction which so far surpass all old-fashioned sorts. Of course the price is very high, but the stock is scarce and very few will be fortunate enough to secure it, so you will surely not miss this opportunity. The average farmer will find much more satisfaction in his small fruit garden if he has no dealings with these troublesome, tiresome agents, but after carefully examining the State Horticultural Reports and consulting with some successful grower of small fruits of his acquaintance, secures the stock he needs of the nearest reliable propagator of the sorts he would use.

As to the care of the small fruit garden, much of value may be gleaned from our state society reports, and I will only add that in my judgment the best care will permit no vegetation growing in the garden except that from which we expect to gather the desired fruit, and perhaps no better way has been devised for accomplishing this result in this section than heavy mulching. If the season is a wet one and results in too excessive a growth of plant, more care will be needed in pruning and pinching back.

But after all my brother farmer says: "Well, yes, the small fruit is all very well. I think it very nice, indeed. Have no doubt that it is a good thing for the health and happiness of the family, but,

really, I do not see how I can be bothered with the raising it. I would rather buy what the family needs." But, my dear brother, that is the very thing you will not do. Not one man in a hundred who does not raise his own small fruits supplies his family with them in the abundance which is so conducive to health and general contentment. The farmer's family which has an abundance of fruit, fresh from its own garden, is the family which appreciates most fully the blessed privilege of living in a country home where nature, in loving recognition of a full appreciation of her bounteous gifts, smiles her happy benedictions upon a contented and prosperous people.

THE RASPBERRY.

W. J. HESSER.

I have been asked to prepare a paper on "Culture of Raspberries." In doing so, I shall be compelled to repeat a portion of a former paper, as my experiences since then have fully convinced me that my views then expressed were correct and practical.

Prior to 1880 I had set a few hundred plants of different variety in open ground which were nearly a failure. About the spring of 1880 I concluded to try them in my apple orchard, which was set the spring of 1873. The trees were planted 20x20. I set one row in apple tree rows, about four or five plants between trees, and one row between apple tree rows, making the rows ten feet apart. Plants four to six feet apart in rows; as I only had a limited number of plants, I wished to make them go as far as possible. I soon found this to be a very great mistake. I had not at this time learned how to pinch back the canes; they grew up tall, and, being far apart, were mainly broken off at the ground by the winds. I soon set one plant between each plant, making them two to three feet apart. As the young canes started up in the spring I went through and pinched the top off each cane at a height of one and one-half to two feet. I usually go through them three times each season, while they are making their growth, so as to get all the canes as they get about the right height. This I regard as very important. By so doing it causes the canes to produce

many branches and bear fruit, and making it a solid matted row. The winds could not break them down, and they produced an abundant crop of berries. They should be well cultivated. I plow three or four times, hoe twice; indeed, keep them perfectly clean from early spring to last of August.

In spring, just as growth starts, I go through canes with a pair of pruning shears and cut all the dead ends off the branches on canes. Cut to a good strong bud, you will always have the dead tips; if not cut off, they are very annoying in picking berries and detract from live wood more or less. This mode of culture and pinching, etc., I regard as very essential. The person that tries to grow raspberries by just planting once, possibly plowing once or twice a season, will very soon say, "It don't pay to grow raspberries in Nebraska," and give it up in disgust, but if you will give clean culture and carefully pinch back and prune, you are sure to say it pays, and pays big, to grow raspberries in Nebraska.

I have never planted or grown anything that has made me as much money, for amount of labor, as my raspberries. July 13, 1883, I had six acres of raspberries just getting large enough to bear nicely. That memorable day to many a Cass county farmer and fruit-grower my six acres was entirely wiped out by the hail, or all of them which was above ground. The roots remained alive that summer, but made no growth that season; the next spring made a fair growth, and the next year bore a good crop. I continued planting until I had five acres of Tyler, two and one-half acres of Gregg, and one-half acre of Turner and Cuthbert. The Tyler I regard as the most profitable. It is early, hardy, and productive; berry of good quality. The Gregg is ten to twelve days later, larger berry, and good quality, but the canes are too tender for our climate. I still cultivate them, but can't get as good return from them as the Tyler. The Cuthbert I recommend as a good berry in quality, but not very sure bearers. From 1886 to 1890 my raspberries (eight acres) netted me over one thousand dollars each year. Since then the dry weather and the shade of the large trees has greatly reduced profit of them.

I am planting a small orchard, the trees are set twenty-five feet apart, and setting to raspberries at once. Set one in each apple tree row, and two rows between apple tree rows. I believe they will be profitable ten to fifteen years.

Another very important point in pruning is to cut out all the old wood as soon as the last berries are picked. I usually set a lot of men in, after the last pickers, to cut out and carry out all bearing canes. They have filled their usefulness, and only detract from young growth and should be removed at once.

Were I to plant in open ground I would make the rows seven feet apart, plants two to two and one-half feet apart in rows; but assuredly I very much prefer the shade the apple trees make for them, besides I get two crops from same ground and always get more apples from that eight acres than any other eight acres of my orchard of thirty acres.

In picking, I use a light stand which holds six boxes, with handle made of old barrel hoops, after the style of the basket handle. The stands have legs about twenty inches long, made of old barrel staves or strips of thin boards, put on so as to be wider at the bottom than the box, so as to not be upset or knocked over. In these we carry berries to the place of packing in crates, where they are always kept well shaded and covered with heavy paper until shipped. If berries are allowed to stand for only a short time exposed to sun, they are very much injured, if not spoilt entirely. Always keep them in a cool, dry, and well shaded place.

There is another very important matter to look after,—that is, marketing the berries after they are grown. For a few years after I had berries to sell I found ready sale and satisfactory prices by shipping to commission houses, but each year my portion grew rapidly less until I had the fun of growing them and some other fellow getting the money. I began to look about for other customers. I soon found a few good reliable retail dealers in different towns along the railroads and made arrangements to ship about so many cases a day. I found this to be a mutual benefit to myself and the dealers. I got fair prices, the dealer getting better and fresher berries than they possibly could get from the commission houses for the same money. Of late years I have had ready sales in the field for nearly all I can grow for the farmers and villages around me. Had I to depend on selling to the commission houses, I fear I should be tempted to give up in despair. Those that only grow a limited amount and are near some small town or a village will usually find ready sale at fairly good prices. Many of the farmers will buy from one to three cases each season.

In conclusion, I would say, plant good hardy varieties not farther than two and one-half feet in rows. Cultivate carefully, and pinch back the young canes as soon as they are high enough. Don't wait until they are all up, but go through them at least three times, usually five to eight days after last pinching, until all are pinched back. Keep thoroughly clean by plowing and hoeing from early spring until last of August, and always cut out the old or bearing canes as soon as the last berries have been picked, and you will find raspberry culture both pleasant and profitable.

DISCUSSION.

W. R. HARRIS—I have found the raspberry the only fruit that has never gone back on me. Since I have been growing fruit the raspberry has always given me a crop that paid for the time and labor spent on it. I would like to ask Mr. Hesser whether he has ever been troubled with scab on any of his plants?

MR. HESSER—On the foliage?

MR. HARRIS—On the plants themselves.

MR. HESSER—I have never noticed anything of that kind. Some seasons I have a little rust on the foliage.

MR. HARRIS—With me the Tyler, especially, has a kind of scab on the wood that has killed it out.

MR. HESSER—My wood is not quite so strong as it used to be, but I attribute that to the fact that my orchard trees are getting so large that they cover the ground; they have been planted twenty-three years.

MR. HARRIS—Perhaps the fact that you cut out the old wood just as soon as the fruit crop is off would make some difference. I have never done that.

MR. HESSER—That makes a very great difference. Those old bearing canes will keep alive nearly all summer, and though they are all dead and gone before spring, yet they will take a certain amount of moisture from the ground that should go to the young plants, besides shading them and obstructing the ground. The day the pickers go through the last time I send a gang of men right after them to cut out the old wood and carry it out with forks.

MR. JENKINS—I would like to have it appear in the record what the expression "pinching back" means.

MR. HESSER—In the spring after the young canes get up to about the proper height we just go through and pinch the tops out.

MR. JENKINS—What is the proper height?

MR. HESSER—I would say from one and one-half to two feet.

MR. JENKINS—I have been using a long bladed knife—say an extra long butcher knife—and cutting them off.

MR. HESSER—You may do that if you like, but I can pinch two while you are cutting one.

PROFESSOR CARD—What is your hardiest berry? Do you protect them in winter?

MR. HESSER—They have no protection but the trees. The Tyler has done better than anything else I have planted.

A MEMBER—How does the Tyler compare in size with the Gregg?

MR. HESSER—It is a little smaller than the Gregg.

A MEMBER—Will it grow as many quarts to the acre as the Gregg?

MR. HESSER—I can grow just as many quarts to the acre.

MR. WHITFORD—Have you had any difficulty with winter killing? I understood you to say you do not cover your plants.

MR. HESSER—No, sir; I do not cover them and the canes go through in good shape. Of course, when you pinch them back they go right ahead and throw out shoots; many of these will run to the ground, and by the next spring more or less of those tips will be killed. Then, after they get started, we go through with the pruning shears and cut them down to the live wood.

PROFESSOR CARD—I want to emphasize one point in regard to pinching back; that is, the importance of going through two or three times and pinching back the canes as they reach the proper height. It is a bad plan to allow the cane to grow up to double the height you want it and then go through and cut it back down; you weaken the cane immensely if you do that. Then another point, Mr. Hesser, do you pinch back both reds and blacks in the same way?

MR. HESSER—No, sir; I do not have the same success with the reds.

MR. STILSON—The difficulty with my raspberries is that for the last five years there has not been a season when it was wet enough so they made any growth whatever to pinch back. The consequence is that each year has seen my plantation so much reduced, and the last five years it has been wiped out of existence. I have had a plantation ranging from ten to fifteen acres in the past, but now I haven't a bush left.

PROFESSOR CARD—How old is your plantation?

MR. STILSON—My oldest plantation would have been fifteen years old this spring. I had seven acres of that planting; then two years later I planted more, and two years later still more, and so on till I got up to fifteen acres. Since that time it has been steadily going back on me. The past five years has been such that I just got a spindling growth, and this last year I didn't get a growth of over eighteen inches.

PROFESSOR CARD—That is owing to the age of your plantation. In New York state it doesn't pay to take over three or four crops form one planting.

MR. STEVENS—Mr. Hesser, will you explain how often your plantation is renewed?

MR. HESSER—That would be a little hard to do. A portion of it was planted in 1883, then right after that, in 1884 and 1885, I planted some more. They have borne reasonably well until the last year or two. Since that time, on account of the extreme dry weather, they have not made a good growth of canes and have not borne so many berries. I think it is all right to let them stand ten or twelve years, if they are properly cultivated, the old wood cut out, and the tops pinched back. I can't help thinking that pinching is a big thing; also cutting out the old wood as soon as the crop is off.

MR. STEVENSON—I want to ask Mr. Hesser one question that I have not been fully decided on myself; that is, whether or not to allow all the young sprouts to grow.

MR. HESSER—When we cut out the old wood I tell my men, if there are too many young sprouts, to cut out some of the weaker ones. I leave five, six, or seven, owing to how healthy they are.

MR. WILCOX—I would like to ask the gentleman if there is any difference in the fruiting as between rows standing in the apple rows and those standing in the middles, taking the same age and conditions of the canes.

MR. HESSER—There was not for some time. After the trees got larger, of course, the plants in the tree rows began to get smaller each year. My trees were ten years old when I planted my raspberries, yet when they had been there five years you could scarcely tell any difference, and I am not sure but those in the tree rows bore the best. Lately they have not done so well.

NEGLECTED NATIVE FRUITS.

PETER YOUNGERS, JR.

Nebraska is blessed with a wonderful amount and remarkable variety of native fruits. By far the greater number of our counties are practically treeless, yet every stream, no matter how small, and even the breaks that head the formation of the streams, abound with native fruits.

Among the best, and at the same time most neglected, is the black-cap raspberry. This berry covers the entire state, and there is no fruit that will yield better returns to the intelligent horticulturist than the black raspberry. In the spring of 1876 we dug 700 plants from the banks of Turkey creek and transplanted them in rows. We gave them very high cultivation, and we have never planted any other small fruit that gave us as good returns for the amount invested. I believe there were at least thirty varieties in the lot that would prove remunerative to the propagator, and but a very small percentage of the fruit was unsatisfactory. Again, in 1878, we dug 1,600 more plants from the same source, and the same results were obtained—good, large berries, hardy bushes, and abundant bearers. If these results can be obtained by simply transplanting wild bushes from their native state to the garden, may it not be possible that we have in them the foundation for a black-cap raspberry that will surpass anything we are now propagating for Nebraska? It seems to me that by a judicious selection of some of the very best of these wild plants a berry might be produced which would meet with all the requirements of our climate, and while the fruit might not be quite so good in quality as some of the tame sorts, yet this would be more than counterbalanced by the hardiness and productiveness of the plants.

The wild black currant is another of Nebraska's neglected fruits. They abound in the western part of the state in many distinct varieties, and if properly selected they will prove an acquisition to the list of fruits we now cultivate. In fact, they have already been quite largely sold by nurserymen, the Crandall currant being of the wild

black currant type, and the true Crandall is well worthy of cultivation. We have fruited some that were dug in Kansas and transplanted from the wild state into nursery rows. A portion of them produced a good crop of fine fruit, and others were practically worthless, showing that this fruit requires more careful selection than the raspberry in order to be made profitable.

The plum abounds in a wild state nearly all over Nebraska and is doubtless better known and receives more attention than any other wild fruit. We can all remember how when other fruit has failed the wild plum has come nobly to the rescue. By selecting sprouts from the best varieties and planting in clumps near the hennery, the wild plum will pay well for all the care and cultivation bestowed upon it, and will make good shelter for the chickens.

We also have a very valuable acquisition in the way of wild cherries, of which we have two varieties that will in time be in almost every price-list issued by Nebraska nurserymen. The dwarf sand cherry, or Rocky Mountain Dwarf, is worthy of a place in every family garden. It is found throughout the western portion of the state, and while nearly all we have found were good, still, like all other fruits, some varieties are much larger and sweeter than others. We notice that some nurserymen offer the Improved Dwarf Rocky Mountain cherry for sale, and I believe that when we have established a standard of excellence for this fruit it will be propalgated much as we now propagate the standard cherry, and our neglected sand cherry will become a fixture in the horticultural world. The other cherry is often called and mistaken for the choke cherry, while, in fact, it is a dwarf wild black cherry, having much the same flavor and somewhat larger fruit. It is very useful for preserves, jellies, pies, etc. It is found growing in much the same portion of the state in which the dwarf sand cherry is found, and we deem it well worthy of cultivation. We observed that the wild cherries will stand a much greater degree of frost than many of our forest trees. Last spring, when the frost of May 20 killed the ash, maple, and catalpa to the ground on low land, the Dwarf Rocky Mountain cherries on the same plot were uninjured. There is also a standard sand cherry tree, a native of Dakota, which attains a height of from four to six feet, but the fruit is not as large as our Nebraska dwarf cherry.

We also have a very nice ornamental shrub which produces fruit

in abundance which is good for jellies, and when fully ripened makes a good substitute for currants; that is, the buffalo berry, which is found growing throughout almost the entire length of the state along the Platte river. We have both the red and yellow berry. This shrub is worthy of cultivation for its beautiful silvery foliage and also for its good fruit.

In the eastern portion of our state we might add the persimmon, pawpaw, and elderberry, which are all worthy of careful attention; and while this list is not complete we will find it a valuable one to work on, and much good can be accomplished by the careful selection and propagation of our neglected native fruits.

HOW WE GROW SMALL FRUIT IN WASHINGTON COUNTY.

GEORGE A. MARSHALL.

As I read the subject assigned me, my mind wandered over the condition of the garden and small fruit plantation on the average farm. While I could see a marked improvement in the last fifteen years, yet I could see a great deficiency, and chances for much greater improvements. No farm table is complete without a supply of small fruit the year around, and unless it is grown on the farm it will never be supplied. I know this from experience; as the first few years in Nebraska, we listened to our neighbors who told us fruit would do no good here and that we could buy it cheaper than we could raise it. At first we started off on the idea that we could buy just when we wanted to and just what we wanted to, and that would beat growing it all to smash. However, we soon found ourselves hungry for fruit and the table destitute of same. Few farmers who depend on buying are generous enough, are thoughtful enough, and have pocket-books large enough, and goes to market often enough to purchase his fruit and keep his table supplied first, last, and all the time with fresh, fine qualitied small fruit, equal in every respect to that which can be grown at home on the farm.

Almost any kind of small fruit can be satisfactorily grown in Washington county if planted and cared for properly. However, the first

thing we must bear in mind is that a small fruit patch once planted is by no means a completed plantation, but that the steady and interesting time has just begun and that the good luck expected must be accompanied by some common sense and hard labor. This well carried out, no other patch on the farm of equal size and given equal labor will give one-half the returns or satisfaction one year with another that the small fruit patch will.

SELECTION OF LOCATION.

While the small fruit patch should be near the house, yet it must be borne in mind that we must keep out of the hollows, as we must have good air drainage in order to prevent late frosts from cutting short our crops of fruit. High east or northeast slopes preferable. South and west slopes bad. If land is level, a wind-break should be planted on the south and west. If east slope, a south wind-break will be sufficient. We have learned by experience that this wind-break is very important, especially with blackberries and raspberries.

PREPARATION OF GROUND.

In preparing the ground for the planting of any small fruits, it should be plowed from eight to ten inches deep and subsoiled if possible, followed by harrow; then with plank drag or roller. This will leave the ground mellow and easy to mark out in rows.

WHAT TO PLANT.

We can plant the following with satisfactory results: Blackberry, raspberry, juneberry, gooseberry, currant, strawberry, and grape. However, as before said, when once planted, we must not sit down and expect "luck" to bring us success.

Blackberry plants should be fresh and lively, with at least one good strong cross-root; should not be started too much (with new shoots not over one-half inch in length); should be planted in rows six to eight feet apart and two to three feet in the row. This can easily be done by running out the rows with a plow or lister running twice in a row. Please remember that a common lister or fourteen-inch plow run once in a row will not make the furrow deep enough for blackberry plants. They should be planted at least two or three inches deeper than they stood in the nursery row, with dirt pressed about

them. Be careful, however, not to disturb the new shoots or buds, which will be very easily broken off at time of planting. The weeds should be kept down by constant cultivation, being careful not to disturb the small young shoots, as the life and success of the blackberry patch depends on the preservation and growth of those young canes.

Pruning should begin the second year by pinching off the ends of the young canes when about two to three feet high. This will cause them to become stocky and send out strong limbs. They will need no more pruning until the next spring, when the tips of these limbs should be shortened and all straggling canes and canes that hang over in the row should be cut out; also all old canes removed, leaving nothing but the wood that is expected to bear the crop. Never allow the berry canes to form a wilderness by filling up the middles. Briers are easier kept down than weeds; therefore the task of keeping them in rows is not so hard after all. Very little hoeing is needed. The one-horse garden cultivator will complete the job.

The Raspberry.—In selecting the plants it should be remembered that the raspberry plant is weak enough at best, therefore the freshest and strongest plants obtainable should be planted. Plants that have been carted around on railroads and laid around depots and nursery packing houses for a week or so are perfectly worthless, and will result in failure if planted.

For planting would recommend the running out of rows six feet apart with some plow that will make a small furrow five or six inches deep; then set the plants at one side, in the furrow, with crown one or two inches under the surface. Be sure to get the roots well spread, with dirt well mixed through and firm about them. In doing this be careful not to press on the crown or break the new white shoots started. They should be cultivated about the same as blackberry, only they will need a little bit more hoeing in the row.

Pruning.—The following spring the canes should be shortened to about twelve or eighteen inches. If the growth has been strong we may reasonably expect a light crop of very nice fruit from these little canes. The second summer, and thereafter when the canes are from one and one-half to two feet high, they should be pinched off same as blackberry. By September 1st they will have numerous long side branches, some of which will reach the ground. New plants can easily be grown by simply covering these tips with earth. This is

also claimed to help the old plants to winter, as the new plants will have strong roots in a few weeks and thus the cane is strengthened and fed from both ends. As soon as the fruit has been picked, the old canes can be removed, and should be if bothered by insects; otherwise they can remain until spring, when it should be cut and all new canes shortened to two to three feet, according to strength of cane.

Our mode of cultivating the old blackberry and raspberry patches is to plow them shallow with an eight or ten inch stirring plow once a year, always throwing the dirt to the row. The balance of the season's cultivation will be with a hoe, Planter Jr. one-horse cultivator, or something similar. They should have a good dressing of manure once in four or five years. A raspberry or blackberry patch thus treated will remain profitable for from eight to twelve years.

The most satisfactory varieties with us are Snyder blackberry, and Gregg, Nemaha, Older, Palmer, and the Old Mammoth Cluster raspberries. The Turner is the best red raspberry yet tried. The Mammoth Cluster may not be so promising in the start, but holds out wonderfully under good care, being in good condition and bearing profitable crops for twelve years.

The juneberry, gooseberry, and currant should be planted from four to five feet apart each way and kept clean by thorough cultivation. They bear well.

Currants do not seem to enjoy our bright hot sun and dry south winds, therefore will be more satisfactory if planted where the south winds do not disturb them, in rows with young orchard trees. The thin shade the young fruit trees will furnish through the heat of the day is just what currants need to make the fruit stick on the full length of the stem, thus giving the best results.

Our most satisfactory method of growing strawberries is to plant in rows from three to three and one-half feet apart and fifteen to eighteen inches in the row, and cultivate and hoe thoroughly. Trail the runners up and down the row until it is filled with plants to a width of from six to eight inches; say two to three plants wide. Keep middles clean all summer by cultivation, and when ground is freezing in late fall cover two inches deep with old hay or straw that has no weed seed in it. In the spring this covering should be raked off the plants and left between the rows until the fruit is picked, when it should be removed from the patch and the plants cultivated as before.

GRAPES.—The old saying that grapes should be planted on a south slope with rows running north and south has proven a dead failure with us. High level land on east slope has given best satisfaction. In planting on level land where there is no danger of wash, plant in rows running east and west; thus the canes will never slide together by a north and south wind. Have the rows six feet apart, except the drive-way rows, which should be ten feet apart. Plant eight to ten feet apart in the row. Plant in furrow made by running twice in a place with a common stirring plow. Be sure that this furrow is ten or twelve inches deep. In setting the plant dig three or four inches deeper with a spade and leave only two or three buds of plant above surface. We lose a great many plants by root killing unless planted deep. Keep weeds out by thorough cultivation. In October, when leaves have fallen, trim them to one or two canes and cover with dirt, then a light covering of old hay or straw. Trail them up to a stake the second year, and if they make an ordinary growth, the canes can be left three feet long the second fall and be ready for the trellis the third year.

I deem it advisable to cover all vines the first two or three years, and if location and varieties are such that they will always need covering, the cane must not be trained to stand perpendicular from the root, but must be trained to lay almost on the ground with top trained up and trained on the wire. This way the vine can easily be pressed to the ground without breaking it. Always bear in mind, in trimming, that it is easier to trim too little than too much, and that the fruit grows on the new wood. Cut out all the weak struggling canes, shape the vine up so that when tied on the wire the fruit wood will be evenly distributed over the trellis. Never leave the fruit wood over four or five buds in length.

The above conclusions and directions are based on actual experience, accompanied by failure and success, and if followed by any planter in east central Nebraska, will give satisfaction. There is no visible reason why any farmer should not have his table blessed with an abundance of small fruits.

A patch of ground along side of the garden, and the same size, planted to small fruits will take less labor and produce more for the table and give more satisfactory returns than the best garden I ever saw in Washington county.

A farm of twenty acres planted to small fruits and well attended will yield more solid cash than can possibly be dug out of a quarter section by common farming. If planting in large quantities for market, it is best in the long run to plant blackberry, raspberry, and currants in young orchards, as the cultivation given the berries is just what the young trees need, and the small amount of shade produced by the young trees will only add to the yield of berries.

DISCUSSION.

QUESTION 1—I would like to ask the gentlemen at what time of the year and how often he pinches his raspberry and blackberry bushes back?

ANSWER—We pinch them just as quick as the plant is high enough; and go over them four or five times a season, keeping them pinched back.

QUESTION 2—How many canes would you generally leave standing?

ANSWER—Three or four canes is, I think, a great plenty; however, it might vary in different varieties.

QUESTION 3—What success do you have with the currant?

ANSWER—The bushes grow all right with us, but they have been rather irregular and uncertain in bearing. We have an extra good crop this season.

QUESTION 4—What is the best variety of currant?

ANSWER—We like the White Grape. The White Dutch is the best bearer, but is rather small, as is also the Red Dutch, although a good currant. The cherry currant is too small. We like a large currant and a large bush as well.

QUESTION 5—When you pinch back the raspberries do you pinch back the branches?

ANSWER—No, just let them grow. If they will make good strong limbs, let them grow.

BEES THE FRIEND OF THE HORTICULTURIST.

E. WHITCOMB.

While the honey-bee is the only one of the thousands of insects which man is able to put to his own exclusive use, yet by a great misunderstanding of this interesting insect we have laid at her door many accusations which a better study of her make-up and habits have entirely acquitted her of the charges. It has long since been established that the jaws of the honey-bee are far too feeble to enable it to puncture the skin of the most delicate fruit. Even some of the warm friends of the honey-bee have been heard lamenting its propensity to banquet on his beautiful peaches, pears, plums, and choicest grapes. Were the honey-bee able to puncture even the pistil of the most delicate flower, we, as bee-keepers, would be able to supply the market with rich red clover honey in abundance, and at a much cheaper price. Had the honey-bee been so constructed as to be able to puncture the skin of the most delicate fruit, juices would have taken the place of the bright clear nectar; we would be eating a condensed fruit jam instead of honey, and there certainly would have been cause for just complaint on the part of the horticulturist, as well as from the bee-keeper.

Bees do gather the sweet juices of fruits when nothing else is at hand to gather, yet their jaws, having been constructed mainly for wax making, are constructed more like two spoons working towards each other. Imagine, if you will, the experiment of attempting to pinch a hole through a rubber ball with the thumb and finger and without the use of the nails, and you have at once the uselessness of the honey-bee attempting to puncture the skin of the most delicate grape. It has also been charged that the visits of the honey-bee to different flowers are a great injury to them. This is the grandest of all delusions. Horticulturists all agree that in order to produce perfect fruit, if at all, there must necessarily be a pollenization from one flower to another. In the past we have regarded the wind as the great agent through which this is accomplished. Here on the great prairies,

where the gentle breezes are often wafted into gales, the rich pollen of our fruit trees is often wafted into Kansas, or *vice versa* into the Dakotas, while we seek for a cause as to why our fruit has not been plentier or better formed. Nothing is so admirably adapted to the fertilization of flowers as the bee as she flits from flower to flower in quest of either nectar or pollen. The particular construction of her feet and legs renders her especially valuable for this work. And here in Nebraska, where the absence of wild bees in any considerable numbers is so marked, I am fully persuaded that apiculture and horticulture should be consolidated together, so far as the needs of the latter would require the good offices of the former. We might with as much propriety wait for our neighbor to pull the weeds out of our strawberries as to wait for his bees to pollenize the blossoms for us. The first instance of the value of the honey-bee as a fertilizer of fruit brought to my notice was four years ago. The weather being wet and cold, the honey-bee was able to fly but little, and as a direct result what at first promised to be an abundant crop dwindled into insignificance with a small amount of imperfectly formed fruit. In my own orchard on this occasion sufficient fruit formed to have made a good crop, but on account of its imperfect fertilization dropped off soon afterwards. On this occasion, and while my cherries were in full bloom, the weather was such as to allow my entire apiary to work on them for two days. As a result I harvested 150 bushels of fine cherries, which brought in the orchard ten cents per quart, while my neighbors, whose trees were equally as well cared for as mine and were equally as well loaded with blossoms, got none. Do you think I erred in attributing this crop to the little honey-bee? An eminent horticulturist of our state, when approached upon this subject, attributed the failure to continued rains which washed the pollen from the flower and prevented its proper fertilization. This being the case, to what cause are we to attribute those orchards which, being visited by the bee, bore an abundant crop; for in Saline county, when rain falls at all it falls alike upon the just as well as the unjust, and of which I am persuaded the latter are in a very large majority, and lay no claim to being bee-keepers.

In introducing the red clover into Australia it was found that this plant did nicely in that fertile island of the sea, but the clover produced no seed. Finally, the great companion of the red clover blossom,

the bumble-bee, was likewise imported there, and there was no more trouble in producing the seed of this clover in that clime. Do you not think that the breezes of Australia would be quite as efficient in wafting the pollen from one flower to another as here in Nebraska, or that the bee does not perform as efficient service in one locality as another?

A controversy has lately been going on between a gentleman of Iowa and one from Missouri, as to the value of the honey-bee in fertilizing the strawberry. Having scrutinized the evidence in this case carefully, most is in favor of its fertilization by the bee, and many have been frank to admit that without the good offices of the bee there would have been no berries. Many of us have sought out the causes for failures, and after finding them have applied the remedies. We are not aware but that a cake of nice honey would look as nice and be as palatable on the table of the horticulturist as on the board of his neighbor, the bee-keeper. We know of no reason why these industries so necessary to each other should not go hand in hand, or why the horticulturist should depend upon his neighbor for bees to fertilize his fruit or for honey to supply his table.

DISCUSSION.

QUESTION 1—Do I understand you to take the position that the bee is the principal agent in the fertilization of the strawberry?

ANSWER—I do think if it were not for the bees we would not get very many perfect strawberries. When you see an ill-formed strawberry you may set it down that the honey-bee has not visited that berry, or blossom. I would like to say that the honey-bee has never bothered us by destroying fruit, not but that it has pretty strong jaws, but I believe these are used for the purpose of destroying the moth. I do not think they are able to puncture the skin of the choicest grape, and do not think they would do it if grapes were placed in the hive. In same cases the saw-toothed wasp is the fellow that punctures the grape and the bee gets the credit for it. The bee will run its tongue into the grape after it has been broken, perhaps three-eighths of an inch, to get the sweet juice. Speaking of fertilization, I have been examining this very closely for the last four years. My observation tells me that the strawberry is visited by the honey-bee, but it is not the honey-bee that does the fertilizing for me. There is a little sweat-bee, not nearly as large as the honey-bee. I do not know whether the regular honey-

bee is after honey, he is probably after the pollen. But I have observed it very closely and have made up my mind that this little sweat-bee is the fellow that does the work of fertilization.

QUESTION 2—Do you not think if the berries were properly fertilized they would be perfect if they were not visited by the bees?

ANSWER—I would rather have the bees around, I think it better. I think the failure in our apples is sometimes caused by its being too cold for the bees to fly.

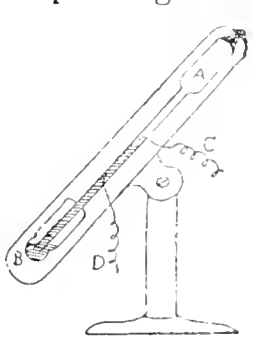
SUNSHINE AND CLOUDINESS IN NEBRASKA.

G. D. SWEZEY.

The amount and the intensity of sunshine in any locality is an element of the weather which possesses large practical importance from the agricultural and horticultural point of view, since not only the growth, but especially the maturing of the crops, as well as the harvesting of them, is largely dependent upon it. Nebraska, as will appear from the following statements, is favored in this respect. While the greater part of our rainfall occurs in the growing season, and especially in the earlier part of the season when crops are developing most rapidly as regards gross weight, the latter part of the growing season on the other hand is characterized by a steady decrease in the amount of cloudiness, a large percentage of sunshine, and a high degree in the intensity of sunshine as well as in its actual duration.

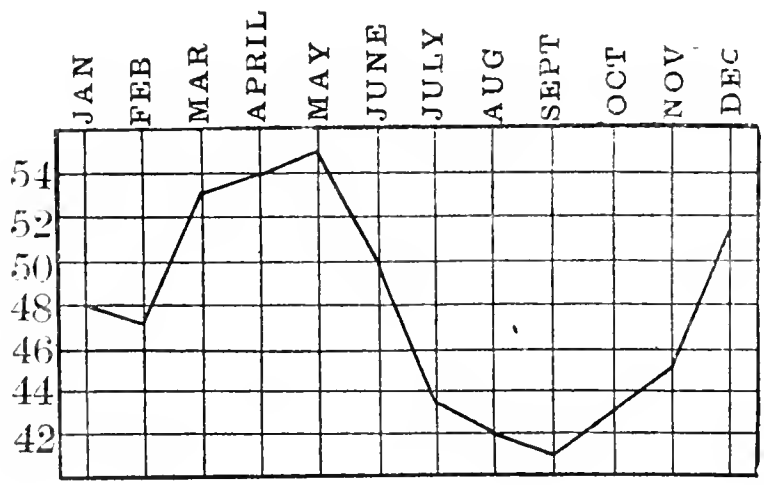
This large percentage and high intensity of sunshine follows as a natural corollary to the fact of the inland position and clear, dry atmosphere of Nebraska.

The instrument by which the hours of sunshine are determined is an electrical sunshine recorder, placed on the roof and operating electrically one of the three pens of the triple register. It consists of an outer tube of glass for protection, containing another glass tube expanded at the ends into air chambers, A and B, and partly filled with a column of mercury, which separates the air in the two chambers. The lower chamber or bulb is coated with lampblack, which when the sun is shining absorbs the sun's rays and heats the air in



the lower bulb more than that in the upper. This causes the lower air to expand and push the mercury up until it comes in contact with the wire C, which is soldered into the tube. The other wire, D, is immersed in the mercury all the while, and as the two form an electric circuit leading to the recording instrument, the rise of the mercury to the wire C will close the circuit and register on the cylinder the fact of sunshine; then when the sun goes under a cloud, the lower bulb cools to the temperature of the upper, the mercury falls away from the wire C, and so the circuit is broken and the sunshine record ceases to be made on the cylinder.

The result of observations on sunshine and cloudiness in eastern Nebraska is shown on the chart. The broken line shows what per-



centage of the time the sky is cloudy. It will be seen that the cloudiest month is May, when the sky is on the average 55 per cent overcast, or, what amounts to practically the same thing, there is sunshine 45 per cent of the day, while in September the cloudiness reaches its lowest point for the year with an average of 41 per cent.

The greatest amount of actual sunshine, however, in the different months varies in a somewhat different manner. The longer duration of daylight during the earlier months of summer more than compensates for the lack of clear skies. The longest days of course occur in June, when the average duration of daylight in this latitude is about fifteen hours. This brings the season of greatest actual sunshine earlier than it appears from the chart. In fact, the actual amount of sunshine is greatest in the month of July, when it averages about 8.3. hours a day; next in amount of sunshine comes August with an aver-

age of 8.0 hours; June averages 7.5 hours; and September 7.4 hours. It will thus be seen that the percentage of sunshine is relatively greatest at that season of the year when crops are ripening and being harvested, in other words, when sunshine is most welcome to the agriculturist.

As to the intensity of sunshine in Nebraska we know as yet but little by direct measurement of it. A few months' observations have been made at the experiment station at Lincoln with a self-registering actinometer, but the data are as yet too few to give much information. By inference, however, we know that the intensity of the sun's rays in Nebraska is greater than in most parts of the country. Our absolute humidity, or the actual amount of moisture present in the atmosphere, is decidedly less on the average than in the states lying nearer the seaboard or to the great lakes, and this low degree of humidity is, to some extent, a measure of the capacity of the atmosphere to transmit the sun's rays. Further, the number of days in summer with a high mean temperature is large for this latitude and argues large penetrating power for the sun's rays.

It will thus be seen that in the years when we have our normal amount of rainfall the conditions could scarcely be more favorable than they are in Nebraska; with about two-thirds of our rainfall occurring in the five months of the growing season and reaching its maximum in the earlier part of the season when growth is most rapid, and with sunshine at a maximum when crops are maturing and being gathered we have conditions well nigh ideal.

But what shall we say of the years of drought when the intensity and duration of sunshine proves an adversary instead of a friend? It is important then that we should clearly understand the forces with which we have to contend, and should so cultivate our farms and orchards as to reduce the evil to its lowest terms. At the summer meeting of the Society I presented facts showing how excessive is our evaporation and how important therefore that, by means of surface cultivation aud mulching, we should husband our resources in the matter of soil moisture. The facts presented to-day will show one reason why evaporation is so large in the summer months and will serve to emphasize this matter of the importance of learning how to handle the soil to the best advantage, which is evidently one of the problems which is to demand our careful attention here in Nebraska.

SOME NOTES ON NEBRASKA BIRDS.

LAWRENCE BRUNER.

INTRODUCTION.

For upwards of twenty-five years the writer has taken an interest in our birds and made notes relative to their abundance, migrations, nesting, food-habits, etc., simply for personal gratification.

About two years ago, during a conversation in which the relation of birds to horticulture incidentally arose, Professor F. W. Taylor suggested the advisability of devoting a portion of a succeeding annual report to our Nebraska birds. With this object in view both the professor and the writer broached the matter to other members of the Society. Several at once not only became interested in the matter, but suggested its early accomplishment. Our late lamented Secretary, D. U. Reed, was especially in favor of the scheme. Accordingly it was decided that my usual report as entomologist should be omitted from the present volume and its place given to one on birds.

It is on these grounds that I now present for publication some "Notes on Nebraska Birds," and it is to be hoped that they will in a measure, at least, have the desired effect, viz., the protection of our birds, which means the destruction of insect pests in proprotion as the protection reaches out. Just so soon as it was decided that this subject be treated in the present report efforts were at once made to secure all such additional material and information as would tend towards making our knowledge as complete as possible. Correspondence with various persons interested resulted in the bringing together of notes taken by about forty separate workers located in different parts of the state.

Of course the vast amount of material thus brought together had to be assorted and arranged at odd times between working hours in the University. While the paper is not what it should be, nor even what it might have been, if coming from a different person, still it is fairly satisfactory as a basis for future work.

By referring to the catalogue on the succeeding pages it will be seen that there are 415 distinct species and subspecies listed. Of these, future more critical examination may eliminate six or seven forms. Perhaps it will also be found that at least twenty-five are only accidental visitors. To counteract these possible eliminations there will undoubtedly be several additions made when we shall be better acquainted with our bird fauna.

These notes, besides definitely extending the recorded ranges of many of our North American birds, will show that at least 227 breed within the state and that more than 100 remain within our borders during ordinary winters.

It is but just here to acknowledge all the aid that has been received from the various persons whose names will be found in succeeding pages in connection with the notes furnished by each. Without such aid these notes in their present state of completeness could not have been written. It should also be generally known that it is due to the liberal policy of the Society that so many illustrations of the birds treated accompany the paper. These illustrations were either loaned by the Illinois State Laboratory of Natural History and the United States Department of Agriculture, or were redrawn and engraved from plates published in Warren's "Birds of Pennsylvania" and from the birds themselves. The drawings were made by Nelly Zehrung and Edna Hyatt of this city, and the engraving done by Blomgren Bros. & Co. of Chicago, Ill.

LAWRENCE BRUNER.

REMARKS ABOUT BIRDS IN GENERAL.

The horticulturist, living as he does among stately trees, graceful shrubs, trailing vines, and showy flowers, must enjoy life to a greater extent than do most other people. Still, it appears to me that unless he is intimately acquainted with his almost constant companions, the birds, he loses much of the real enjoyment that might otherwise be his. These little creatures are so closely connected with all that interests the devotee of horticulture that there should be a mutual acquaintance struck up at once. What is true of the horticulturist in this connection is also true to a greater or less extent of all persons who are in any way related to the growth of trees, or even to the cultivation of the soil. I would even go further and say that everybody should be interested in the birds, be his occupation what it may. This being true, it gives me great pleasure at this time to be able to introduce to the readers of this paper our mutual friends, the birds of Nebraska.

Perhaps birds are better known, in a general way at least, than are the members of any other natural group among animal forms—in fact than all the others combined. Yet the ignorance of the general public as relates to the habits, modes of life, food, names, etc., of even our commoner species is simply appalling.

Although birds are comparatively few in species they are moderately numerous in individuals when compared with some other groups of animal forms. They are also quite general in their distribution over the earth's surface.

In their relations to other animal forms, birds approach most closely to the reptiles. In fact, some of the earlier geological birds were more like reptiles than they were like the species of our day. Some of our species even now have very marked reptilian characteristics. Yet we seldom, if ever, think of birds in such a relation. Their beautiful forms, musical voices, gaudy plumages, smooth tempers, and many other pleasing features have endeared them to us from childhood. These, along with their general usefulness, have won for them our sincere friendship.

In size birds vary greatly, ranging from the minutest humming-bird, which is scarcely larger than a bumble-bee, to the largest ostrich that stands higher than the tallest man. Yet in size, color, form and habits they are perfectly fitted for the respective places which each fills in the vast sea of life about them.

Unlike most other animals, birds are much less restricted in their distribution over the earth's surface. This is undoubtedly due to their power of locomotion, which enables them "to choose their climates and their seasons,—thus avoiding, in a great measure, one of the most destructive checks upon the multiplication of animals." And, by the way, the organs which they possess for locomoting the air are very characteristic of these creatures alone. They are made up of a series of modified scales, or, perhaps more properly speaking, hairs that grow out of the front pair of limbs and the tail. Consequently it is that in birds the law of migration reaches its climax. Directly related to this trait, and largely regulating its different phases, are such features as change in the seasons with their accompanying variations in heat and cold, food supply, reproduction, moulting of feathers, etc.

When applied to the entire feathered tribe, bird migrations are certainly more of a study than one would at first suppose. Hardly any two species seem to possess this trait in the same degree, nor to act in precisely the same manner during its performance. Some of them make the change from one region to another so gradually that the movement is barely noticed. Others remain either in the sunny south, where they revel among showy flowers and the giant trees of tropical forests dressed in their festoons of clinging vines and deep green mosses, or in the northland, where the memories of their wooings, and, more recently, the caring for their hungry little ones, occupied the long summer days. At last the moment for action has come, and they are up and away. Some birds travel in flocks, some by families, and others in pairs, or singly, as the case may be. These journeys are made with some only during the day-time, while others travel only by night, and still others move along as necessity demands. In spring they go northward, in fall towards the south. Some migrate principally for breeding, others on account of food supply, all of them seemingly of a necessity. During their migrations, as well as at other times, the speed attained in their flights by some birds is simply marvelous, if not almost incredible. Some ducks are said to travel at the rate of two

miles or more per minute. The doves, hawks, and even the snipes, and many of the song birds are rapid fliers. A few of these are known to draw on a vast scope of country for their food supply, and it is not an uncommon occurrence for some of them to reach a point at least one hundred miles or more from their nests during a single day's search.

Although not directly in the line of greatest interest to the cultivator of the soil, one of the most charming features in bird study is that connected with their nest building and the rearing of their young. So varied are the methods employed in nest building, and later in caring for the offspring among different birds, that the student never has learned all that is to be known on this topic alone, even though he has spent a lifetime in observing and remembering what he has seen. From no nest at all, as we find the night-hawk providing for its eggs, to the complicated structure made by the orioles, tailor bird, and allies, all variations of nest building are to be found. The locations where these structures are placed by their builders also vary much.

Plumage, as we find it with different birds, also offers much food for reflection. In the female and young it is usually modest, while the males of some species at least are very gaudily attired. In some it is protective, while with others it seems to be the reverse.

The habits and peculiarities of most birds coincide with their surroundings. The waders are long-legged, long-necked, and live about the margins of streams and bodies of water and in the depths of swamps. They are usually drowsy-appearing creatures, not especially noted for their beauty of form nor melody of voice, nevertheless many of them are gaily attired. The love-song of the Bittern is not of a kind that would produce within the reader poetical dreams. But to these birds accustomed to the coarse croak of the bull-frog and roar of alligators it is sweet music, no doubt. The soul-stirring, hair-lifting hoots of the Great Horned Owl are songs which in all probability produce reflective moods in these naturally wise-looking nocturnal prowlers among the feathered tribe. The predaceous forms delight in shrill, piercing cries, while the graminivorous ones habitually modulate their voices.

Aside from taking life very seriously, many birds seem to be imbued at times with a spirit of fun. The Meadow Lark will sometimes start out with a plaintive call, and after attracting its mate will go off into

a paroxysm of laughter, as it were. Other birds, notably the domestic cock, will call up to himself hens and chicks to partake of some supposed dainty morsel, and then slap his leg with his wing and laugh at the practical joke he has perpetrated.

With these miscellaneous and general remarks about birds as an introduction, and for the uninitiated, it will be more to the point in the present paper to speak of the practical side of the subject.

Quoting from a paper by Professor S. A. Forbes, who has done much in the study of birds and their direct relation to man, we have the following: "Excluding the inhabitants of the great seas, birds are the most abundant of the Vertebrata, occupying in this great subkingdom the same prominent position that insects do among invertebrate animals." This position of the two groups in their respective divisions of the animal life of the globe cannot be due simply to chance. There must be some connection between them. Let us see.

In my former reports, to both this Society and to the State Board of Agriculture, it has been shown time and again that not only are the distinct kinds of insects almost myriads in number, but also that the individuals of each species are incalculable. That their powers of reproduction are simply wonderful, being limited only by the amount of food available, etc. Now, the disproportionate number of birds on the other hand, with "their universal distribution, the remarkable locomotive-power which enables them readily to escape unfavorable conditions, and their higher rate of life, requiring for their maintenance an amount of food relatively enormous," give to them a significance which few seem ever to have realized. While naturally birds are quite numerous both in species and individuals, their greatest enemy, man, has so depleted their ranks in many localities that they have become scarce.

Perhaps few of us have ever thought much about what birds eat. Yet those who have studied these creatures assure us that a very large per cent of their food, possibly fully three-fourths, consists of insects. Even those species which are classed as graminivorous, during the summer months from choice partake chiefly of an insect diet.

Careful estimates of three conservative ornithologists have placed the bird-life of Illinois at three birds per acre during the six summer months. Now, if we place their number for Nebraska at one and one-half birds to each acre during a similar period, we would have in

round numbers about 75,000,000 of birds. If, as has been estimated, three-fourths of the food of this host of birds should consist of insects, what would this mean? A very conservative estimate as to the number of insects eaten daily by each bird can be set down at twenty-five.* This being true, it would take one billion eight hundred and seventy-five millions of insects for a single day's rations for our birds during any one of the 175 days of summer. If these insects were spread out at the average of ten thousand to the acre, a day's work of our birds would mean the complete clearing of 18,750 acres.

Professor Forbes says: "On this basis, if the operations of the birds were to be suspended, the rate of increase of these insect hosts would be accelerated about seventy per cent, and their numbers, instead of remaining year by year at the present average figure, would be increased over two-thirds each year. Any one familiar with geometrical ratios will understand the inevitable result. In the second year we should find insects nearly three times as numerous as now, and in about twelve years if this increase were not otherwise checked, we should have the entire state carpeted with insects, one to the square inch over our whole territory."† What would be true in Illinois would apply equally well for Nebraska.

More than twenty-five years ago Benjamin Walsh, the first state entomologist of Illinois, estimated the damage done by insects in that state at twenty million dollars annually. Again splitting these figures in the middle and allowing only half as much for our state, or ten million dollars. Supposing that by some means or other we could increase the efficiency of our birds only one per cent, the saving that would result could be plainly set down at $100,000. This increase in the efficiency of our birds, like all other estimates, is very low. Supposing it should be five per cent instead, then the saving would be an even half million dollars annually. The sparing of a single bird annually for each inhabitant of the state would more than meet the above estimates.

Even if birds do destroy alike the injurious and the parasitic insects,

* These figures, large as they seem, are much too small. Most birds eat at least two meals each day, and the stomach contents of all birds examined by those engaged in the study of their food-habits would indicate that seventy-five or a hundred insects per day would be more nearly correct.

† Bulletin of the Illinois State Laboratory of Natural History. Vol. I, No. 3, p. 81.

no dire result will follow. It is not from the depredations of the masses of insect species that we lose our crops or suffer severe losses in a single direction; but on the contrary, from the few that at times become abnormally numerous. This being true, the birds naturally turn their attention to these latter for the bulk of their food supply. We may infer from this statement then that even a bird is not fool enough to ignore a plentiful food supply for that which is difficult to obtain.

While a very large per cent of our birds retire toward the south as winter approaches, a few of the species remain with us over winter. Of course these that remain must be fed, and if left to themselves they will find that food. Most of them now change to a vegetable diet of which they find a plentiful store in the numerous weeds and other, to man, useless seeds that lie strewn about the country everywhere. These seeds, which are quite rich in oils, give the necessary fuel supply and energy that warm the small snow-buntings and sustain their powers as they hurl themselves into the very teeth of the arctic blasts when the thermometer registers many degrees below zero. Even here the birds befriend the tiller of the soil by searching out and destroying the seeds of many a noxious weed that would quickly grow up and occupy the ground to the disadvantage or destruction of that which is being cultivated.

There are instances where a bird may be harmful during one part of the year and exceedingly beneficial during the remainder. In such cases, if we apply business principles, we will carefully estimate both sides of the account before a summary settlement is made by destroying the bird. He is a poor business man who pays ten dollars for that which he knows must later be sold for fifteen cents, or even less. Yet I have known of instances where a robin that had saved ten to fifteen bushels of apples that were worth a dollar per bushel, by clearing the tree from canker worms in spring, was shot when he simply pecked one of the apples that he had saved for the grateful or ungrateful fruit-grower. Some persons would gladly sell cherries to their neighbors at the rate of ten cents per quart, but would refuse to let a bird have them at ten cents apiece after they had been paid for in advance. The ordinary Red-headed Woodpecker, which is almost universally credited with being an insect destroyer, has been found by actual examination to take more corn and other vegetable food than is taken by any of the thrushes—birds which most of us brand as rascals.

Some birds, but these are comparatively few, are harmful throughout the year; *i. e.*, their food-habit is such as to count against them when the ledger is balanced. Two of our hawks, the Blue Jay and English Sparrow will fall in this category, but aside from these it would not be safe to begin killing birds indiscriminately, for in so doing we might be injuring ourselves financially.

It is true that reports have reached us at the University of Nebraska to the effect that certain birds like the blackbirds, Robin, Brown Thrush, English Sparrow, and orioles had done great injury by pecking apples full of holes as they hung on the trees. It has also reached us that these same birds had occasionally been observed to destroy certain injurious insects.

On the following pages is given as nearly a complete list of the different species and varieties of Nebraska birds as could at this time be compiled from the data available. While it has been impossible to give an account of the food-habits of each one separately, or even of each group fully, I trust that in most cases sufficient has been said to warrant the reader in looking into the subject more closely for himself before he ruthlessly kills birds about which he knows nothing or but little. In certain special cases where birds have been known to attack fruit and other crops the food-habits, along with other notes, will be found in connection with the bird's name at its proper place in the list.

In closing this preliminary chapter to a list of our Nebraska birds, it might be well to suggest that the subject is of sufficient importance to call for its being taught in our public schools to a limited extent at least. We should have a "Bird" day just as we have an "Arbor" day, and a "Flag" day, when suitable exercises should be held commemorative of the occasion.

It might also be well to add that we have laws in this state against the indiscriminate slaughter of birds which it might be worth knowing about. These will be found incorporated in the appendix to the list which follows.

A LIST OF NEBRASKA BIRDS, TOGETHER WITH NOTES ON THEIR ABUNDANCE, MIGRATIONS, BREEDING, FOOD-HABITS, ETC.

Nebraska appears to be well fitted as a home for many distinct forms of birds, just as it is for the other kinds of animal life. From our studies of these creatures for the past twenty-five years and those of about fifty other persons whose notes we have had for reference, it would appear that although a prairie state, Nebraska has an unusually large bird fauna. These notes show 415 species and subspecies as visiting the state, while there are records of 227 breeding within our borders and more than 100 winter residents. When we learn that only about 780 species are recorded for the whole of North America north of the Mexican boundary, it certainly seems astonishing that from among these we should receive so large a percentage. If, however, we take into consideration the variations in altitude above sea level, the differences in surface configuration, climate, etc., that pertain to our state, its location and the relation which it bears to the country at large, perhaps the wonderment will become less. Our southeastern corner is only about 800 feet, our western border almost 6,000 feet above tide water. The state is divided into timbered, prairie and plains regions. We lie nearly in the middle of the United States, with a high mountain chain to the west and a giant waterway along our eastern boundary. In fact in Nebraska meet eastern, western, southern, and northern faunas; while we also have a fauna of our own. We find forms belonging to low and high altitudes, to wet and dry climates, to timbered and prairie countries, as well as to semi-desert and alkali regions.

ORDER PYGOPODES.—THE DIVING BIRDS.

FAMILY **PODICIPIDÆ.**—THE GREBES.

The grebes feed chiefly upon snails and other aquatic animals, such as are found in and about their haunts. They also destroy grasshoppers and such other insects as come across their path. They cannot

be set down as injurious, neither can they be termed beneficial, on account of their food-habits.

1. **Æchmophorus occidentalis** (*Lawr.*).—Western Grebe.

Cut-off lake near Omaha (L. Skow); "North Platte, common migrant in spring and fall" (M. K. Barnum).

2. **Colymbus holbœllii** (*Reinh.*).—American Red-necked Grebe.

Reported and taken at Alda, Nebr., rare (Bull. 2, U. S. Dept. Agr., Div. Ornith.); North America (Ridgeway).

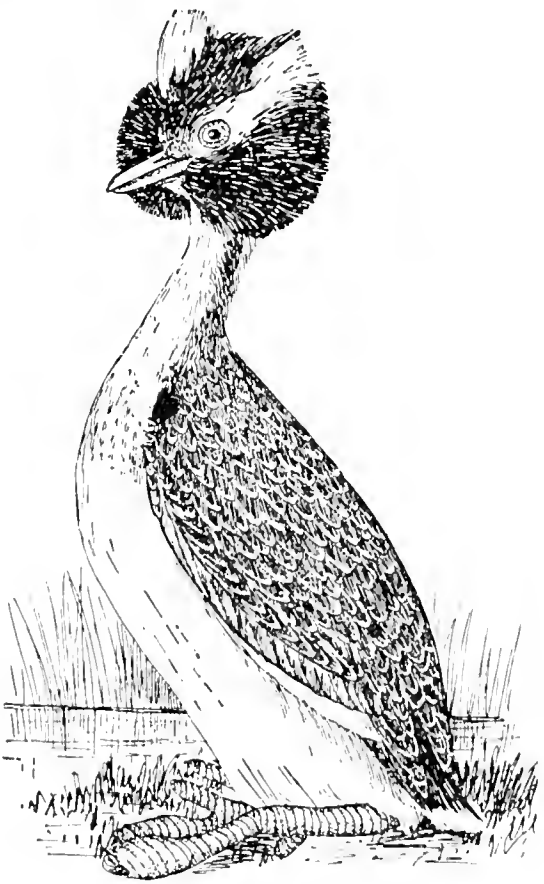


Fig. 1.—Horned Grebe.

3. **Colymbus auritus** *Linn.*—Horned Grebe.

West Point, Nebr., common (L. Bruner); "Migratory, rare" (Taylor); "Northern hemisphere" (Goss); northern portions of northern hemisphere (Ridgeway); Cherry county—breeds (J. M. Bates); "a common breeder in alkali lakes of Cherry county, June 20-30" (I. S. Trostler).

4. **Colymbus nigricollis californicus** (*Heerm.*).—American Eared Grebe.

Throughout the state, especially along larger streams and lakes (L. Bruner); "Rather abundant in Nebraska" (Aughey); "Migratory, abundant, arrive in

May and September (Taylor); "Western North America, east to the Mississippi river" (Goss); east to the Mississippi valley (Ridgeway); Omaha—breeding (L. Skow); a common migrant—a few breeding in Florence and Cut-off lakes near Omaha (I. S. Trostler).

6. **Podilymbus podiceps** (*Linn.*).—Pied-billed Grebe; Hell-diver; Dabchick.

Common over most of the state (L. Bruner); "Migratory, rare" (Taylor); "British Provinces southward into South America" (Goss); The whole of America (Ridgeway); Omaha—breeding (L. Skow); Gage county (F. A. Colby); "an abundant migrant and common breeder" (I. S. Trostler).

Family **URINATORIDÆ**.—The Loons.

7. **Urinator imber** (*Gunn.*).—Loon.

West Point, Nebr., Omaha, Nebr. (L. Bruner); not common, "Migratory, common, arrive the first of April and in September and October" (Taylor); "Northern part of the northern hemisphere" (Goss); Omaha, Rockport (L. Skow); Lincoln (Brezee); "Migrant, not rare" (I. S. Trostler).

11. **Urinator lumme** (*Gunn.*).—Red-throated Diver.

Missouri river at Omaha (L. Skow); "a rare migrant, one killed on the Missouri river near Bellevue, Sept. 28, 1894" (I. S. Trostler).

Family **STERCORARIIDÆ**.—Skuas and Jaegers.

36. **Stercorarius pomarinus** (*Temm.*).—Pomarine Jaeger.

"Twice seen in Nebraska" (Aughey); "one shot at North Platte, Nov. 11, 1895" (M. K. Barnum); "Seas and inland waters of northern portions of the northern hemisphere, south in winter to Africa, Australia, and probably South America (A. O. U. Check List).

Order LONGIPENNES.—The Long-winged Swimmers.

Family **LARIDÆ**.—Gulls and Terns.

The gulls, on account of their long wings and powers for flight, are not confined to the sea coast, hence they reach far inland in their migrations, feeding extensively upon insects like locusts, June beetles, crickets, etc., large numbers of which they destroy. Several kinds of these birds are known to follow the plow and pick up large numbers of white-grubs and other insects that are laid bare. In early days, when grasshoppers did much harm in this state, large flocks of these birds were seen to feed upon the insects.

47. **Larus marinus** *Linn.*—GREAT BLACK-BACKED GULL.

"I only saw this bird once in Nebraska, and then it was dead. Some Winnebago Indians brought one to Dakota City in May, 1871" (Aughey).

51*a*. **Larus argentatus smithsonius** *Coues.*—HERRING GULL.

Rockport, Nebr., West Point, Nebr. (L. Bruner); northeastern Nebraska (Aughey); "Common during spring migration" (Taylor); "North America in general" (Goss); Omaha (L. Skow); "a rare migrant, April 15, 1894" (I. S. Trostler).

54. **Larus delawarensis** *Ord.*—RING-BILLED GULL.

Migrant spring and fall, West Point, Omaha, and Lincoln (L. Bruner); "Rather common in Nebraska" (Aughey); "Migratory, common, arrive from May till July" (Taylor); "North America at large" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); Dakota City, Wood River (D. H. Talbot); "not uncommon as a migrant at Omaha" (I. S. Trostler).

58. **Larus atricilla** *Linn.*—LAUGHING GULL.

Alda, Nebr. (Bull. No. 2, U. S. Dept. Agric., Div. Ornith.); Omaha (L. Skow)

59. **Larus franklinii** *Sw. & Rich.*—FRANKLIN'S GULL.

West Point, Omaha, Lincoln (L. Bruner); "Large numbers here during the spring and fall migrations" (Aughey); "Migratory, abundant, arrive in April, May, September, and October" (Taylor); "Interior of North America" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Genoa (D. H. Talbot); Omaha, common migrant (I. S. Trostler).

60. **Larus philadelphia** (*Ord*).—BONAPARTE'S GULL.

Lincoln, Nebr. (W. D. Hunter); "The whole of North America" (Goss): Lincoln, Nov. 3d (A. Eiche).

62. **Xema sabinii** (*Sab.*).— SABINE'S GULL.

"A rare visitant, south in winter to Kansas" (Goss).

64. **Sterna tschegrava** *Lepech.*—CASPIAN TERN.

Lincoln, spring 1893 (Dr. F. L. Riser).

69. **Sterna forsteri** *Nutt.*—FORSTER'S TERN.

West Point, Swan lake, Lincoln—breeds in Sand Hills (L. Bruner); "Dixon county, May, 1871" (Aughey); "Migratory, rare, arrive about the first of May" (Taylor); "North America generally" (Goss); Cherry county—breeds" (J. M. Bates); Gage county (A. Colby); Omaha, "a not uncommon migrant," "Several pairs seen in Cherry county June 20 to 30, where they probably breed" (I. S. Trostler); Fairbury (Dr. M. L. Eaton).

70. **Sterna hirundo** *Linn.*—COMMON TERN; SEA SWALLOW.

Lincoln, West Point (L. Bruner); "Migratory, rare, arrive about the first of May" (Taylor); "Migratory, very rare" (Goss, Birds of Kansas); Omaha (L. Skow).

71. **Sterna paradisæa** (*Brünn*).—ARCTIC TERN.

"Only saw a few of these terns in Dixon county, in May, 1866" (Aughey).

74. **Sterna antillarum** (*Less.*).—LEAST TERN.

West Point, Nebr. (L. Bruner); "Rather common in Nebraska" (Aughey); "Migratory, abundant; summer resident, not uncommon" (Taylor); "North America, northward to California and New England" (Goss); Omaha—breeding (L. Skow); Peru, abundant—probably breeds (G. A. Coleman); "A few seen around Cut-off lake near Omaha during summer of 1893" (I. S. Trostler).

77. **Hydrchelidon nigra surinamensis** (*Gmel.*).—BLACK TERN.

West Point, Omaha, Lincoln, Holt county, Platte river (L. Bruner); "Breeds here" (Aughey); "Migratory, common; summer resident, rare; arrive about the first of May and in October" (Taylor); "Temperate North America" (Goss); Beatrice (A. S. Pearse); Omaha—breeding (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county—breeds (J. M. Bates); Swan lake, Holt county (D. H. Talbot); Gage county (F. A. Colby); "A common migrant and not an uncommon summer resident—breeds" (I. S. Trostler).

ORDER STEGANOPODES.—TOTIPALMATE SWIMMERS.

FAMILY **ANHINGIDÆ**.—DARTERS.

118. **Anhinga anhinga** (*Linn.*).—ANHINGA, SNAKE BIRD.

An accidental visitor—based on a single specimen that was shot several years ago within a few miles of Omaha and mounted by F. J. Brezee (L. Bruner).

FAMILY **PHALACROCORACIDÆ**.—CORMORANTS.

120. **Phalacrocorax dilophus** (*Swain.*).—DOUBLE-CRESTED CORMORANT.

Florence lake (J. Budd); Cut-off lake (F. J. Brezee); West Point (L. Bruner); "Perhaps passing through the state in April and November" (Taylor); "South in winter to the Gulf coast" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); "migrant, not rare" (I. S. Trostler).

120*a*. **Phalacrocorax dilophus floridanus** (*Aud.*).—FLORIDA CORMORANT.

West Point, Omaha, Platte river, Lincoln (L. Bruner); Omaha (F. J. Brezee).

121. **Phalacrocorax mexicanus** (*Brandt*).—MEXICAN CORMORANT.

North in the interior to Kansas and southern Illinois (A. O. U. Check List); Reported in spring from West Point, Cuming county, by a friend (L. Bruner).

Family **PELECANIDÆ**.—Pelicans.

125. **Pelecanus erythrorhynchos** *Gmel.* — American White Pelican.

Numerous localities (L. Bruner); "Frequently seen in Nebraska during its migrations" (Aughey); "Migratory, abundant, arrive in April, May, October, and November" (Taylor); "Temperate North America" (Goss); Beatrice (A. S. Pearse); Omaha (L. Skow); Cherry county (J. M. Bates); Wood River (D. H. Talbot); Gage county (F. A. Colby); "migratory, not uncommon" (I. S. Trostler).

126. **Pelecanus fuscus** *Linn.*—Brown Pelican.

St. Paul, Nebr., Oct. 10, 1885, one male specimen (D. H. Talbot); Honey Creek lake, near Omaha, in spring, "Saw fragments of six specimens in hog-pen where they had been thrown by the man who shot them" (L. Skow).

Order ANSERES.—Short-winged Swimmers or Ducks, Geese, etc.

Family **ANATIDÆ**.—Ducks, Brants, Geese, Swans.

129. **Merganser americanus** (*Cass.*).—American Merganser.

West Point, Omaha, Platte river, and Lincoln (L. Bruner); "Migratory, rare, arrive the last of April or first of May" (Taylor); "The whole of North America" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); "Omaha, migratory, common" (I. S. Trostler); Lincoln (Dr. F. L. Riser).

130. **Merganser serrator** (*Linn.*).—Red Breasted Merganser.

West Point, Omaha, Lincoln, Platte river (L. Bruner); "Winter resident, rare" (Taylor); "south in winter throughout the United States" (Goss); Omaha (L. Skow); "Omaha, migratory, several killed on Florence lake in 1894" (I. S. Trostler).

131. **Lophodytes cucullatus** (*Linn.*).—Hooded Merganser.

West Point, Omaha, Fremont, Holt county, Rockport, South Bend, Lincoln (L. Bruner); "Winter resident, somewhat common; resident, rare" (Taylor); North America in general" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); "Occasionally seen in summer around lakes in Burt and Washington counties" (I. S. Trostler).

132. **Anas boschas** *Linn.*—Mallard.

Common over state—breeds (L. Bruner); ' Very abundant in Nebraska during its migrations; many also breed here" (Aughey); "Migratory, abundant; resident, common" (Taylor); "Whole of Northern hemisphere" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); several Nebraska localities (D. H. Talbot); Gage county (F. A. Colby); "an abundant migrant, rare breeder in vicinity of Omaha, but common breeder in Cherry county" (I. S. Trostler).

133. **Anas obscura** *Gmel.*—BLACK DUCK; DUSKY DUCK.

Once at West Point (L. Bruner); occasional in market in Omaha (L. Bruner); Lincoln, occasionally (W. D. Hunter); "Occurs sparingly in Nebraska" (Aughey); "Migratory, common, arrive the last of March or first of April" (Taylor); "Eastern North America" (Goss); Omaha (L. Skow); not rare as a migrant—seen in company with the mallard at Omaha" (I. S. Trostler).

135. **Anas strepera** *Linn.*—GADWALL.

West Point, Swan lake, Lincoln, Omaha—breeding in Holt county (L. Bruner); "Migratory, common, probably breeds in Nebraska" (Taylor); "Northern hemisphere in general" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); a common migrant (I. S. Trostler).

136. **Anas penelope** *Linn.*—WIDGEON.

A single specimen at West Point years ago, also seen in Omaha markets on rare occasions (L. Bruner).

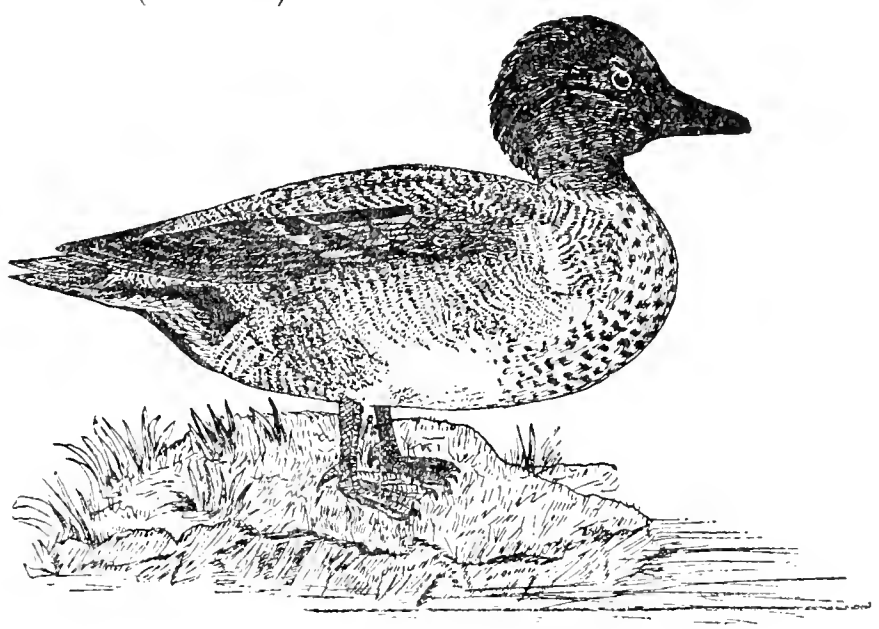


FIG. 2.—Green-winged Teal.

137. **Anas americana** *Gmel.*—BALDPATE; AMERICAN WIDGEON.

A common duck over all Nebraska—West Point, Norfolk, Neligh, Holt county, Platte river, Omaha, etc. (L. Bruner); "Migratory, common, arrive the last of March or first of April" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); "Omaha, a common migrant" (I. S. Trostler).

139. **Anas carolinensis** *Gmel.*—GREEN-WINGED TEAL.

West Point, Holt county, Norfolk, Dakota county, Omaha, Platte river, Lincoln (L. Bruner); "Very abundant in Nebraska during its migrations" (Aughey); "Migratory, abundant, arrive in April and September" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Cherry county (J. M.

Bates); Genoa, Wood River (D. H. Talbot); Gage county (F. A. Colby); Omaha, "a common migrant" (I. S. Trostler).

140. **Anas discors** *Linn.*—Blue-winged Teal.

A common summer resident over most of the state—numerous localities (L. Bruner); found in Nebraska (Aughey); "Migratory, abundant; summer resident, rare—arrive in May" (Taylor); "North America in general, but chiefly east of the Rocky mountains" (Goss); Beatrice (A. S. Pearse); Omaha—breeds (L. Skow); Cherry county—breeding (J. M. Bates); Genoa, O'Neill (D. H. Talbot); Gage county (F. A. Colby); Omaha, an abundant migrant and common breeder over state" (I. S. Trostler).

141. **Anas cyanoptera** *Vieill.*—Cinnamon Teal.

West Point, Omaha, Niobrara (L. Bruner); Grand Island, Florence (F. J. Brezee); "Occasional visitant" (Bull. No. 2, U. S. Div. Ornith); "In North America east to the plains, and casual to Florida and Manitoba" (Goss); Omaha (L. Skow); Cherry county—rare (J. M. Bates); Omaha, "a rare migrant—seen in company with Blue-winged Teal" (I. S. Trostler); Lincoln (Dr. F. L. Riser).

142. **Spatula clypeata** (*Linn.*).—Shoveller Duck.

Common summer resident over state, numerous localities (L. Bruner); "Occasionally met with in Nebraska" (Aughey); "Migratory, sometimes common, arrive about the first of April, a few may breed in the state (Taylor); "Northern hemisphere in general", (Goss); Omaha (L. Skow); Peru, common—may breed (G. A. Coleman); Cherry county—breeds (J. M. Bates); Elm Creek (D. H. Talbot); Omaha, a common migrant, breeding in Cherry county" (I. S. Trostler).

143. **Dafila acuta** (*Linn.*).—Pintail; Sprigtail.

A common migrant, West Point, Norfolk, Omaha, Lincoln (L. Bruner); "common in Nebraska, especially during its migrations" (Aughey); "Migratory, abundant, arrive in March and first of April" (Taylor); "Northern hemisphere in general" (Goss); Omaha (L. Skow); Peru, migrant (G. A. Coleman), Cherry county—breeding (J. M. Bates); Wood River (D. H. Talbot); Gage county (F. A. Colby); Omaha, "an abundant migrant" (I. S. Trostler).

144. **Aix sponsa** (*Linn.*).—Wood Duck; Summer Duck.

West Point, Omaha, Lincoln, Oakdale (L. Bruner); "Rather abundant in Nebraska and breeds here" (Aughey); "Summer resident, common, arrive the first of April and stay till October" (Taylor); "The whole of temperate North America" (Goss); Omaha—breeding (L. Skow); Cherry county (J. M. Bates); Genoa, O'Neill (D. H. Talbot); Gage county (F. A. Colby); "a common migrant and summer resident in vicinity of Omaha" (I. S. Trostler).

146. **Aythya americana** (*Eyt.*).—Red-head Duck.

West Point, Holt county, Lyons, Blair, Omaha, South Bend, Lincoln, etc. (L. Bruner); "Migratory, common, arrive in April and May, September and October" (Taylor); "North America in general" (Goss); Beatrice (A. S. Pearse);

Omaha (L. Skow); Peru, rare migrant (G. A. Coleman); Cherry county—breeding (J. M. Bates); Wood River (D. H. Talbot); Gage county (F. A. Colby); "Omaha, an abundant migrant" (I. S. Trostler).

147. **Aythya vallisneria** (*Wils.*).—CANVAS-BACK DUCK.

West Point, Lyons, Lincoln, Omaha (L. Bruner); "Migratory, sometimes abundant" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Cherry county—rare (J. M. Bates); Omaha, "an irregualr migrant, some years abundant and others rare" (I. S. Trostler).

148. **Aythya marila nearctica** *Stejn.*—BLUE-BILL; SCAUP DUCK.

West Point, Omaha, Lincoln (L. Bruner); "Probably migratory, rare" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Peru, rare migrant (G. A. Coleman); Cherry county (J. M. Bates); Omaha, "a common migrant" (I. S. Trostler).

149. **Aythya affinis** (*Eyt.*).—LITTLE BLUE-BILL; LESSER SCAUP DUCK.

West Point, Holt county, Lincoln (L. Bruner); "Migratory, common, arrive in April (Taylor); "North America in General" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county (J. M. Bates); Omaha, "a common migrant" (I. S. Trostler).

150. **Aythya collaris** (*Donov.*).—RING-NECKED DUCK.

West Point, Omaha, Lincoln (L. Bruner); "Probably migratory and not uncommon" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Omaha, "a not uncommon migrant" (I. S. Trostler).

151. **Glaucionetta clangula americana** (*Bonap.*).—GOLDEN-EYE; WHISTLER.

Omaha, Lyons (L. Bruner); Omaha, Grand Island (F. J. Brezee); "Migratory, common, arrive in April and May" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Omaha, "a not uncommon migrant" (I. S. Trostler).

152. **Glaucionetta islandica** (*Gmel.*).—BARROW'S GOLDEN-EYE; ROCKY-MOUNTAIN WHISTLER.

Long Pine (L. Bruner); Graud Island (F. J. Brezee); Omaha, "a rare migrant in company with American Golden-eye" (I. S. Trostler).

153. **Charitonetta albeola** (*Linn.*).—BUTTERBALL; BUFFLE-HEAD; SPIRIT DUCK.

West Point, Norfolk, Lyons, Blair, Omaha, Lincoln, etc. (L. Bruner); "along the Missouri and its tributaries in Nebraska" (Aughey); "Migratory, common" (Taylor); "North America" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county (J. M. Bates); Omaha, "a not uncommon migrant" (I. S. Trostler).

154. **Clangula hyemalis** (*Linn.*).—OLD-SQUAW DUCK.

Omaha market, lake near Blair, Nebr. (L. Bruner).

155. **Histrionicus histrionicus** (*Linn.*).—HARLEQUIN DUCK.

A specimen was obtained in Omaha market from among birds said to have been shot in Burt county (L. Bruner); Omaha, "a rare migrant, two seen which were killed on the Missouri river, Sept. 16, 1893, one also killed Sept. 19, 1895, on Florence lake" (I. S. Trostler).

165. **Oidemia deglandi** *Bonap.*—WHITE-WINGED SCOTER.

Tekamah or some point in Burt or Washington counties (F. J. Brezee).

166. **Oidemia perspicillata** (*Linn.*).—SURF SCOTER.

"South in winter to Jamaica, Florida, Ohio river, Kansas, and Lower California" (Goss). Three birds that without doubt belong here were shot on "Salt Lake" near Lincoln, November, 1895, by students of the University. The specimens were unfortunately picked and cooked before their value was known (L. Bruner).

167. **Erismatura rubida** (*Wils.*).—RUDDY DUCK.

Numerous localities in the state (L. Bruner); "Rather common along the Missouri during its migrations" (Aughey); "Migratory, common, arrive in May and October" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Gage county (F. A. Colby); Omaha, "a very irregular migrant" (I. S. Trostler).

169. **Chen hyperborea** (*Pall.*).—LESSER SNOW GOOSE.

West Point, Lincoln, Ashland (L. Bruner); "Migratory, abundant, arrive in April and in October" (Taylor); "East to the Mississippi valley" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); a number of localities on Platte river (D. H. Talbot); an abundant migrant in company with Canada and Hutchin's geese" (I. S. Trostler).

169*a*. **Chen hyperborea nivalis** (*Forst.*).—GREATER SNOW GOOSE.

Occasional on Platte and Missouri rivers, West Point, Omaha (L. Bruner); "Abundant in Nebraska during its migrations" (Aughey); Omaha (L. Skow); "a common migrant" (I. S. Trostler).

169. 1. **Chen cœrulescens** (*Linn.*).—BLUE GOOSE.

West Point, Omaha, Ashland (L. Bruner); "Migratory in fall, common; winter resident, rare; arrive October 1 and leave about the middle of December" (Taylor); "Interior of North America, east of the Rocky mountains" (Goss); Omaha (L. Skow); Gibbon, Wood River (D. H. Talbot); Omaha, "a not common migrant" (I. S. Trostler).

171*a*. **Anser albifrons gambeli** (*Hartl.*).—AMERICAN WHITE-FRONTED GOOSE.

West Point, Platte river (L. Bruner); "Migratory, common, arrive about the first of March" (Taylor); "North America" (Goss); Omaha (L. Skow);

Omaha, "a common migrant, the first goose in spring" (I. S. Trostler); Wood River, Gibbon, Elm Creek, and Grand Island (D. H. Talbot).

172. **Branta canadensis** (*Linn.*).—CANADA GOOSE.

West Point, Omaha, Lyons, Lincoln, South Bend, etc. (L. Bruner); "Migratory, somewhat common; summer resident, rare" (Taylor); "Temperate North America" (Goss); Omaha (L. Skow); Peru, common—migrant (G. A. Coleman); Cherry county—breeds (J. M. Bates); numerous localities in central part of state (D. H. Talbot); Omaha, "a very abundant migrant" (I. S. Trostler); "very abundant in Nebraska, and occasionally breeds here" (Aughey).

172*a*. **Branta canadensis hutchinsii** (*Rich.*).—HUTCHIN'S GOOSE.

West Point, Omaha (L. Bruner); "Migratory, abundant, arrives in April" (Taylor); "South in winter chiefly through the Mississippi valley" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Omaha, "a common migrant" (I. S. Trostler).

173. **Branta bernicla** (*Linn.*).—BRANT; BERNICLE GOOSE.

In Omaha gun store, said to have been shot on Platte river (L. Skow); Omaha, "a not very rare migrant, saw three that were killed on the Missouri river, Nov. 9, 1895—sportsmen say they are *commonest* in *fall*" (I. S. Trostler).

180. **Olor columbianus** (*Ord*).—WHISTLING SWAN.

West Point, North Bend, Ashland, Lincoln, etc.—formerly bred in Holt county (L. Bruner); "Probably migratory, rare" (Taylor); "North America in general" (Goss); Omaha (L. Skow); Omaha, "a rare migrant" (I. S. Trostler).

181. **Olor buccinator** (*Rich.*).—TRUMPETER SWAN.

Platte river (L. Bruner); "Rare in Nebraska" (Aughey); "Migratory, rare, arrives in April and October" (Taylor); "chiefly the interior of North America" (Goss); Cherry county (J. M. Bates); Grant county (J. D. Knight); Omaha, "a rare migrant" (I. S. Trostler).

ORDER HERODIONES.—HERONS, STORKS, IBISES, ETC.

FAMILY **IBIDÆ**.—IBISES.

186. **Plegadis autumnalis** (*Hasselq.*).—GLOSSY IBIS.

Omaha (F. J. Brezee); "wandering northward to New England and Illinois. In America only locally abundant and of irregular distribution" (A. O. U. Check List).

187. **Plegadis guarauna** (*Linn.*).—WHITE-FACED GLOSSY IBIS.

Omaha (L. Skow); Omaha, "a straggler was killed on Florence lake, Aug. 19, 1893 (I. S. Trostler); Clarks, Nebr. (Frank Parmalee).

FAMILY **CICONIIDÆ.**—STORKS AND WOOD IBISES.

188. **Tantalus loculator** *Linn.*—WOOD IBIS.

A rare, irregular straggler, if the reports of several persons, the names of whom cannot be recalled at this moment, can be relied upon (L. Bruner).

FAMILY **ARDEIDÆ.**—HERONS, BITTERNS, ETC.

190. **Botaurus lentiginosus** (*Montag.*).—BITTERN; THUNDER PUMPER.

West Point, Holt county, Lincoln, Platte river—breeds in state (L. Bruner); "Occasionally seen in Nebraska" (Aughey); "summer resident, common, arrives in April and leaves in October" (Taylor); "The whole of temperate and tropical North America" (Goss); Omaha—breeds (L. Skow); Peru—breeds (G. A. Coleman); Cherry county (J. M. Bates); Wood River, O'Neill, Hartington (D. H. Talbot); Omaha, a common migrant, but uncommon summer resident (I. S. Trostler).

191. **Ardetta exilis** (*Gmelin*).—LEAST BITTERN.

West Point, Lincoln—breeding at West Point (L. Bruner); "The whole of temperate North America" (Goss); Omaha—nesting (L. Skow); Peru, abundant—breeds (G. A. Coleman); Gage county (F. A. Colby); Omaha, "an abundant migrant and a common summer resident" (I. S. Trostler).

194. **Ardea herodias** *Linn.*—GREAT BLUE HERON.

West Point, Norfolk, Florence, Blair, Lincoln, etc.—breeding at West Point (L. Bruner); "occasionally seen in Nebraska" (Aughey): "migratory, sometimes common, more abundant in the fall than spring" (Taylor); "North America from the Arctic regions southward" (Goss); Omaha—breeding (L. Skow); Oakdale, Wood River (D. H. Talbot); Gage county (F. A. Colby); Omaha, "a common migrant and not uncommon resident" (I. S. Trostler).

196. **Ardea egretta** *Gmelin.*—GREAT WHITE EGRET.

Richardson county, May, 1873 (Samuel Aughey); "North casually to the British provinces" (Goss); Nebraska City, Florence lake (L. Skow); "a straggler was killed near Omaha, July 12, 1894" (I. S. Trostler).

197. **Ardea candidissima** *Gmelin.*—SNOWY HERON; LITTLE WHITE EGRET.

Reported from southeastern Nebraska—not rare (L. Bruner); "Otoe and Richardson counties" (Aughey); "From the northern United States to Chili" (Goss); "Straggler, one was killed near Fremont, Sept. 4, 1893" (I. S. Trostler).

200. **Ardea cœrulea** *Linn.*—LITTLE BLUE HERON.

Omaha (?) (Brezee); occasional in south part of state (L. Bruner): "Probably not an uncommon summer resident" (Taylor); "Casually north to Massachusetts, Illinois, Kansas, etc." (Goss); Butler county, on Platte river (Dr.

Peebles); "Rare in the vicinity of Omaha, but a colony breed annually thirty miles north of here" (I. S. Trostler).

201. **Ardea virescens** (*Linn.*).—GREEN HERON; POKE.

West Point, Omaha, Lincoln, Oakdale, etc.—common, breeds (L. Bruner); "Probably not an uncommon summer resident" (Taylor); "The whole of tem-

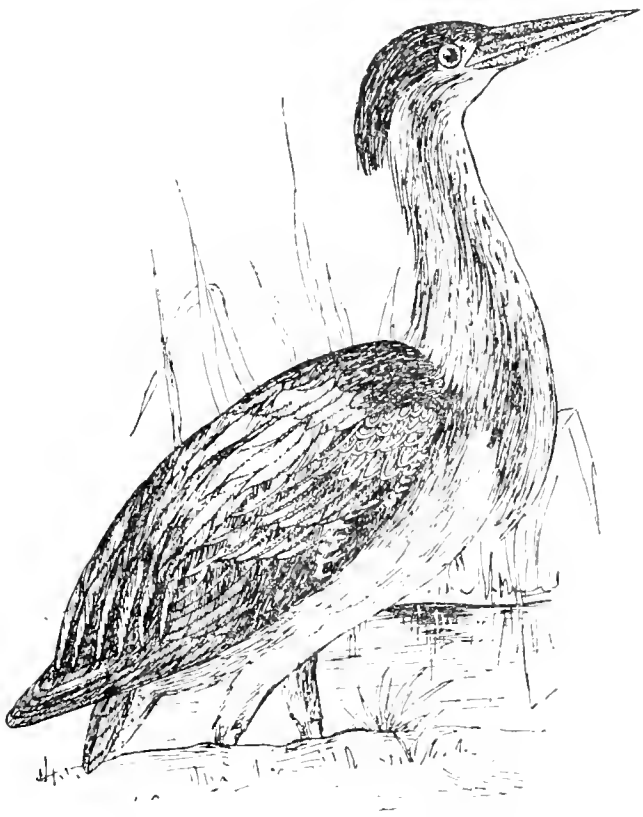


FIG. 3.—Green Heron: Poke.

perate North America" (Goss); Beatrice—nesting, De Witt (A. S. Pearse); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county—breeds (F. A. Colby); "not rare as a summer resident" (I. S. Trostler).

202. **Nycticorax nycticorax nævius** (*Bodd.*). — BLACK-CROWNED NIGHT HERON.

West Point, Oakland, Omaha, Lincoln (L. Bruner); "Nearly the whole of America except the Arctic regions" (Goss); Omaha—nesting (L. Skow); Peru, not uncommon—may breed (G. A. Coleman); Bow creek, Nebr. (D. H. Talbot); "Straggler, saw one that was killed Sept. 3, 1894, near Cut-off lake" (I. S. Trostler).

203. **Nycticorax violaceus** (*Linn.*).—YELLOW-CROWNED NIGHT HERON.

Reported from Platte river—a single specimen seen from Valley (L. Bruner); "Probaby a rare summer resident" (Taylor); "Breeding regularly north into Kansas, Missouri, Illinois, Indiana, etc. (Goss); "A rare summer resident" (I. S. Trostler).

Order PALUDICOLÆ.—Cranes, Rails, etc.

Family **GRUIDÆ.**—Cranes.

204. **Grus americana** (*Linn.*).—Whooping Crane.

West Point, Craig, Holt county, Omaha, etc. (L. Bruner); "Occasionally seen in northern Nebraska" (Aughey); "Migratory, somewhat common" (Taylor); "Interior of North America" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Grand Island (F. J. Brezee); Elm Creek, Wolf creek (D. H. Talbot); Gage county (F. A. Colby); "a common migrant" (I. S. Trostler).

205. **Grus canadensis** (*Linn.*).—Little Brown Crane.

"Migrating south through western United States, east of the Rocky mountains" (Goss); West Point, Scribner, Nebr. (L. Bruner); Omaha (L. Skow).

206. **Grus mexicana** (*Müll.*).—Sandhill Crane.

Omaha, West Point, Lyons, Holt county, Platte river—breeding in Holt county (L. Bruner); "Rather abundant in Nebraska" (Aughey); "Migratory, abundant, arrive in March and in the fall" (Taylor); "From the Mississippi valley to the Pacific coast" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county—breeds (J. M. Bates); numerous localities (D. H. Talbot); "A common migrant, observed breeding one-half mile north of state line—five young in nest owned by two females and one male" (I. S. Trostler).

Family **RALLIDÆ.**—Rails, Gallinules, and Coots.

208. **Rallus elegans** *Aud.*—King Rail.

West Point, Omaha, Elkhorn (L. Bruner); "Southeastern Nebraska" (Aughey); "Summer resident, rare, arrives in May" (Taylor); "Fresh water marshes of eastern, southern, and middle United States" (Goss); Omaha—breeding (L. Skow); "Summer resident—breeds in June" (I. S. Trostler).

212. **Rallus virginianus** *Linn.*—Virginia Rail.

West Point, Oakland, Plattsmouth (L. Bruner); "Migratory, abundant, may breed in the state" (Taylor); "The whole of temperate North America" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); "An abundant migrant—probably breeds" (I. S. Trostler).

214. **Porzana carolina** (*Linn.*).—Sora Rail; Carolina Rail.

West Point, Oakland, Holt county—breeding, Omaha, Lincoln, etc. (L. Bruner); "Have seen this bird but once in Nebraska—Richardson county" (Aughey); "Whole of temperate North America" (Goss); Omaha—nesting (L. Skow); Peru, common—may breed (G. A. Coleman); Cherry county—breeds (J. M. Bates); Ponca, Ewing, O'Neill (D. H. Talbot); Gage county (F. A. Colby); "A not uncommon migrant—probably breeds" (I. S. Trostler).

215. **Porzana noveboracensis** (*Gmelin*).—YELLOW RAIL.

Omaha in market, Bellevue (L. Bruner); "North America, breeding chiefly northward (Goss).

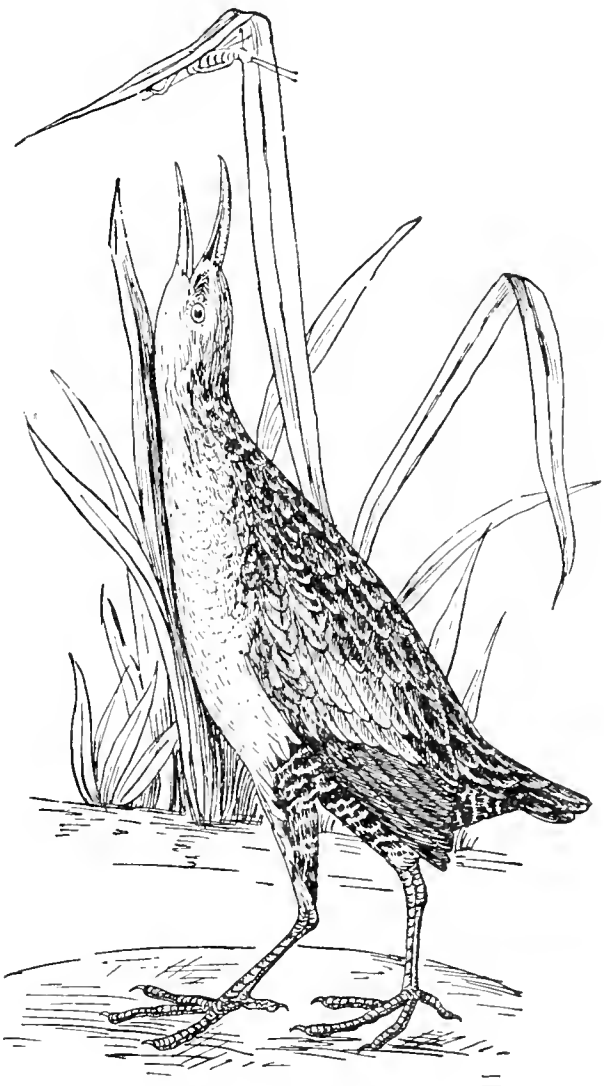


FIG. 4.—Virginia Rail.

216. **Porzana jamaicensis** (*Gmelin*).—BLACK RAIL.

West Point, Omaha markets (L. Bruner); southeastern Nebraska (Bull. No. 2, Div. Ornith); "Rare in Nebraska" (Aughey); "Summer resident, rare" (Taylor); "North to Massachusetts, Nebraska, and Oregon" (Goss).

218. **Ionornis martinica** (*Linn.*).—PURPLE GALLINULE.

Once at West Point (L. Bruner).

219. **Gallinula galeata** (*Licht.*).—FLORIDA GALLINULE.

Omaha, Platte river (L. Bruner); "Sent to me from Beatrice in Sept., 1872" (Aughey); "North to the British provinces" (Goss); Omaha—breeding (L.

Skow); "A common migrant and summer resident—breeds in June" (I. S. Trostler).

221. **Fulica americana** *Gmelin.*—Coot; Mud Hen.

Over entire state, common, breeds (L. Bruner); "often seen in Nebraska" (Aughey); "Migratory, abundant, found in the state from the first of May till the last of September" (Taylor); "The whole of North America" (Goss); Beatrice (A. S. Pearse); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); O'Neill, Harding (D. H. Talbot); Gage county (F. A. Colby); "Abundant migrant, formerly a common breeder in vicinity of Omaha, still so in Cherry county" (I. S. Trostler).

Order LIMICOLÆ.—Shore Birds.

Family **PHALAROPODIDÆ.**—Phalaropes.

223. **Phalaropus lobatus** (*Linn.*).—Northern Phalarope.

Alda, Nebr. (Bull. No. 2, U. S. Dept. Agric., Div. Ornith.); D. A. Haggard took a specimen at Lincoln in May; "Northern portion of northern hemisphere, south in winter to Guatemala" (Goss); "a rare migrant, Omaha" (I. S. Trostler).

224. **Phalaropus tricolor** (*Vieill.*).—Wilson's Phalarope.

West Point, Holt county, Fremont, Omaha, Lincoln (L. Bruner); "Common in eastern Nebraska" (Aughey); "Migratory, common, found in the state from last of April till September" (Taylor); "Temperate North America, but chiefly in the interior" (Goss); Omaha (L. Skow); Peru, rare migrant (G. A. Coleman); Cherry county—breeds (J. M. Bates); Omaha "an abundant migrant" (I. S. Trostler); Fullerton, Nance county (C. E. Barker).

Family **RECURVIROSTRIDÆ.**—Avocets and Stilts.

225. **Recurvirostra americana** *Gmelin.*—American Avocet.

West Point, Lincoln (L. Bruner); "in the vicinity of ponds, lakelets, and streams" (Aughey); "Migratory, abundant, summer resident rare" (Taylor); "Temperate North America, abundant in the interior" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Wood River (D. H. Talbot); "an abundant migrant, breeds in Dewey Lake Township, Cherry county" (I. S. Trostler).

226. **Himantopus mexicanus** (*Müll.*).—Black-necked Stilt.

Omaha (L. Skow); Omaha, "an occasional visitor, never common" (I. S. Trostler).

Family **SCOLOPACIDÆ.**—Snipes, Sandpipers, etc.

228. **Philohela minor** (*Gmelin*).—American Woodcock.

West Point, Omaha (L. Bruner); "Occasionally seen in Nebraska, and breeds here" (Aughey); "Migratory, somewhat common; summer resident

rare" (Taylor); "west to the plains" (Goss); Omaha—breeds (L. Skow); Gage county (F. A. Colby); Omaha "migrant, not common; as a resident rare, gradually diminishing in numbers" (I. S. Trostler).

230. **Gallinago delicata** (*Ord*).—WILSON'S SNIPE.

West Point, Lyons, Norfolk, Holt county, Neligh, Omaha, etc. (L. Bruner); "Common in Nebraska during its migrations" (Aughey); "Migratory, abundant, arrives in April, September, and October" (Taylor); "The whole of North America" (Goss); Fairbury (M. L. Eaton); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county—remains throughout winter at Long Pine (J. M. Bates); Omaha, "an abundant migrant" (I. S. Trostler); Sioux county, Dec., 1895 (L. Bruner); Feb. 24, 26, 1896 (W. D. Hunter, L. Skow).

231. **Macrorhamphus griseus** (*Gmelin*).—DOWITCHER; RED-BREASTED SNIPE.

West Point, Omaha, Lincoln (L. Bruner); "Abundant during its migrations" (Aughey); "Migratory, abundant, arrives in May, September, and October" (Taylor); Omaha (L. Skow); Cherry county (J. M. Bates); Omaha, "a common migrant" (I. S. Trostler).

232. **Macrorhamphus scolopaceus** (*Say*).—LONG-BILLED DOWITCHER.

West Point, Lincoln (L. Bruner); "Migratory, somewhat rare, has been found in April" (Taylor); "North America in general, but chiefly in the western provinces" (Goss); Cherry county (J. M. Bates); Omaha, "a not uncommon migrant" (I. S. Trostler).

233. **Micropalama himantopus** (*Bonap.*).—STILT SANDPIPER.

West Point, Omaha, Lincoln, Holt county (L. Bruner); "West to the Rocky mountains" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Omaha, "a not uncommon migrant" (I. S. Trostler).

234. **Tringa canutus** *Linn.*—KNOT; ROBIN SNIPE.

"Occasionally seen in Nebraska" (Aughey); Nebraska (Bull. No. 2, Div. Ornith.); "Migratory, rare, has been seen in October" (Taylor); Omaha, "a very rare migrant, one killed on Missouri river by a gunner Sept. 30, 1893" (I. S. Trostler).

239. **Tringa maculata** *Vieill.*—PECTORAL SANDPIPER; JACK SNIPE.

West Point, Lincoln (L. Bruner); "Migratory, common—the records of the Normal Science Society show its arrival as early as April 12" (Taylor); "Nearly the whole of America" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county (J. M. Bates); Omaha, "a common migrant" (I. S. Trostler).

240. **Tringa fuscicollis** *Vieill.*—White-rumped Sandpiper; Bonaparte's Sandpiper.

"I have only occasionally seen this bird in Nebraska" (Aughey); Lincoln (D. A. Haggard); "Migratory, rare" (Taylor); "Nearly the whole of America" (Goss); Fairbury (M. L. Eaton); Omaha (L. Skow); Peru, common, migrant (G. A. Coleman); Cherry county (J. M. Bates); Omaha, "a not common migrant" I. S. Trostler).

241. **Tringa bairdii** (*Coues*).—Baird's Sandpiper.

West Point, Holt county, Lincoln (L. Bruner); "Rather common in Nebraska during its migrations" (Aughey); "Migratory, common, arrive in May and October" (Taylor); "America in general, but chiefly the interior" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Omaha, "rarely seen, but probably a common migrant" (I. S. Trostler).

242. **Tringa minutilla** *Vieill.*—Least Sandpiper.

West Point, Lincoln, Holt county (L. Bruner); "Very abundant in Nebraska during its migrations" (Aughey); "Migratory, abundant; arrive in April, September, and October" (Taylor); "America in general" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county (J. M. Bates); Wood River (D. H. Talbot); Omaha, "an abundant migrant" (I. S. Trostler).

243*a*. **Tringa alpina pacifica** (*Coues*).—Red-backed Sandpiper.

Lincoln (D. A. Haggard); North America in general (Goss); Omaha (L. Skow); Omaha, "quite common as a migrant in spring" (I. S. Trostler).

246. **Eureunetes pusillus** (*Linn.*).—Semi-palmated Sandpiper.

West Point, Lincoln (L. Bruner); "Occasionally present in Nebraska during its migrations" (Aughey); "Migratory, rare, arrive about the first of May" (Taylor); "West during migration to the Rocky mountains" (Goss); Omaha (L. Skow); Peru, rare—breeds (G. A. Coleman); Cherry county (J. M. Bates); Gage county (F. A. Colby); Omaha, "a common migrant" (I. S. Trostler).

247. **Ereunetes occidentalis** *Lawr.*—Western Sandpiper.

Omaha (L. Skow).

248. **Calidris arenaria** (*Linn.*).—Sanderling.

West Point, Lincoln (L. Bruner); "Nearly cosmopolitan, but breeding only in northern portions of the northern hemisphere" (Goss); Omaha (L. Skow); North Loup, Nebr. (D. H. Talbot); Omaha, "not rare as a migrant" (I. S. Trostler).

249. **Limosa fedoa** (*Linn.*).—Marbled Godwit.

West Point, Holt county (L. Bruner); "Common in Nebraska and breeds here" (Aughey); "Migratory, abundant; summer resident, common; arrives in May and September" (Taylor); "North America in general, breeding from Iowa, Dakota, etc. (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Omaha, "a common migrant" (I. S. Trostler).

251. **Limosa hæmastica** (*Linn.*).—HUDSONIAN GODWIT.

West Point, Oakland, Lincoln, Holt county (L. Bruner); "Probably occasionally found in May" (Taylor); "Nearly the whole of America" (Goss).

254. **Totanus melanoleucus** (*Gmel.*).—GREATER YELLOW-LEGS.

West Point, Norfolk, Neligh, Holt county—breeds, Lincoln, Omaha (L. Bruner); "Abundant in Nebraska" (Aughey); "Migratory, common, arrives in April, May, September, and October" (Taylor); "Nearly the whole of America" (Goss); Omaha (L. Skow); Peru, rare—breeds (G. A. Coleman); Cherry county (J. M. Bates); Omaha, "a common migrant" (I. S. Trostler).

255. **Totanus flavipes** (*Gmel.*).—YELLOW-LEGS.

West Point, Holt county, Lincoln, etc. (L. Bruner); abundant in Nebraska (Aughey); "Migratory, abundant, arrives in April, September, and October" (Taylor); "The whole of North America" (Goss); Beatrice (A. S. Pearse); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county (F. A. Colby); Omaha, "an abundant migrant" (I. S. Trostler).

256. **Totanus solitarius** (*Wils.*).—SOLITARY SANDPIPER.

West Point, Lincoln (L. Bruner); "Only seen in Nebraska during its migrations" (Aughey); "Migratory, abundant; summer resident, common; arrives in April" (Taylor); "The whole of temperate North America" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); Ponca (D. H. Talbot); Omaha, "a common migrant" (I. S. Trostler).

258*a*. **Symphemia semipalmata inornata** *Brewster*.—WESTERN WILLET.

West Point, Lincoln (L. Bruner); "Probably not uncommon in the state" (Taylor); "Western North America, east to the Mississippi valley" (Goss); Omaha (Skow); Cherry county—breeds (J. M. Bates); "a common migrant and probably a summer resident in the lake region of north and northwest Nebraska" (I. S. Trostler).

261. **Bartramia longicauda** (*Bechst.*).—BARTRAMIAN SANDPIPER; FIELD PLOVER.

Greater portion of state—breeding (L. Bruner); exceedingly abundant in Nebraska" (Aughey); "Migratory, abundant; summer resident, common; arrives in May and September" (Taylor); "Eastern and central North America" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—nesting (L. Skow); Peru, rare—probably breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county (F. A. Colby); "a very common migrant and not uncommon resident, very common in Cherry county in late June, 1895 (I. S. Trostler).

262. **Tringites subruficollis** (*Vieill.*)—BUFF-BREASTED SANDPIPER.

West Point (L. Bruner); "Rare in Nebraska,—Nebraska City" (Aughey); "Migratory, rare, arrives in May and September" (Taylor): "North America

in general, especially the interior" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha (L. Skow); Lincoln (D. A. Haggard); Gage county (F. A. Colby).

263. **Actitis macularia** (*Linn.*).—Spotted Sandpiper.

West Point, Lincoln (L. Bruner); "Rather common in Nebraska, especially during its migrations" (Aughey); "Migratory, common; summer resident, probably rare; arrives in May and September" (Taylor); "North America in general" (Goss); Beatrice (A. S. Pearse); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman): Cherry county—breeds (J. M. Bates); Gage county (F. A. Colby); Omaha, "an abundant migrant, and an occasional summer resident" (I. S. Trostler)

264. **Numenius longirostris** *Wils.*—Long-billed Curlew.

West Point, Holt county, Omaha—breeding in Holt county (L. Bruner); "Formerly abundant in Nebraska—breeds here" (Aughey); "Migratory, common; summer resident, rare; arrives in April and September" (Taylor); "The whole of temperate North America" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); "A common migrant, and saw young just hatched in Cherry county June 22, 1895" (I. S. Trostler).

265. **Numenius hudsonicus** *Lath.*—Hudsonian Curlew.

West Point, Holt county (L. Bruner); "Rare in Nebraska" (Aughey); "Nearly the whole of North America, breeds from northern Dakota to the Arctic coast" (Goss); Omaha (L. Skow).

266. **Numenius borealis** (*Forst.*).—Eskimo Curlew.

Omaha, West Point (L. Bruner), "in northeastern Nebraska during its migrations" (Aughey); "Migratory, abundant, arrive in April, May, and October" (Taylor); "Northern and eastern North America" (Goss); Cherry county (J. M. Bates); "A common migrant" (I. S. Trostler).

Family **CHARADRIIDÆ**.—Plovers.

270. **Charadrius squatarola** (*Linn.*).—Black-bellied Plover.

Lincoln (L. Bruner); "Occasionally seen in Nebraska" (Aughey); Lincoln (A. Eiche); "Migratory, rare" (Taylor); "Nearly cosmopolitan" (Goss); Omaha (L. Skow); Alliance, Atkinson (J. M. Bates); Omaha, "a not common migrant" (I. S. Trostler).

272. **Charadrius dominicus** *Müll.*—Golden Plover.

West Point, Norfolk, Holt county, Omaha, Lincoln (L. Bruner); "Have only seen this plover pass through Nebraska during its migrations" (Aughey); "Migratory, abundant, arrives in April, May, September, and October" (Taylor); "Nearly the whole of America" (Goss); Genoa (D. H. Talbot); "A common migrant" (I. S. Trostler).

273. **Ægialtis vocifera** (*Linn.*).—Killdeer.

Common throughout the state—breeds (L. Bruner); "Sparingly present in Nebraska" (Aughey); "Summer resident, abundant, arrive in April, May,

September, and October" (Taylor); "The whole of temperate North America" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—nests (L. Skow); Peru—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Genoa, O'Neill, Bow creek (D. H. Talbot); Gage county (F. A. Colby); Omaha, an abundant migrant, and a common summer resident" (I. S. Trostler).

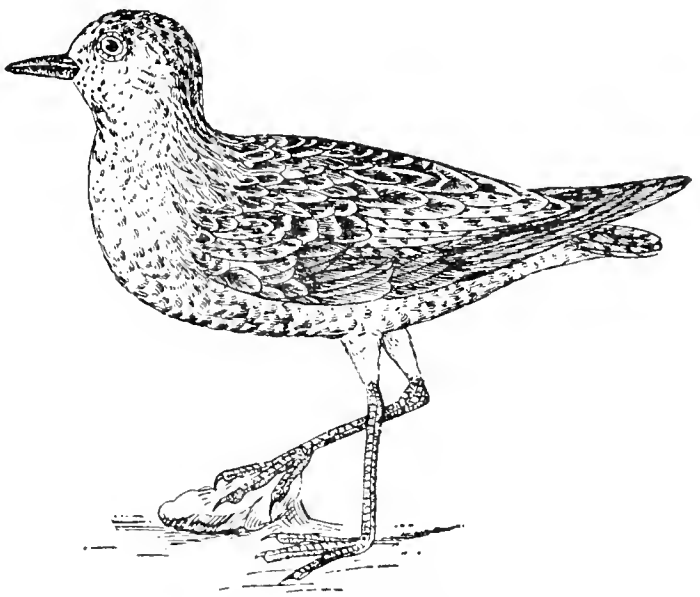


FIG. 5.—Golden Plover.

274. **Ægialtis semipalmata** *Bonap.*—SEMIPALMATED PLOVER.

West Point, Omaha, Lincoln (L. Bruner); "Abundant in Nebraska during its spring and fall migrations" (Aughey); "Migratory, common, arrive in May and September" (Taylor); "The whole of North America" (Goss); Omaha (L. Skow); Omaha, "a common migrant" (I. S. Trostler).

277*a*. **Ægialtis meloda circumcincta** *Ridgw.*—BELTED PIPING PLOVER.

Lincoln, West Point (L. Bruner); "Common in Nebraska, and breeds here" (Aughey); "Migratory, common; summer resident, occasional; arrives in May and September" (Taylor); "Breeding from northern Illinois and Nebraska, northward" (Goss); Peru, rare migrant (G. A. Coleman); Omaha, "a rare migrant" (I. S. Trostler).

278. **Ægialtis nivosa** *Cass.*—SNOWY PLOVER.

A small flock of what was supposed to be this plover was seen in Holt county in spring of 1885 (L. Bruner); "from California east to Kansas and western Gulf states" (A. O. U. Check List); "quite common as a summer resident in western Nebraska" (a "travelling salesman" through I. S. Trostler).

281. **Ægialtis montana** (*Towns.*).—MOUNTAIN PLOVER.

Sidney, Marsland, Harrison (L. Bruner); "Abundant in Nebraska, especially in the western portions of the state" (Aughey); "Migratory, abundant in

western Nebraska; summer resident, common; arrives in May and September" (Taylor); "East into Texas and Dakota" (Goss).

FAMILY **APHRIZIDÆ.**—SURF BIRDS AND TURNSTONES.

283. **Arenaria interpres**—(*Linn.*).—TURNSTONE.

Lincoln, on salt basins, May 25th (W. D. Hunter); do., May 16, 1895 (A. Eiche).

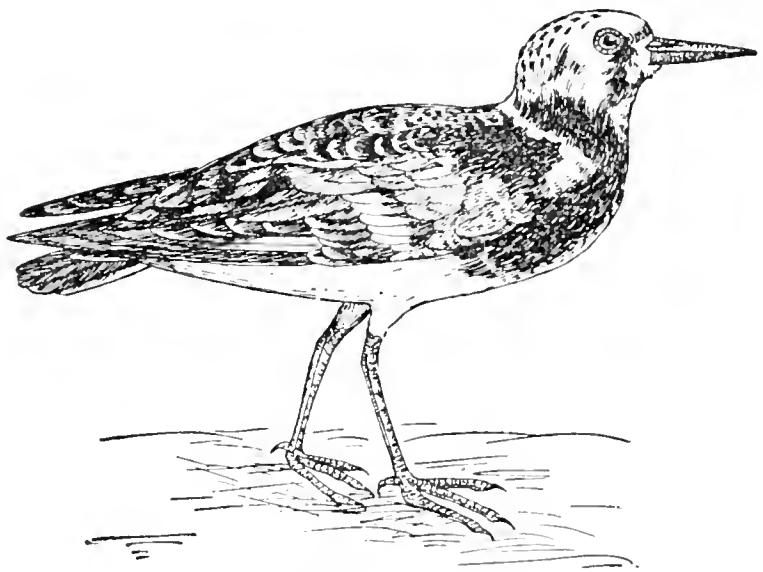


FIG. 6.—Turnstone.

286. **Hæmatopus palliatus** *Temm.*—THE AMERICAN OYSTER-CATCHER.

Northeastern Nebraska—accidental, a single specimen of this bird is reported as having been shot in spring of 1889 by a Mr. Chas Vaughn of Vermillion, S. Dak. (Dr. G. S. Agersborg).

ORDER GALLINÆ.—GALLINACEOUS BIRDS.

FAMILY **TETRAONIDÆ.**—GROUSE, PARTRIDGES, ETC.

The various members of the present family, while belonging to a grain eating group, are certainly quite prominent as insect destroyers. Especially is this true with respect to the Quail, Prairie Hen, Sharp-tailed Grouse, and Wild Turkey, all of which occupy most of the summer in capturing and destroying vast numbers of such insects as are found on the prairies. Grasshoppers, locusts, crickets, caterpillars and similar insects thus form the bulk of their insect food, forms that are all among the most numerous as well as destructive species. In

writing about these birds as insect destroyers Professor Samuel Aughey writes:* "I happened to be in the Republican valley, in southwestern Nebraska, in August, 1874, when the locusts invaded that region. Prairie chickens and quails, that previous to their coming had a large number of seeds in their stomachs when dissected, seemed now for a time to abandon all other kinds of food. At least from this onward for a month little else than locusts were found in their stomachs. All the birds seemed now to live solely on locusts for a while."

In winter and at other times of the year when insect life is scarce and difficult to obtain these birds feed more or less extensively upon seeds and other kinds of vegetation. Some even enter cultivated grounds and seek food that belongs to the farmer, thereby doing more or less direct injury. The extent of such injury, of course, depends upon the number of birds engaged in the depredations, and also on the time over which it is allowed to extend. If corn and other grain is harvested at the proper time but little damage ensues; but if allowed to remain in the field throughout winter much of the crop is liable to be taken by the birds.

289. **Colinus virginianus** (*Linn.*).—BOB-WHITE; QUAIL.

Greater part of state—breeds (L. Bruner); "Common in Nebraska" (Aughey); "Resident, common" (Taylor); "the greater portion of Nebraska" (Bendire); "West to Dakota, Kansas, Indian Territory, and eastern Texas" (Goss); Beatrice, De Witt—nesting (A. S. Pearse); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); Elm Creek, Elk Creek, Wood River, Verdigris, etc. (D. H. Talbot); Gage county (F. A. Colby); Omaha, "formerly an abundant resident, gradually becoming rarer, although still comparatively common, breeds April 15 to Aug. 1—two to four broods" (I. S. Trostler).

Perhaps no other bird that frequents the farm pays higher prices for the grain it eats than does the Quail. Living about the hedgerows, groves, and ravines, where insect enemies gather and lurk during the greater part of the year, this bird not only seizes large numbers of these enemies daily during the summer months when they are "abroad in the land," but all winter through it scratches among the fallen leaves and other rubbish that accumulates about its haunts seeking for hibernating insects of various kinds. Being a timid little creature, the quail seldom leaves cover to feed openly in the fields, and therefore does but little actual harm in the way of destroying grain. In fact it only takes stray kernels that otherwise might be lost.

*See 1st Rept. U. S. Ent. Com., p. 341.

It is also one of the few birds that feeds upon that unsavory insect, the Chinch-bug; and the number of this pest that occasionally fall its prey is really astonishing. A single Chinch-bug is a small thing, still I have seen a quail's stomach filled with them—more than 500 at least calculation having been sacrificed for a single meal of the bird examined.

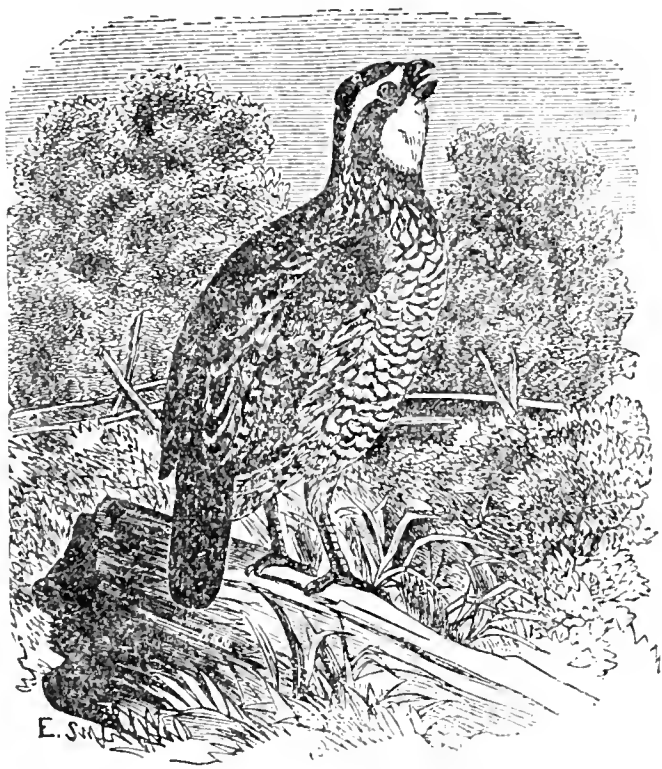


FIG. 7.—Bob-white; Quail.

No farmer or fruit-grower should ever kill a quail himself, nor should he allow any one else to hunt them on his premises.

Among the many complimentary things that have been said and written about the Quail the following is worthy of note:

A statement was made by Rev. J. E. Long, of Ithaca, Mich., and printed in the Gratiot *Journal*, to the effect that "several weeks ago a pair of quails flew up out of his garden. In making the turn about the corner of the house, one of them missed its reckoning in some way, and striking the house, fell dead. On examining its distended crop, 101 potato bugs were found, the little fellow's breakfast, for the bugs were yet alive and began to move about when brought to the fresh air."

297*b*. **Dendragapus obscurus richardsonii** (*Dougl.*).—RICHARDSON'S DUSKY GROUSE.

"Baird mentions ten specimens collected in western Nebraska in the month of August" (Taylor); "Eastward through Wyoming and western South Dakota" (Bendire).

The last edition of the A. O. U. Check List gives the typical *obscurus* as reaching "eastward to the Black Hills of South Dakota."

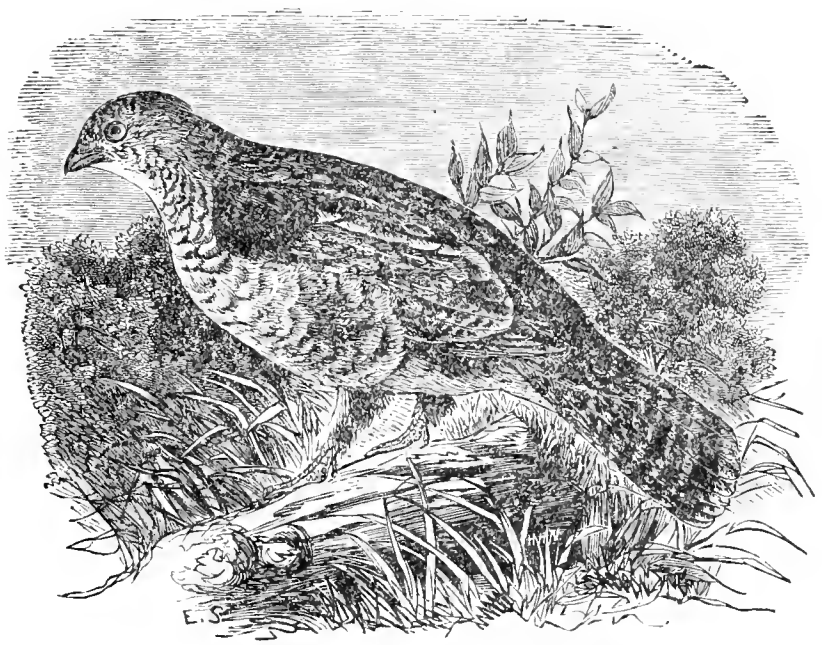


FIG. 8.—Ruffed Grouse.

300. **Bonasa umbellus** (*Linn.*).—RUFFED GROUSE.

Weeping Water (T. A. Williams); "Rare in Nebraska" (Aughey); "Probably may be found in the western part of the state" (Taylor); "South through southeastern Nebraska" (Bendire); "West to the edge of the Great Plains" (Goss); South Omaha, Rockport—breeding (L. Skow); "rare resident, one killed near Florence Nov. 4, 1894, and several killed near Bellevue winter of 1893" (I. S. Trostler).

305. **Tympanuchus americanus** (*Reich.*).—PRAIRIE HEN; PINNATED GROUSE.

Greater portion of the state, breeds (L. Bruner); "enormously abundant in Nebraska" (Aughey); "Resident, abundant in the western part of the state, but somewhat rare in eastern Nebraska" (Taylor); "throughout Nebraska" (Bendire); "Prairies of the Mississippi valley (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeds (L. Skow); Peru—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); numerous localities in eastern half of state (D. H. Talbot); Gage county—breeds (F. A. Colby); Omaha, "formerly a common resident, and may still be met with occasionally in flocks of from four to fifteen individuals" (I. S. Trostler).

307. **Tympanuchus pallidicinctus** *Ridgw.*—Lesser Prairie Hen.

Eastern border of Great Plains, from Nebraska (?), southwestern Kansas, southwestern Missouri (?), and western part of Indian Territory to western Texas (Ridgway); Vermillion, S. Dak.* (Agersborg); a number of years ago several specimens were reported as having been seen in Cuming county near West Point (L. Bruner); Cherry county—breeds (J. M. Bates). Hon. E. K. Valentine, of West Point, just recently told me that in the early fall, 1870, he killed two of these birds, and that H. C. Plimton and Sam Greggory killed one each out of a flock of about a dozen that was found on the west side of the Elkorn river in Cuming county. In the winter of 1871–'72, while at home for holiday vacation, I saw one of these birds in a corn-field just adjoining the town of West Point (L. Bruner). At about this time B. E. B. Kennedy, of Omaha, reports the killing of several of these birds in Washington county by Henry Homan, of Omaha. Still other birds were killed by George A. Hogland, near West Point, in Cuming county, but on the east side of the Elkhorn river (Notes collected by I. S. Trostler).

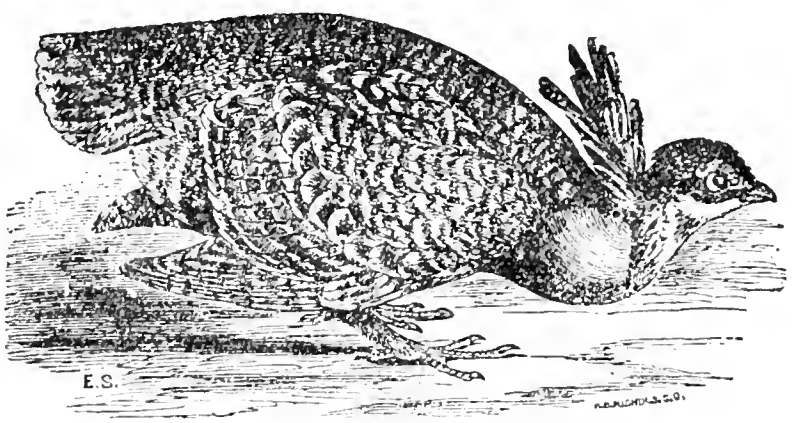


Fig. 9.—Prairie Hen; Pinnated Grouse.

308*a*. **Pediocætes phasinellus columbianus** (*Ord*).—Columbian Sharp-tailed Grouse.

Pine Ridge near Hay Springs (Wm. Waterman); Sioux county, Feb. 24, 1896—several specimens (W. D. Hunter, L. Skow).

308*b*. **Pediocætes phasianellus campestris** *Ridgw.*—Prairie or Common Sharp-tailed Grouse.

West Point, Holt county, Harrison, Thedford—breeds (L. Bruner); "Formerly very abundant in Nebraska" (Aughly); "Resident, formerly abundant, becoming rare" (Taylor); "North thruogh western Nebraska" (Bendire); "Plains and prairies east of the Rocky mountains" (Goss); Hay Springs—breeds (Wm. Waterman); Cherry county—breeds (J. M. Bates); Wood River,

* Specimen shot by Ed. Spatz, Mechling, Clay county.

O'Neill (D. H. Talbot); "not seen in the vicinity of Omaha, but a fine male taken in Cherry county June 25, 1895, where it is a common resident" (I. S. Trostler).

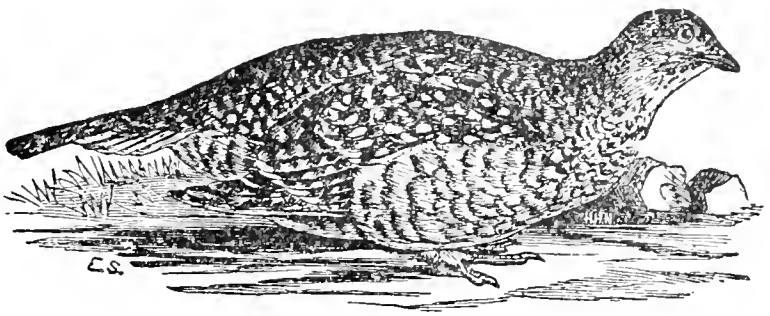


FIG. 10.—Prairie Sharp-tailed Grouse.

309. **Centrocercus urophasianus** (*Bonap.*)—SAGE GROUSE; SAGE COCK.

Hat creek basin, Sioux county (L. Bruner); western Nebraska (Aughey); "An occasional resident in western Nebraska" (Taylor); "through western Nebraska" (Bendire); Indian creek, in Sioux county, Feb., 1896—not rare (Elliott W. Brown).

FAMILY **PHASIANIDÆ**.—PHEASANTS, ETC.

310. **Meleagris gallopavo** *Linn.*—WILD TURKEY.

Rockport and Ft. Calhoun (L. Bruner); "Formerly very abundant in Nebraska" (Aughey); "Formerly an abundant resident, but now rapidly disappearing" (Taylor); "It was not uncommon in southern South Dakota and Nebraska within the last ten years" (Bendire); west along the timbered streams to the edge of the Great Plains (Goss); Bellevue (L. Skow); "formerly found in southern part of Lincoln county, in canyons and along Medicine creek, but none left" (M. K. Barnum).

ORDER COLUMBÆ.—PIGEONS.

FAMILY **COLUMBIDÆ**.—PIGEONS.

The various species of doves or pigeons are not, as a rule, thought of as being especially harmful, yet repeated examinations of their stomach contents would indicate that their food seldom, if ever, consists of anything but grains and various kinds of seeds along with other particles of vegetation. The good done by these birds as destroyers of weed seeds more than balances for the harm done by them as grain eaters.

315. **Ectopistes migratorius** (*Linn.*).—Passenger Pigeon.

West Point, Norfolk (L. Bruner); "Some years abundant in Nebraska" (Aughey); "Summer resident, irregular, arrives in May and leaves in September" (Taylor); "Deciduous forest regions of eastern North America" (Bendire); west to the great plains (Goss); Florence (L. Skow); "One killed out of flock of fifteen or twenty by Hon. Edgar Howard, of Papillion, in woods five miles south east of that place, in Sarpy county, Nov. 9, 1895,—also a flock of fifteen was by Geo. W. Sabine, of Omaha, seen flying over his residence on morning of Nov. 28, 1895" (I. S. Trostler); Cuming county (J. H. Mockett, Jr.).

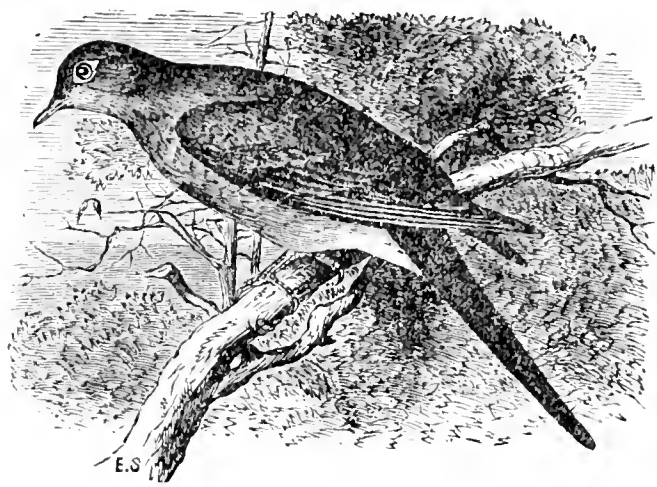


Fig. 11.—Carolina Dove.

316. **Zenaidura macroura** (*Linn.*).—Mourning Dove; Carolina Dove.

Especially common over wooded portions of the state where it breeds (L. Bruner); "Abundant in Nebraska" (Aughey): "Summer resident, abundant, arrives in April and leaves in September" (Taylor); "Extends over the entire United States" (Bendire); "The whole of temperate North America" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—nesting (L. Skow); Peru, breeds, winters (G. A. Coleman); Cherry county—breeds (J. M. Bates); Genoa (D. H. Talbot); Gage county—breeds (F. A. Colby); Omaha, "an abundant summer resident—breeds Apr. 1 to Sept. 1" (I. S. Trostler).

Order RAPTORES.—Birds of Prey.

In summing up the food-habits of the hawks and owls as found in the state, I can do no better than to quote Dr. C. Hart Merriam's words used in his letter of transmittal to the Secretary of Agriculture when submitting for publication a report on the hawks and owls of the United States. He writes as follows:*

* "The Hawks and Owls of the United States in Their Relation to Agriculture," by A. K. Fisher, U. S. Dept. Agric., Div. Ornith. and Mam., Bul. No. 3.

"The statements herein contained respecting the food of the various hawks and owls are based on a critical examination, by scientific experts, of the actual contents of about 2,700 stomachs of these birds, and consequently may be fairly regarded as a truthful showing of the normal food of each species. The result proves that a class of birds commonly looked upon as enemies to the farmer, and indiscriminately destroyed whenever occasion offers, really rank among his best friends, and with few exceptions should be preserved and encouraged to take up their abode in the neighborhood of his home. Only six of the seventy-three species and subspecies of hawks and owls of the United States are injurious. Of these, three are so extremely rare they need hardly be considered, and another (the Fish Hawk) is only indirectly injurious, leaving but two (the Sharp-shinned and Cooper's Hawks) that really need be taken into account as enemies to agriculture. Omitting the six species that feed largely on poultry and game, 2,212 stomachs were examined, of which 56 per cent contained mice and other small mammals, 27 per cent insects, and only 3½ per cent poultry or game birds. In view of these facts the folly of offering bounties for the destruction of hawks and owls, as has been done by several states, becomes apparent, and the importance of an accurate knowledge of the economic status of our common birds and mammals is overwhelmingly demonstrated."

Family **CATHARTIDÆ**.—American Vultures.

325. **Cathartes aura** (*Linn.*).—Turkey Buzzard; Turkey Vulture.

Omaha, West Point, Dismal river—breeding, Crawford, Lincoln (L. Bruner); "Summer resident, common, arrive in April and leave in September" (Taylor); "Nearly the whole of temperate and tropical America" (Bendire); do. (Goss); Omaha—breeds (L. Skow); Peru, breeds—common (Coleman); Cherry county—breeds (J. M. Bates); Gage county (F. A. Colby); "quite common summer resident" (I. S. Trostler).

326. **Catharista atrata** (*Bartram*).—Black Vulture; Carrion Crow.

"Casually to * * Kansas and South Dakota" (Bendire); "Casually to Maine, New York, Illinois, Dakota, etc." (Goss); Wolf Creek, Nebr. (D. H. Talbot).

The food-habits of both the Turkey Vulture and the Carrion Crow or Black Vulture, are of such a nature that the destruction of these

birds should be prohibited. In fact, in many of the states this is done by law. They live almost exclusively upon carrion or decomposing animal matter, and in this manner aid in the prevention of diseases that might result from the presence of such filth. They may, however, be the cause of indirectly spreading hog cholera where animals that have died from this disease are left unburied or unburnt.

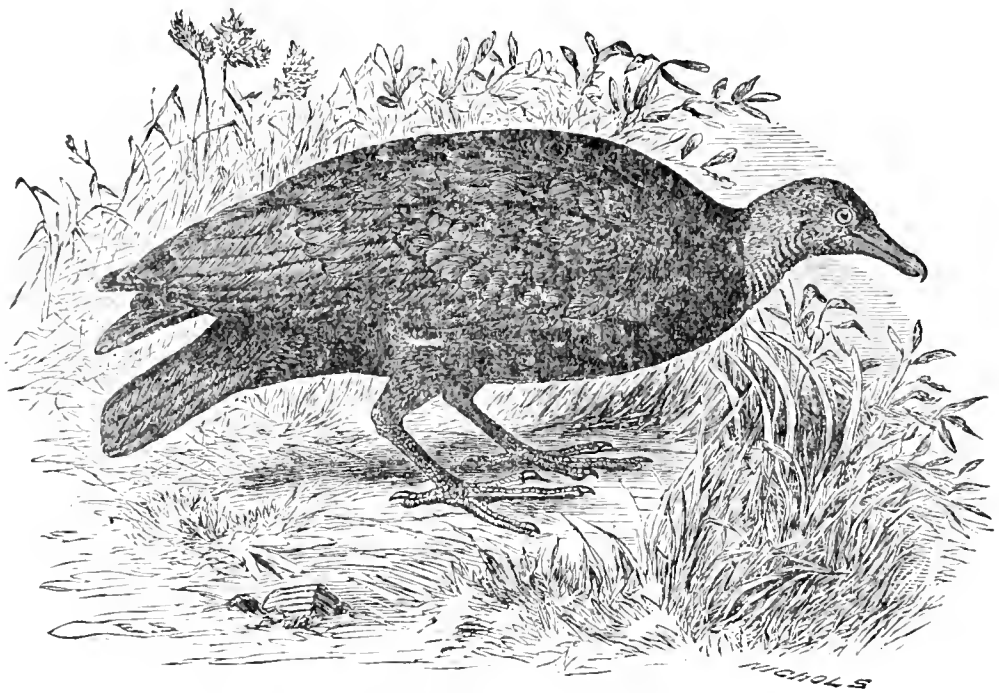


Fig. 12.—Black Vulture; Carrion Crow.

Family **FALCONIDÆ**.—Falcons, Hawks, Eagles, etc.

327. **Elanoides forficatus** (*Linn.*).—Swallow-tailed Kite.

Omaha, West Point, Tekamah (L. Bruner); "I have seen this kite as far north as Cedar county and as far west as the meridian of Ft. Kearney" (Aughey); "Summer resident, common, arrive in May and leave in September" (Taylor); north to Wisconsin, Minnesota, Dakota (Goss); "North regularly to Iowa, Minnesota, Illinois, etc." (Fisher); Rockport—breeds (L. Skow); "rarely seen—a pair reported to breed eighteen miles north of Omaha" (I. S. Trostler); Fullerton, Nance county (C. E. Barker).

329. **Ictinia mississippiensis** (*Wils.*).—Mississippi Kite.

"A flock of six or seven was seen October 12 at Omaha" (R. E. Dinges); "North to South Carolina, southern Illinois, Kansas, etc." (Goss); "Casually to Iowa and Wisconsin" (Fisher).

328. **Elanus leucurus** (*Vieill.*).—White-tailed Kite.

Lanham, Nebr., "one seen March 14, 1893" (Amos Pyfer).

331. **Circus hudsonius** (*Linn.*).—MARSH HAWK.

Entire state—common—breeds (L. Bruner); "Occasionally seen in Nebraska" (Aughey); "Summer resident, common, may remain in the state during the winter" (Taylor); "Nearly the entire North American continent" (Bendire); "The whole of North America" (Goss); "Inhabits the whole of North America" (Fisher); Omaha—breeding (L. Skow); Cherry county—breeds, also winters here (J. M. Bates); Gage county (F. A. Colby); "a not common summer resident—never observed earlier in spring than May 25" (I. S. Trostler).

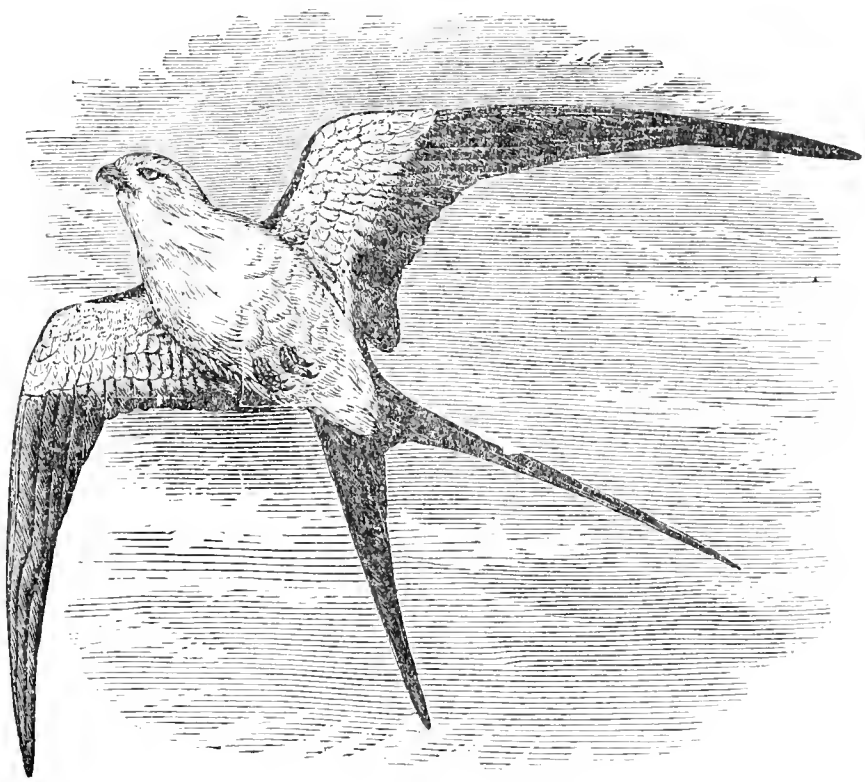


FIG. 13.—Swallow-tailed Kite.

332. **Accipiter velox** (*Wils.*).—SHARP-SHINNED HAWK.

West Point, Omaha, South Bend, Lincoln (L. Bruner); "Migratory, common, may breed in northern Nebraska" (Taylor); "North America in general" (Bendire); "Nearly the whole of North America" (Goss); "It breeds in most, if not all, of the states" (Fisher); Omaha (L. Skow); Peru, rare (G. A. Coleman); Gage county (F. A. Colby); Omaha, "somewhat rare, permanent resident, seen in April, May, and September (I. S. Trostler); Sioux county (Mrs. Wallace).

333. **Accipiter cooperi** (*Bonap.*).—COOPER'S HAWK.

West Point, Hat Creek Basin—breeding, Lincoln (L. Bruner); common (Aughey); "Resident, common" (Taylor); "Whole of temperate North America" (Bendire); "They breed in suitable localities throughout the United

States (Goss);" "Throughout the United States and the greater part of Mexico" (Fisher); Omaha—nesting (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county (J. M. Bates); Omaha (F. J. Brezee); Gage county (F. A. Colby); "common resident, except in coldest weather—breeds April 7-20" (I. S. Trostler).

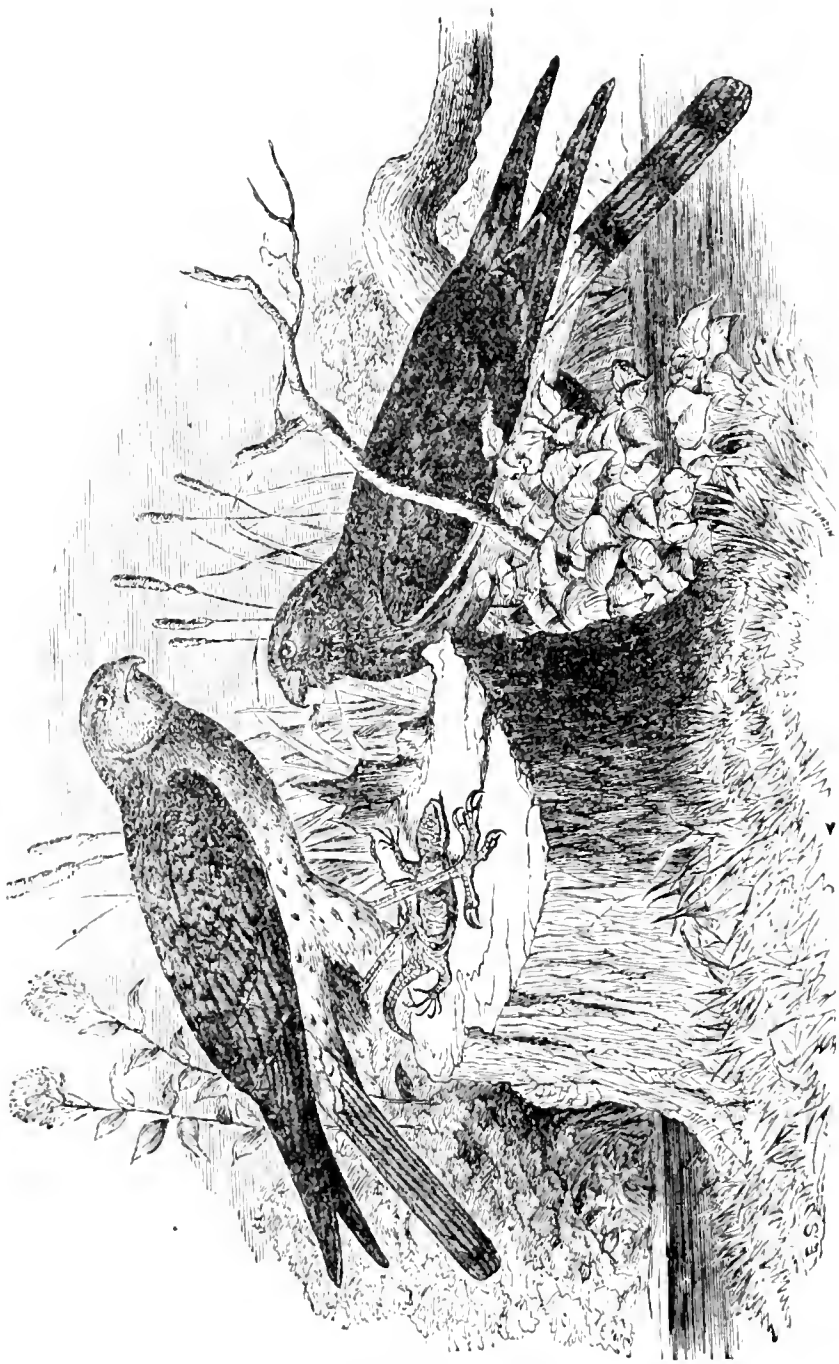


FIG. 14.—Marsh Hawk.

334. **Accipiter atricapillus** (*Wils.*).—AMERICAN GOSHAWK.

West Point, Omaha (L. Bruner); "Present but rare on the prairies of Nebraska" (Aughey); "South in winter to the Middle States" (Bendire); "West

to and including the Rocky mountains" (Goss); "Northern and eastern North America" (Fisher); Rockport, Florence (L. Skow); Lincoln (F. J. Brezee); Sioux county, Feb. 24, 1896 (L. Skow).

334*a*. **Accipiter atricapillus striatulus** *Ridgw.*—WESTERN GOS-HAWK.

Florence, Nebr., 1889 (L. Skow).

FIG. 15.—Cooper's Hawk.

337. **Buteo borealis** (*Gmel.*).—RED-TAILED HAWK.

Timbered portion of state, breeding (L. Bruner); "Common in Nebraska" (Aughey); "Found in the summer and fall, and may remain all winter" (Taylor); "West to border of Great Plains" (Bendire); "West to the Great Plains" (Goss); do. (Fisher); Beatrice, De Witt—nesting (A. S. Pearse); Omaha—breeding (L. Skow); Gage county (F. A. Colby); common resident, breeds April 1 to 20 (I. S. Trostler); Jamaica—breeding (R. E. Dinges).

337*a*. **Buteo borealis kriderii** *Hoopes.*—KRIDER'S HAWK.

West Point, Lincoln, Tekamah (L. Bruner); "Great plains of the United States, from Minnesota to Texas" (Bendire); "East casually to Illinois and Iowa" (Goss); "Great Plains from Minnesota to Texas" (Fisher); Omaha—breeding (L. Skow); Omaha, "have twice taken eggs from a pair of very light Red-tails that would probably be classified as Kriderii" (I. S. Trostler).

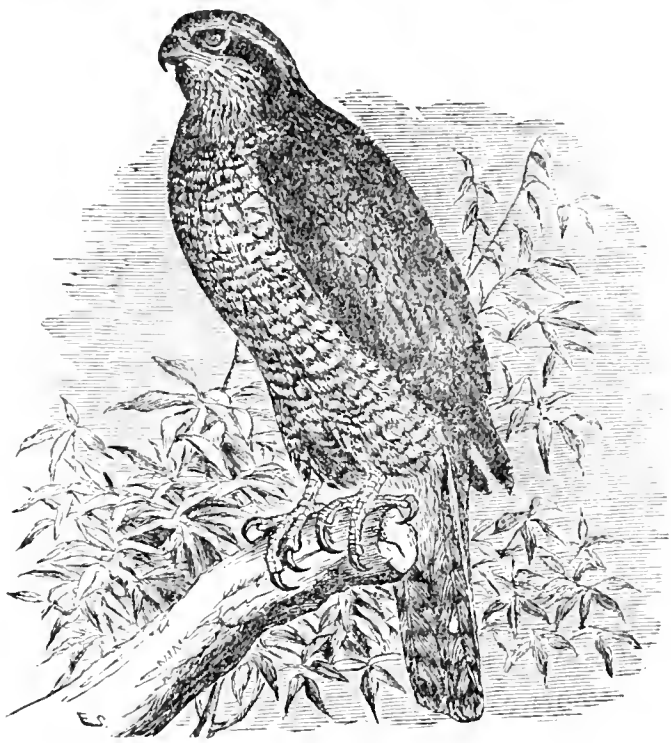


FIG. 16.—Goshawk.

337*b*. **Buteo borealis calurus** (*Cass.*).—WESTERN RED-TAIL HAWK.

Lincoln, West Point (L. Bruner); "Baird mentions two specimens taken in August, 1857" (Taylor); "casual east to Illinois" (Bendire); "East to Kansas, casually to Illinois" (Goss); "Country west of the Rocky mountains" (Fisher); Omaha (L. Skow); "this dark phase is occasionally seen in the vicinity of Omaha" (I. S. Trostler); Lincoln (Dr. F. L. Riser).

337*d*. **Buteo borealis harlani** (*Aud.*).—HARLAN'S HAWK.

Lincoln, Omaha, West Point (L. Bruner); "The records of the Normal Science Society show two specimens killed in April" (Taylor); "North to Kansas, Iowa, and Illinois" (Bendire); "Casually to Iowa, Illinois, and Pennsylvania" (Fisher); Omaha (L. Skow); "One killed on farm near Omaha and mounted by L. Skow" (I. S. Trostler).

339. **Buteo lineatus** (*Gmel.*).—RED-SHOULDERED HAWK.

Omaha, Bellevue, Rulo (L. Bruner); "Probably a common resident" (Taylor); "West to Texas and the Great Plains" (Bendire); "West to the edge of

the Great Plains" (Goss); "West to the Great Plains" (Fisher); Omaha—breeding (L. Skow); Omaha, "rarely seen" (I. S. Trostler); Lincoln (A. Eiche, Dr. F. L. Riser).

342. **Buteo swainsoni** *Bonap.*—SWAINSON'S HAWK.

West Point, Lincoln (L. Bruner); "Rather abundant in the state" (Aughey); "A common summer resident and may remain in the state during the winter" (Taylor); "east to Wisconsin, Illinois, and Arkansas" (Bendire); do. (Goss); "As far south as South Dakota and Nebraska it is a migratory species" (Fisher); Omaha—breeding (L. Skow); "Resident, except in coldest weather, but not commonly seen" (I. S. Trostler).

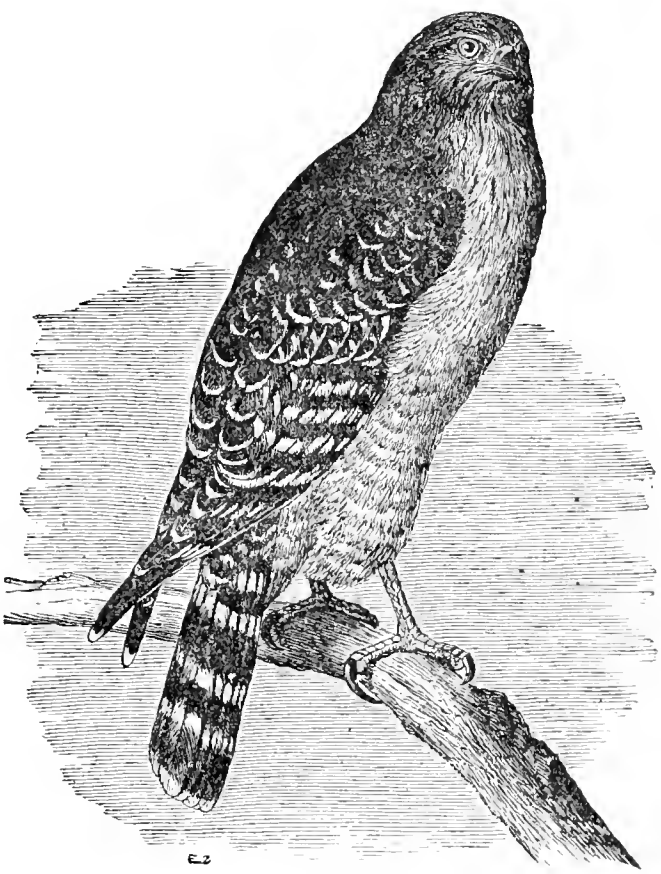


FIG. 17.—Red-shouldered Hawk.

343. **Buteo latissimus** (*Wils.*).—BROAD-WINGED HAWK.

West Point, Omaha, Harrison, Lincoln (L. Bruner); "Rather common during the fall along the bluffs of the Missouri" (Taylor); "West to edge of Great Plains" (Bendire); do. (Goss); "East of the Great Plains" (Fisher); Omaha—breeding (L. Skow); Peru, rare—breeds (G. A. Coleman); Omaha, summer resident, rather rare—breeds in May" (I. S. Trostler).

347*a*. **Archibuteo lagopus sancti-johannis** (*Gmel.*).—AMERICAN ROUGH-LEGGED HAWK.

West Point, Oakland, Lincoln (L. Bruner); "Rare in southern Nebraska" (Aughey); "Whole of North America" (Bendire); "The whole of North

America north of Mexico" (Goss); "In the west it extends far south in winter" (Fisher); Omaha (L. Skow); "I have never observed this hawk in vicinity of Omaha, but on June 27, 1895, saw a pair in Cherry county flying very low in vicinity of a colony of striped ground squirrels" (I. S. Trostler); Lincoln (Dr. F. L. Riser).

FIG. 18.—Swainson's Hawk.

348. **Archibuteo ferrugineus** (*Licht.*).—FERRUGINOUS ROUGH-LEG; FERRUGINOUS BUZZARD.

Omaha (L. Bruner); "I have seen but one of these hawks in Nebraska" (Aughey); "Resident, rare" (Taylor); "east to and across the Great Plains" (Bendire); "East into Iowa and casually to Illinois" (Goss); "Ranging to the eastern border of the Great Plains" (Fisher); Omaha (L. Skow); "not observed in vicinity of Omaha, a common summer resident in Cherry county" (I. S. Trostler); Sioux county, Feb. 24, 1896 (W. D. Hunter); Harrison—breeding (E. H. Barbour).

349. **Aquila chrysaetos** (*Linn.*).—GOLDEN EAGLE.

West Point, Oakland, Decatur, Lincoln, etc. (L. Bruner); "Resident, rare" (Taylor); "Northern portions of northern hemisphere" (Bendire); do. (Goss);

do. (Fisher); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); Grand Island (F. J. Brezee); Wood River (D. H. Talbot); "Straggler, one seen Sept. 21, 1895, in Sarpy county, breeds annually on Scott's Bluff, Scott's Bluff county" (I. S. Trostler); Sioux county, Feb. 19, 1896 (L. Bruner).

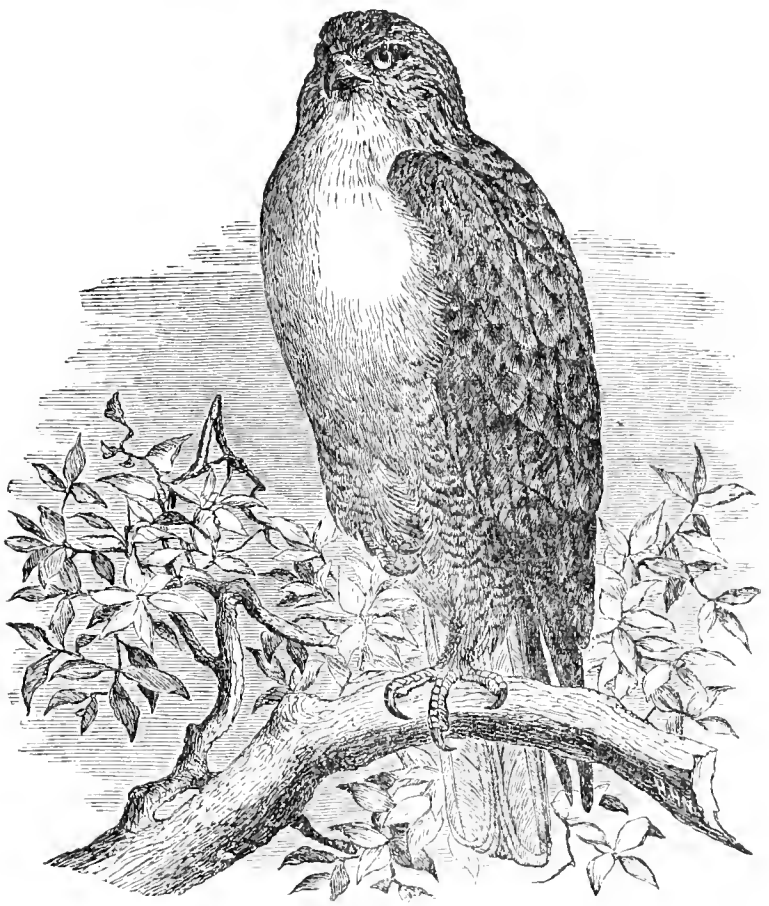


FIG. 19.—Ferruginous Rough-leg.

352. **Haliæetus leucocephalus** (*Linn.*).—BALD EAGLE; WHITE-HEADED EAGLE.

South Bend, West Point (L. Bruner); "Resident, somewhat common" (Taylor); "Whole of North America" (Bendire); do. (Goss); do. (Fisher); Alliance (O. Bowman); Rockford—breeding (A. S. Pearse); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); Wood River (D. H. Talbot); Gage county (F. A. Colby); "accidental visitor, not common at North Platte" (M. K. Barnum).

354*a*. **Falco rusticolus gyrfalco** (*Linn.*).—GYRFALCON; MCFARLANE'S GYRFALCON.

Norfolk, West Point (L. Bruner); "An accidental winter visitant in Kansas" (Goss).

355. **Falco mexicanus** *Schleg.*—PRAIRIE FALCON.

West Point, Holt county (L. Bruner); "Only occasionally seen in Nebraska" (Aughey); "Has been seen in the state in the summer and fall" (Taylor);

"From eastern border of Great Plains to the Pacific" (Bendire); "East to the eastern border of Great Plains" (Goss); "Eastern border of Great Plains to the Pacific" (Fisher); Omaha (L. Skow); Cherry county (J. M. Bates); "occasionally seen during spring and fall, one killed near Bellevue, May 12, 1894" (I. S. Trostler); Sarpy county (A. K. Fisher); Sioux county, Feb. 25, 1896, a pair (W. D. Hunter, L. Skow).

FIG. 20.—Prairie Falcon.

356. **Falco peregrinus anatum** (*Bonap.*).—DUCK HAWK; PEREGRINE FALCON.

West Point (L. Bruner); "Have seen this hawk but three times in the state" (Aughey); "Not uncommon in the spring and fall" (Taylor); "Whole of America" (Bendire); do. (Goss); "Inhabits all of North America" (Fisher); Omaha (L. Skow).

357. **Falco columbarius** *Linn.*—PIGEON HAWK.

Pine Ridge in Dawes and Sioux counties, West Point (L. Bruner); "Unfortunately too abundant in Nebraska" (Aughey); "Abundant during spring and fall" (Taylor); "The whole of North America" (Bendire); do. (Goss); "Inhabits the whole of North America" (Fisher); Omaha (L. Skow); Cherry county (J. M. Bates).

358. **Falco richardsonii** *Ridgw.*—RICHARDSON'S MERLIN.

West Point, Omaha (L. Bruner); "Rather common in Nebraska, breeds here" (Aughey); "Resident, common" (Taylor); "From the Mississippi river to

the Pacific coast" (Bendire); do. (Goss); "Inhabits the interior of North America" (Fisher).

360. **Falco sparverius** *Linn.*—AMERICAN SPARROW HAWK.

Omaha, Lincoln, West Point, Holt county, etc. (L. Bruner); breeds; "Very abundant and breeds here (Aughey); "Abundant during spring, summer, and fall, and probably during the winter" (Taylor); "Whole of temperate

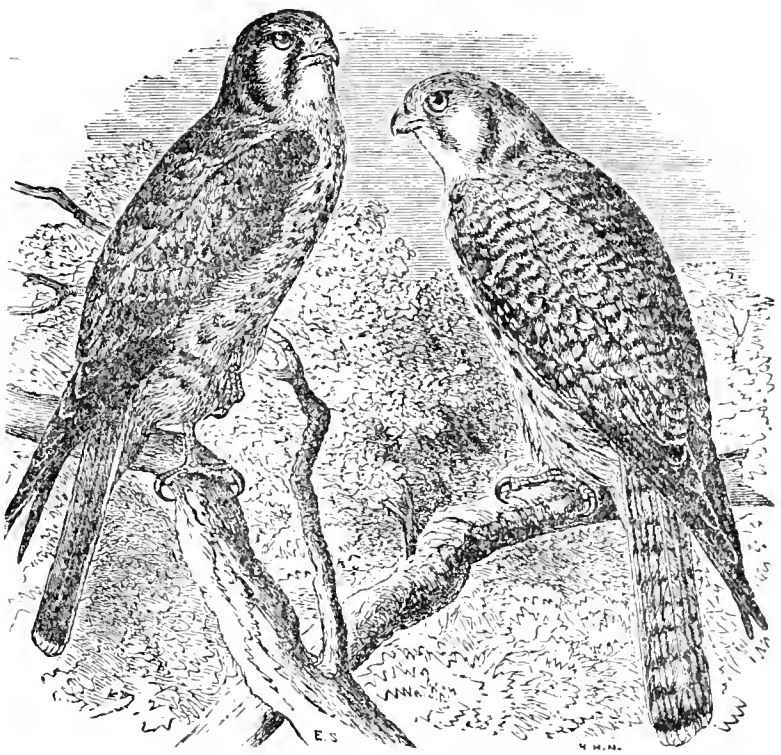


FIG. 21.—Sparrow Hawk.

North America" (Bendire); do. (Goss.); "Entire temperate North America" (Fisher); Beatrice, De Witt (A. S. Pearse); Omaha—breeding (L. Skow); Peru, common summer resident (G. A. Coleman); Cherry county—breeds (J. M. Bates); Ponca (D. H. Talbot); Gage county (F. A. Colby); "common during migrations, a few remain to breed" (I. S. Trostler).

364. **Pandion haliaetus carolinensis** (*Gmel.*).—OSPREY; FISH-HAWK.

West Point, Lyons, South Bend, Lincoln, etc. (L. Bruner); "Temperate and tropical America in general" (Bendire); "North America in general" (Goss); tropical and temperate America (Fisher); Omaha (L. Skow); Omaha (F. J. Brezee); Omaha, "occasionally seen during spring and fall" (I. S. Trostler).

FAMILY **STRIGIDÆ**.—BARN OWLS.

365. **Strix pratinicola** *Bonap.*—AMERICAN BARN OWL; MONKEY-FACED OWL.

West Point, Gilmore, Lincoln, Scribner (L. Bruner); "Only occasionally found in Nebraska, but breeds here" (Aughey); breeding in hole in ground in Saline county, breeding in Lancaster county (R. E. Dinges); "An occasional summer resident" (Taylor); "United States generally" (Bendire); do. (Goss); "Reaches southern Minnesota, Wisconsin, etc." (Fisher); Beatrice (A. S. Pearse); Omaha—breeding (L. Skow); Cherry county (J. M. Bates); Gage county (F. A. Colby); "occasionally seen in late spring and summer, a set of eggs taken June 12, 1891, at Hebron, Thayer county, others known to have bred in wolf den in Sarpy county" (I. S. Trostler).

FIG. 22.—Barn Owl.

FAMILY **BUBONIDÆ**.—HORNED OWLS, ETC.

366. **Asio wilsonius** (*Less.*).—AMERICAN LONG-EARED OWL.

West Point, Lincoln, Gilmore (L. Bruner); rare (Aughey); "Occasionally found in summer and fall" (Taylor); "Whole of temperate North America" (Bendire); do. (Goss); do. (Fisher); Omaha—breeding (L. Skow); Cherry county (J. M. Bates); Wood River, Genoa, Jackson (D. H. Talbot); Omaha, "resident, not common—breeds" (I. S. Trostler).

367. **Asio accipitrinus** (*Pall.*).—SHORT-EARED OWL.

West Point, Omaha, Lyons, Holt county, Gilmore, Lincoln, etc., breeding, Dodge county in April (L. Bruner); "This owl is frequently seen on the borders of the Missouri bottoms in Nebraska" (Aughey); "Resident, rare"

(Taylor); "Entire western hemisphere" (Bendire); "The entire continent of America" (Goss); "Greater part of both hemispheres" (Fisher); Beatrice (A. S. Pearse); Omaha (L. Skow); Cherry county (J. M. Bates); Wood River, Elm Creek, Dakota City (D. H. Talbot); Gage county (F. A. Colby); "resident, rare, seen in vicinity of Omaha in summer and winter" (I. S. Trostler).

FIG. 23.—Short-eared Owl.

368. **Syrnium nebulosum** (*Forst.*).—BARRED OWL.

West Point, Tekamah, Lincoln (L. Bruner); "Very seldom seen in Nebraska" (Aughey); "Rarely seen in the state, but may be a constant resident" (Taylor); "West to eastern Nebraska and Kansas" (Bendire); "I have never met with them west of Kansas" (Goss); "Westward to Manitoba, Dakota, Kansas, and Texas" (Fisher); Omaha—breeding (L. Skow); Lincoln—breeding (A. Cook); Gage county (F. A. Colby); Omaha, "resident, not rare—breeds in March" (I. S. Trostler).

370. **Scotiaptex cinerium** (*Gmel.*).—GREAT GRAY OWL.

Long Pine, Neb.—specimen in a saloon (J. M. Bates); Omaha, "rare winter resident, one seen Dec. 17, 1893, in county poor farm woods" (I. S. Trostler).

371. **Nyctala tergmalmi richardsoni** (*Bonap.*).—RICHARDSON'S SAW-WHET OWL.

Lincoln, Neb., Dec. 10, 1892 (L. Bruner); "to northern United States in winter" (Bendire).

FIG. 24.—Barred Owl.

372. **Nyctala acadica** (*Gmel.*).—SAW-WHET OWL.

West Point, Omaha, Lincoln (L. Bruner); "rarely south of 40° in eastern portions" (Bendire); "The United States and southern British possessions, from Atlantic to the Pacific" (Goss); "Ranging south to about the thirty-ninth parallel in the east" (Fisher); Omaha (L. Skow); Cherry county (J. M. Bates); Sioux county, Feb. 22, 1896, heard at night (W. D. Hunter, L. Skow).

373. **Megascops asio** (*Linn.*).—SCREECH OWL.

West Point, Omaha, Rockport, Lincoln, etc—breeds (L. Bruner): "Often met with in the wooded portions of Nebraska, where it breeds" (Aughey); "Resident, abundant" (Taylor); "west to the Great Plains" (Bendire); "Temperate eastern North America" (Goss); "West to the Great Plains" (Fisher); Beatrice, De Witt (A. S. Pearse); Omaha—breeding (L. Show); Dakota City (D. H. Talbot); Gage county—breeds (F. A. Colby); "resident, not

common, breeds in April" (I. S. Trostler); Sioux county, Feb. 25, 1896 (L. Skow, W. D. Hunter).

373*e*. **Megascops asio maxwelliæ** (*Ridgw.*).—Rocky Mountain Screech Owl.

"It is likely to be found in the extreme northwestern parts of Nebraska" (Bendire); "From Colorado to eastern Montana" (Fisher).

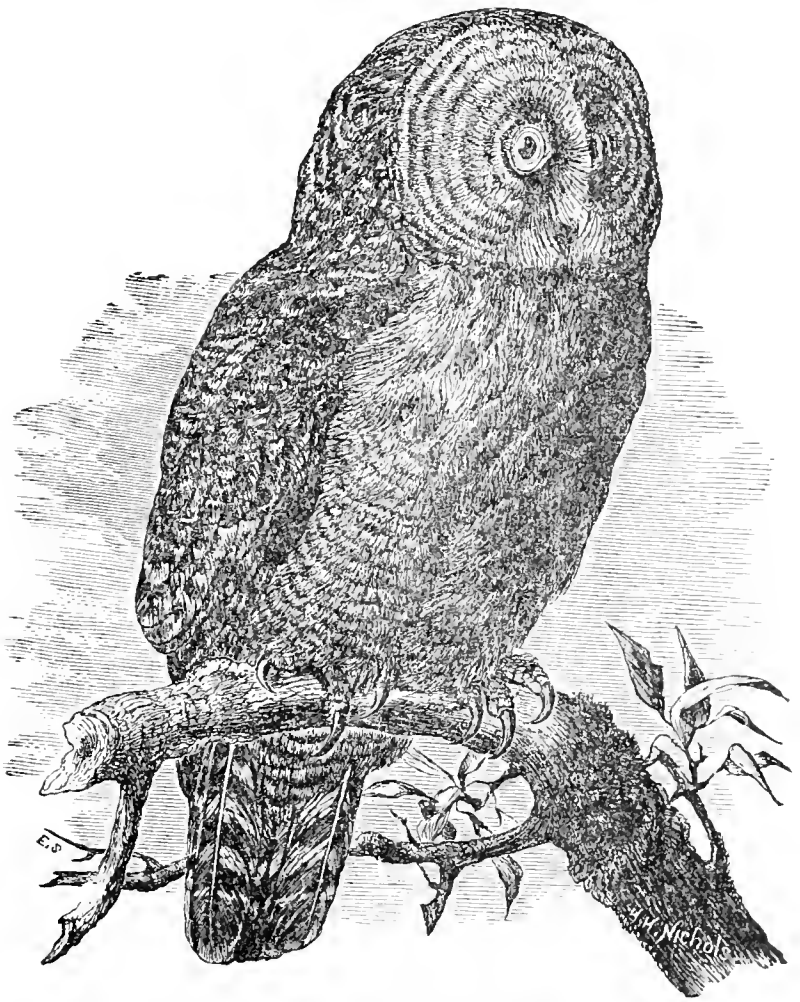


Fig. 25.—Great Gray Owl.

375. **Bubo virginianus** (*Gmel.*).—Great Horned Owl.

West Point, Tekamah, Bellevue, Lincoln, Rockport, etc.—breeds (L. Bruner); Dakota county (Aughey); "Not common during the spring, summer, and fall, and probably remains during the winter (Taylor); "Eastern North America" (Bendire); "West to the edge of the Great Plains" (Goss); "Ranges from Labrador and the eastern United States south through eastern Mexico" (Fisher); Omaha—breeding (L. Skow); Cherry county—one form (J. M. Bates); Dakota City, Elk Creek (D. H. Talbot); Gage county (F. A. Colby); Omaha, "resident, not common, usually one pair in each piece of heavy timber—breed in latter part of February and early March" (I. S. Trostler).

375*a*. **Bubo virginianus subarcticus** (*Hoy*).—WESTERN HORNED OWL.

West Point (L. Bruner); "eastward across the Great Plains" (Bendire); "East across the Great Plains to western Texas and western Manitoba" (Goss); do. (Fisher); Omaha (L. Skow); Cherry county (J. M. Bates); Sioux county, Feb. 26, 1896, several seen but not taken (W. D. Hunter, L. Skow).

FIG. 26.—Saw-whet Owl.

375*b*. **Bubo virginianus arcticus** (*Swains.*).—ARCTIC HORNED OWL.

West Point (L. Bruner); "South in winter to Manitoba and the mountains of Dakota and Montana" (Fisher); Florence (L. Skow).

375*c*. **Bubo virginianus saturatus** *Ridgw.*—DUSKY HORNED OWL.

Near Omaha—accidental (?) (L. Skow).

376. **Nyctea nyctea** (*Linn.*).—SNOWY OWL.

Omaha, Papillion, West Point, Oakland, Lincoln (L. Bruner); "Frequently seen in winter and occasionally in late autumn" (Aughey); "A common winter visitant" (Taylor); "Southward in winter * * * almost across the United States" (Bendire); "Northern portion of the northern hemisphere, migrating south in winter" (Goss); "Sometimes common as far south as the fortieth parallel" (Fisher); Omaha (L. Skow); Cherry county (J. M. Bates); Wakefield (D. H. Talbot); Gage county (F. A. Colby); "not rare as a winter resident" (I. S. Trostler).

377*a*. **Surnia ulula caparoch** (*Müll.*).—AMERICAN HAWK OWL.

Raymond, Nebr., Nov., 1891 (E. R. Mockett); once near Omaha (?) (L. Skow).

378. **Speotyto cunicularia hypogæa** (*Bonap.*).—BURROWING OWL.

Omaha, Lincoln, West Point, Crawford, Sidney, etc.—breeds (L. Bruner); "Abundant in central and western Nebraska, and sparingly present almost to the Missouri" (Aughey); "Abundant during spring, summer, and fall, and probably remains during the winter" (Taylor); "east throughout the Great

FIG. 27.—Great Horned Owl.

Plains" (Bendire); "East to middle Texas and Nebraska" (Goss); "East to Dakota, Nebraska, etc." (Fisher) Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeding (L. Skow); Cherry county—breeds (J. M. Bates); Genoa (D. H. Talbot); Gage county—breeds (F. A. Colby); "none in the vicinity of Omaha within the past twelve years—formerly a small colony about ten miles west" (I. S. Trostler); Sioux county in Hat creek valley (Mr. Plunkett).

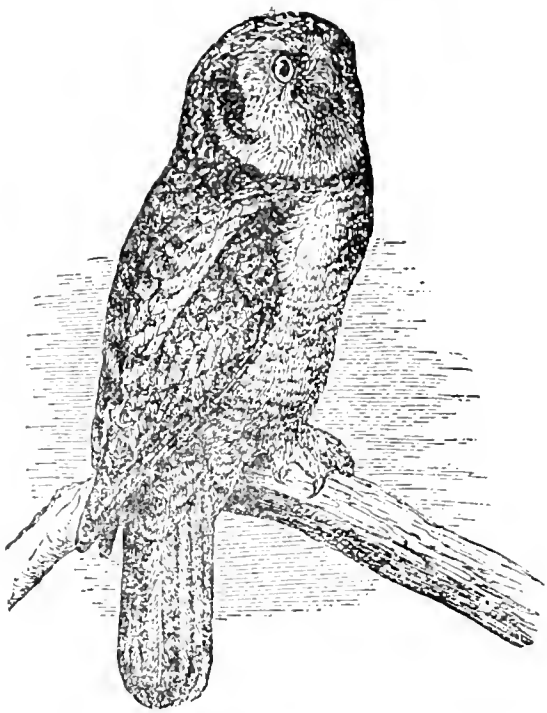


FIG. 28.—Hawk Owl.

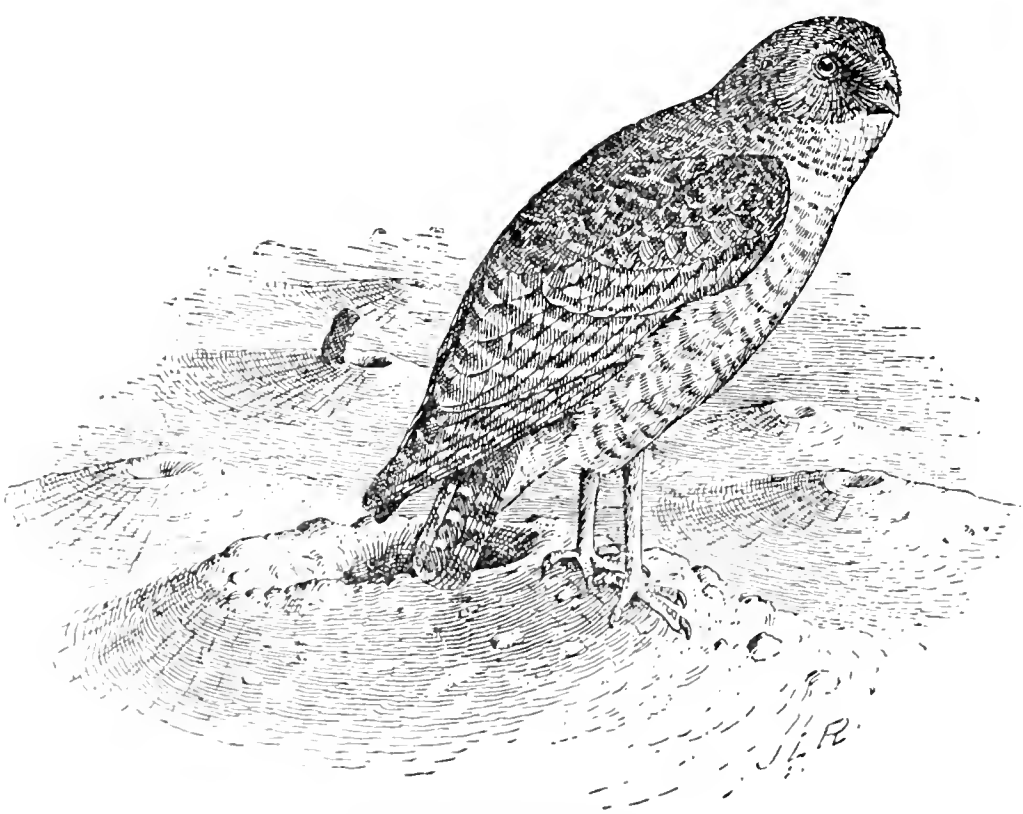


FIG. 29.—Burrowing Owl.

Order PSITTACI.—Parrots, Macaws, Paroquets, etc.

Family **PSITTACIDÆ**.—Parrots and Paroquets.

382. **Conurus carolinensis** (*Linn.*).—Carolina Paroquet.

Mouth of Platte river (Coues, Birds of Northwest); not now reaching the state, "Formerly abundant, even in eastern Nebraska, now rare, if found in the state" (Taylor); "Regularly to Ohio, Illinois, and southern Nebraska" (Goss).

Fig. 30.—Carolina Paroquet.

Order COCCYGES.—Cuckoos, etc.

Family **CUCULIDÆ**.—Cuckoos.

The cuckoos are among the few birds that habitually feed upon hairy caterpillars, such as the various "tent-making" species. They also destroy large numbers of other caterpillars, and do not object to beetles and other insects which they find among the foliage of trees. Although shy birds they are frequently seen in cities, where they do their share in protecting the trees from the ravages of insect pests.

387. **Coccyzus americanus** (*Linn.*).—YELLOW-BILLED CUCKOO.

Omaha, Blair, West Point, Lincoln—breeds (L. Bruner); "More frequently seen in Nebraska than the last one (*erythropthalmus*)" (Aughey); "Summer resident, arrives in May and leaves in September" (Taylor); "West to eastern Mexico and edge of Great Plains" (Goss); Beatrice—nesting (A. S. Pearse); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "common summer resident, arrives May 1 to 10" (I. S. Trostler).

388. **Coccyzus erythrophthalmus** (*Wils.*). — BLACK-BILLED CUCKOO.

West Point, Lincoln, Omaha—breeds (L. Bruner); "only occasionally met in this state" (Aughey); "Summer resident, somewhat rare, arrives in May and leaves in September" (Taylor); "West to the Rocky mountains" (Goss); Omaha—nesting (L. Skow); "summer resident, not so common as the preceding" (I. S. Trostler).

FIG. 31.—Black-billed Cuckoo.

FAMILY **ALCEDINIDÆ**.—KINGFISHERS.

390. **Ceryle alcyon** (*Linn.*).—BELTED KINGFISHER.

West Point, Lyons, Norfolk, Omaha, Lincoln, South Bend, etc.—breeds (L. Bruner); "Frequently seen in Nebraska" (Aughey); "A very common summer resident" (Taylor); "The whole of North America" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county (F. A. Colby); "summer resident, quite common, sometimes seen in midwinter" (I. S. Trostler).

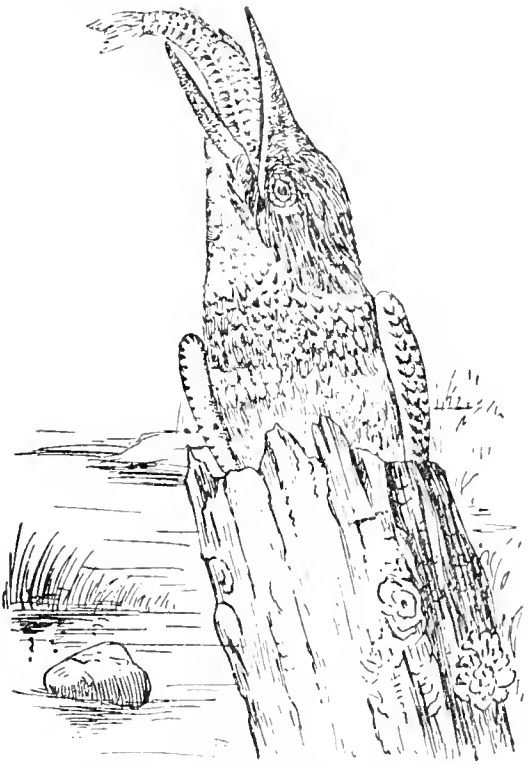


FIG. 32.—Belted Kingfisher.

ORDER PICI.—WOODPECKERS, WRYNECKS, ETC.

FAMILY **PICIDÆ.**—WOODPECKERS.

Taking the woodpeckers as a family, there are but few persons but who will readily admit that these birds are a very useful group. Feeding as many, in fact most of them, do, upon the larvæ of wood-boring insects, they can readily do much greater good for the actual number destroyed in comparison with others that feed upon the foliage of trees. Not unfrequently will a single borer kill an entire tree if left to itself, while hundreds of foliage-feeding caterpillars of the same size make but litttle effect upon the appearance, to say nothing of the health of it.

Separately, the different species of woodpeckers vary much in habits and the nature of food taken, therefore it would be quite difficult to summarize as to the group with respect to their relation to agriculture. Several years ago the United States Department of Agriculture undertook the study of these birds from this standpoint, with the result, so far as made public, at least, of showing that all of the species and subspecies embraced in the study—nineteen—with but a single exception,

possibly, are beneficial. The Downy Woodpecker seems to possess the fewest traits that might count against it, while the Yellow-bellied species has been found to do much harm at times in "sap-sucking." The Flicker and Red-headed Woodpecker both eat fruit and more or less grain, and most of the other species at times eat various proportions of different wild seeds and berries.

FIG. 33.—Hairy Woodpecker.

Mr. F. E. L. Beal, assistant in the Division of Ornithology and Mammology of the United States Department of Agriculture, in summing up the results obtained from the examination of 679 stomachs of these birds, writes as follows:*

"In reviewing the results of these investigations and comparing one

* See Bull. No. 7, Div. Ornith. & Mamolog., p. 9.

species with another, without losing sight of the fact that comparative good is not necessarily positive good, it appears that of seven species considered the Downy Woodpecker is the most beneficial." He then goes on to give the food habits based on contents of the stomachs of our most common species. "Judged by the results of the stomach examinations of the Downy and Hairy Woodpecker and Flicker it would be hard to find three other species of our common birds with fewer harmful qualities."

392. **Campephilus principalis** (*Linn.*).—IVORY-BILLED WOODPECKER.

Reported as rare in vicinity of Peru (G. A. Coleman).

393. **Dryobates villosus** (*Linn.*).—HAIRY WOODPECKER.

West Point, Omaha, Lincoln, etc., breeding at West Point (L. Bruner); "Resident, common" (Taylor); "Atlantic coast to near the base of the Rocky mountains" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeding (L. Skow); Peru—breeds (G. A. Coleman); Cherry county—breeds (?) (J. M. Bates); Gage county (F. A. Colby); "a not uncommon resident—breeds (I. S. Trostler).

393*a*. **Dryobates villosus leucomelas** (*Bodd.*).—NORTHERN HAIRY WOODPECKER.

Omaha (L. Skow); Omaha, "a rather rare winter visitor" (I. S. Trostler).

393*c*. **Dryobates villosus harrisii** (*Aud.*).—HARRIS'S WOODPECKER.

West Point (L. Bruner); "Abundant in the woody portions" (Aughey); "Given by Baird as taken in Nebraska" (Taylor); Sioux county, Dec., 1895 (L. Bruner, D. A. Haggard); northeastern Nebraska, common, breeds (Dr. Agersborg); Sioux county, Feb. 20, 25, 1896 (W. D. Hunter, L. Skow).

394. **Dryobates pubescens** (*Linn.*).—DOWNY WOODPECKER.

West Point, Dakota City, Blair, Omaha, Lincoln, etc.—breeds (L. Bruner); "frequently seen among the timber of river bottoms" (Aughey); "Common during spring, summer, and fall, probably a constant resident" (Taylor); "Northern North America" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeding (L. Skow); Peru, breeds—not common (G. A. Coleman); Gage county (F. A. Colby); "a common resident in vicinity of Omaha" (I. S. Trostler).

394*a*. **Dryobates pubescens gairdnerii** (*Aud.*).—GAIRDNER'S WOODPECKER.

Omaha (L. Skow); Sioux county, Feb. 19, 1396 (L. Bruner).

This may possibly be the form 394*b*, described by Batchelder in Auk, VI, 253. I do not happen to have access to this paper.

400. **Picoides arcticus** (*Swains.*).—Arctic Three-toed Woodpecker.

Omaha (F. J. Brezee); Dakota City (Wallace Bruner); Omaha, "a rare winter visitant, one taken Dec. 15, 1895" (I. S. Trostler).

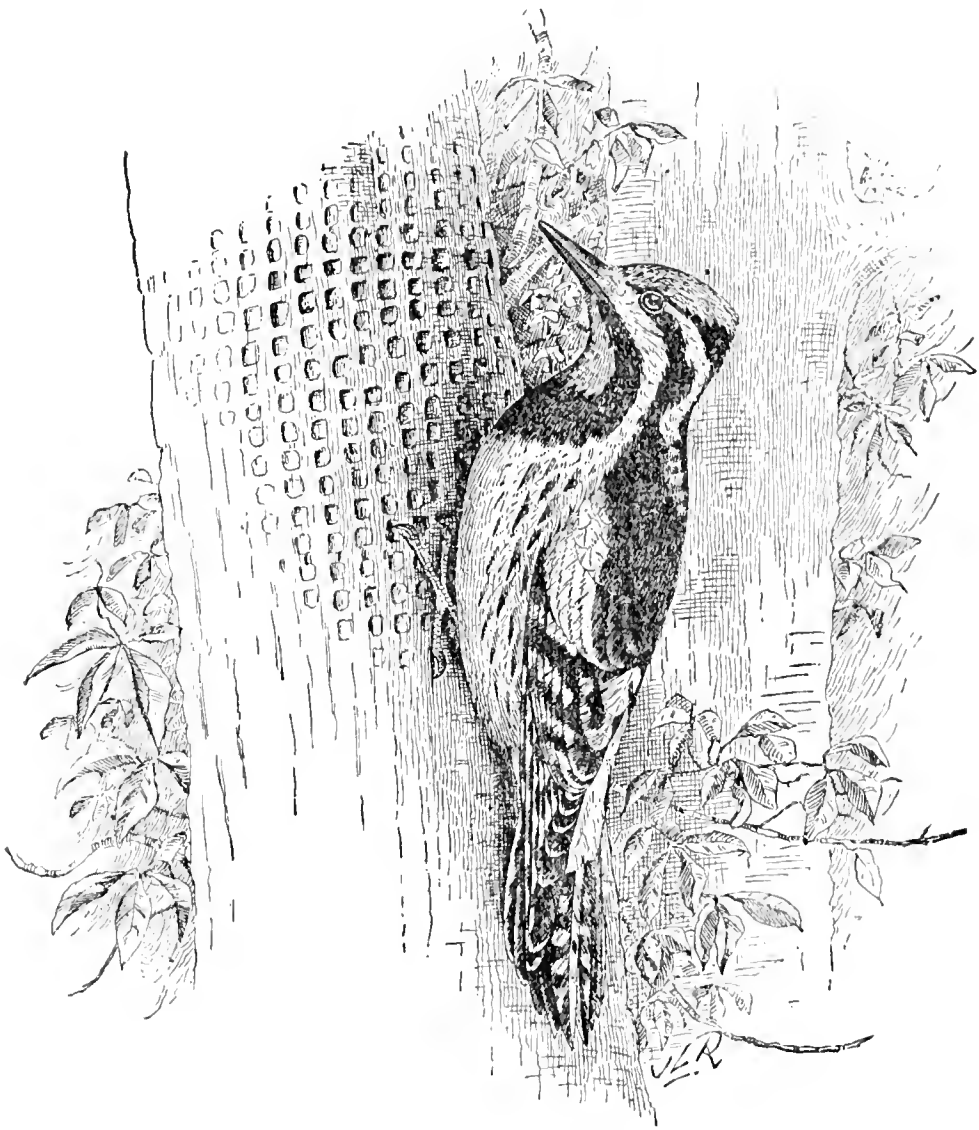


Fig. 34.—Yellow-bellied Woodpecker.

402. **Sphyrapicus varius** (*Linn.*).—Yellow-bellied Woodpecker; Yellow-bellied Sap-sucker.

West Point, Omaha (L. Bruner); "Rather common * * in eastern Nebraska" (Aughey); "Common during spring, summer, and fall" (Taylor); "North and east of the Rocky mountain slope" (Goss); Omaha—breeding (L. Skow); Pern, rare—probably breeds (G. A. Coleman); Omaha, "not rare as a summer resident—breeds late in May" (I. S. Trostler).

405. **Ceophlœus pileatus** (*Linn.*).—PILEATED WOODPECKER.

Rockport, Tekamah (L. Bruner); "In the heavily wooded districts of North America at large" (Goss); Rockport (L. Skow); "Probably only a winter visitor in the heavy timber along the Missouri river" (Dr. Agersborg); Omaha, "a very rare straggler, one seen May 20, 1895" (I. S. Trostler).

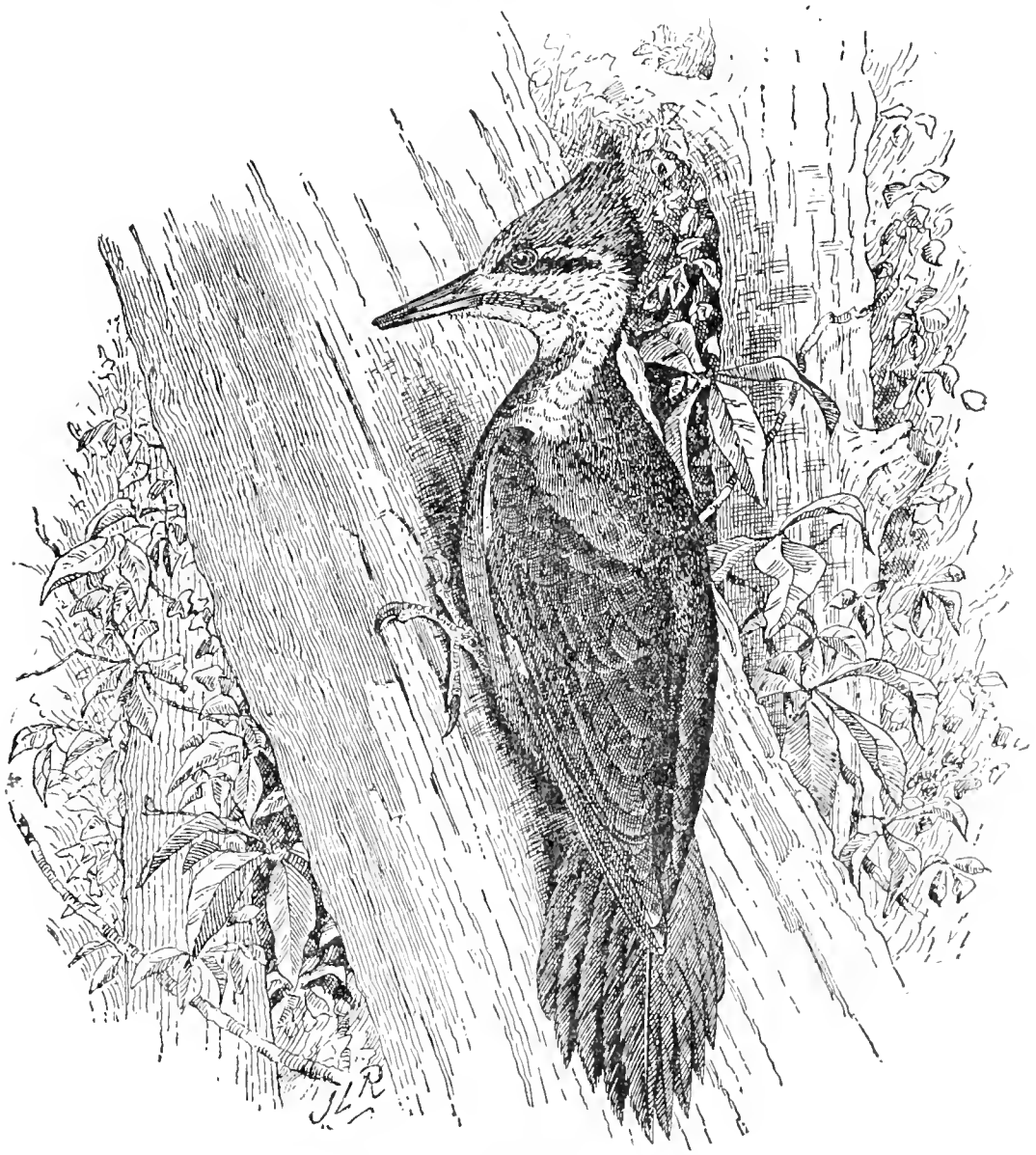


FIG. 35.—Pileated Woodpecker.

406. **Melanerpes erythrocephalus** (*Linn.*). — RED-HEADED WOODPECKER.

Omaha, West Point, Lincoln, Sioux county, etc.—breeds (L. Bruner); "wherever there is timber enough" (Aughey); "Common during spring, summer, and fall" (Taylor); "Westward to within the Rocky mountains" (Goss); Beatrice, De Witt—nesting (A. S. Pearse); Omaha—breeding (L.

Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "common resident, returning southward in very cold weather" (I. S. Trostler).

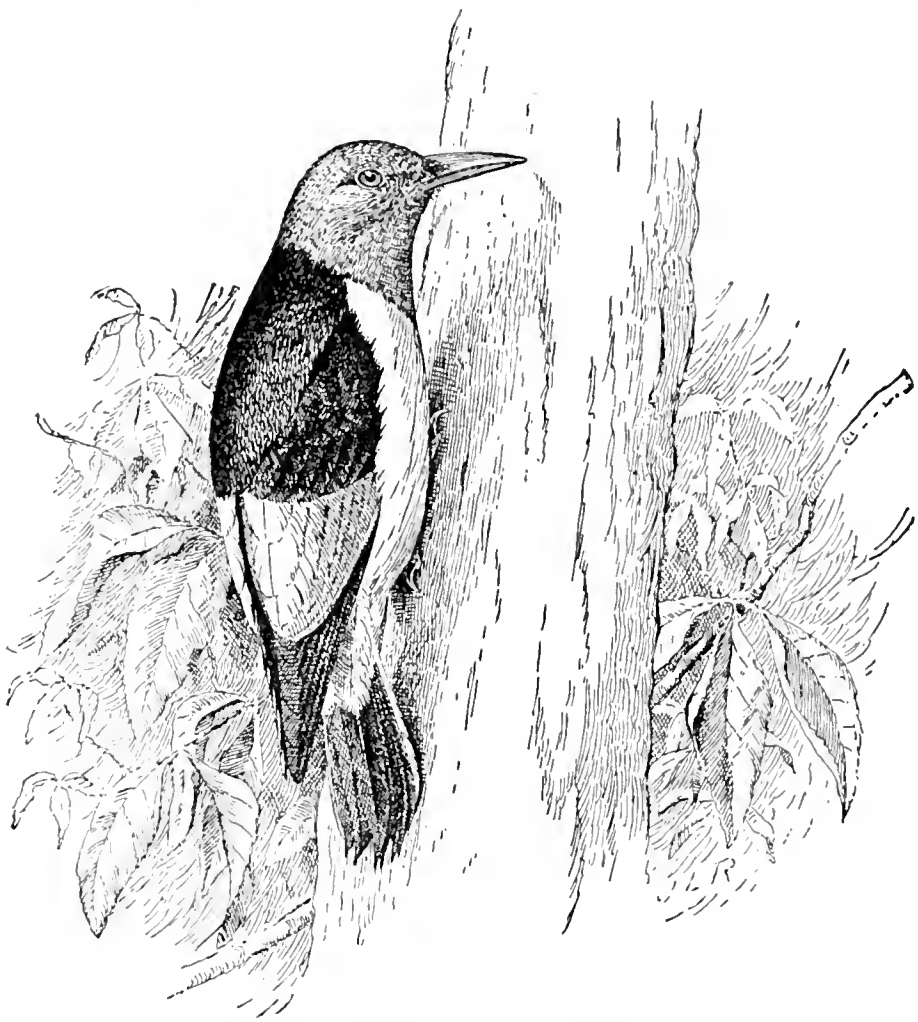


Fig. 36.—Red-headed Woodpecker.

The Red-headed Woodpecker, according to the results obtained from examinations of stomach contents of various birds belonging to this family, is a trifle more inclined to eat fruits of the orchard than are its allies. It is said to partake "rather freely of cultivated varieties, showing some preference for the larger ones, such as apples." It also feeds upon corn and beechnuts in winter where these are to be had. To counteract these injuries it eats large numbers of grasshoppers and other injurious insects.

408. **Melanerpes torqatus** (*Wils.*).—Lewis's Woodpecker.

Sioux county (L. Bruner); "Given by Baird as taken in August and March" (Taylor); "East to the Black hills and western Texas" (Goss); Cherry county (J. M. Bates).

409. **Melanerpes carolinus** (*Linn.*). — RED-BELLIED WOODPECKER.

West Point, Omaha, Harrison (L. Brnner); "Rather common in spots in southern Nebraska" (Aughey); "Resident, not uncommon" (Taylor) "West to eastern base of the Rocky mountains" (Goss); Omaha (L. Skow); Lincoln (F. J. Brezee); "Not commonly seen—breeds in Sarpy county" (I. S. Trostler).

412. **Colaptes auratus** (*Linn.*).—FLICKER; YELLOW-SHAFTED FLICKER.

West Point, Omaha, Lincoln, Pine Ridge, Holt county (L. Bruner); breeds; "Wooded portions of Nebraska—breeds" (Aughey); "Abundant during spring, summer, and fall, and probably a constant resident" (Taylor); "West to the eastern slopes of the Rocky mountains" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeding (L. Skow); Cherry county—breeds (J. M. Bates); Wood River, Newcastle, Genoa, O'Neill (D. H. Talbot); Gage county—breeds (F. A. Colby); "a common resident—becoming scarcer and being replaced by the Red-shafted Flicker" (I. S. Trostler); Sioux county, Feb. 25, 1896 (L. Skow).

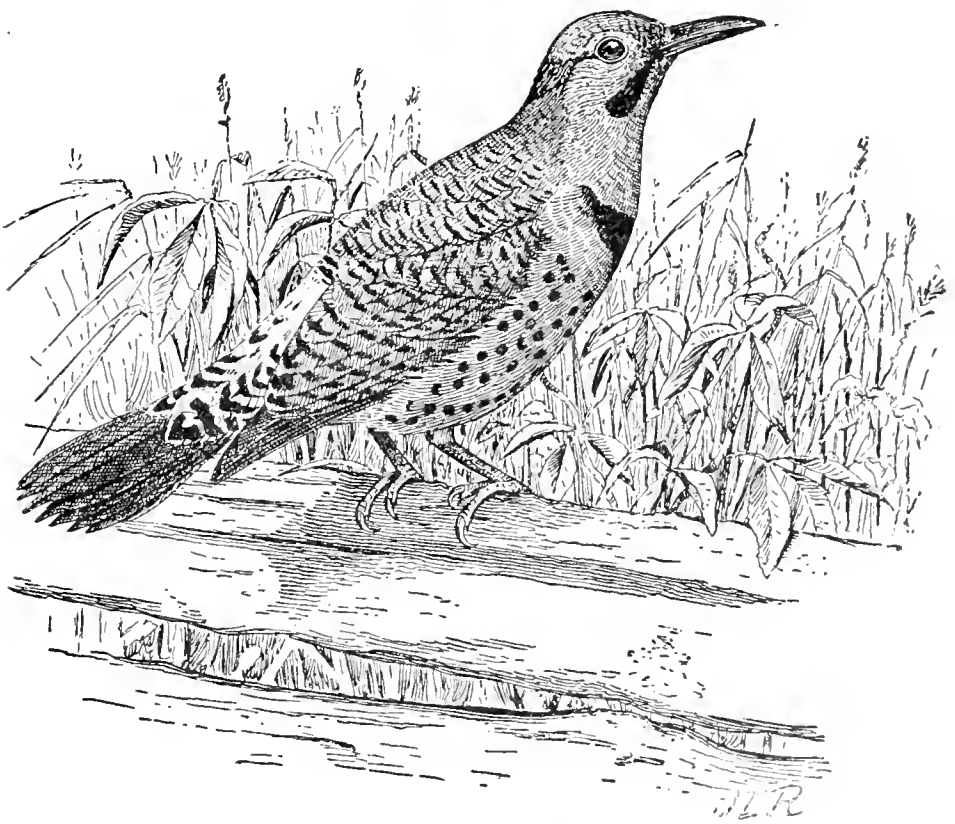


FIG. 37.—Flicker.

The Flicker is one of our most common woodpeckers in Nebraska, and does much towards keeping down a number of different kinds of insects. It is very fond of, in fact it is partial to, ants as a diet and

this element forms almost half of its entire food-supply during the year. It also occasionally feeds upon the Chinch-bug, as can be attested by the fact that the stomach of a specimen killed near Lincoln contained in the vicinity of 1,000 of these bugs. It is also a fruit eater to the extent of about one-quarter of its entire bill of fare, but nature, not man, furnishes the supply. It takes the wild kinds in preference to those that are cultivated.

413. **Colaptes cafer** (*Gmel.*).—Red-shafted Flicker.

West Point, Omaha (L. Bruner); "is not abundant" (Aughey); "Found in the summer and late fall" (Taylor); "Western United States" (Goss); De Witt (A. S. Pearse); Omaha (L. Skow), Cherry county—breeds (J. M. Bates); Lincoln (D. A. Haggard); Wood River, Genoa, St. Edward (D. H. Talbot); "formerly rare but gradually becoming more common—breeds same time as preceding" (I. S. Trostler).

Order MACROCHIRES.—Goatsuckers, Swifts, etc.

Family **CAPRIMULGIDÆ.**—Goatsuckers, etc.

417. **Antrostomus vociferus** (*Wils.*).—Whippoorwill.

West Point, Omaha, Lincoln, Thomas county (L. Bruner); "Occasionally found in eastern Nebraska, where it breeds" (Aughey); "Summer resident, not uncommon" (Taylor); "Eastern United States to the plains" (Goss); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—perhaps breeds (J. M. Bates); "a common summer resident—breeds May 16 to July 1" (I. S. Trostler).

418. **Phalænoptilus nuttalii** (*Aud.*).—Poorwill.

Crawford, Harrison (L. Bruner); "Rather in central and western Nebraska in the vicinity of timber" (Aughey); "Summer resident, common" (Taylor); "East into Iowa and Missouri" (Goss).

420. **Chordeiles virginianus** (*Gmel.*).—Nighthawk.

West Point, Omaha, Holt county, Lincoln, etc.—breeds (L. Bruner); "Common in Nebraska, and breeds here" (Aughey); "Summer resident, common" (Taylor); "West to edge of Great Plains" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county (F. A. Colby); "common summer resident—breeds in latter May and early June" (I. S. Trostler).

420*a*. **Chordeiles virginianus henryi** (*Cass.*).—Western Nighthawk.

Holt county, Harrison, Thedford—breeds (L. Bruner); "Occasionally straggling east into Illinois" (Goss); Omaha—breeds (L. Skow); Cherry county—

breeds (J. M. Bates); North Platte, "summer resident, common" (M. K. Barnum); Omaha, one killed Aug. 1, 1892, from flock seen in evening (I. S. Trostler).

Family **MICROPODIDÆ.**—Swifts.

423. **Chætura pelagica** (*Linn.*).—Chimney Swift.

Omaha, West Point, Lincoln—breeds (L. Bruner); "Abundant in eastern Nebraska" (Aughey); "Summer resident, common, arrive in May" (Taylor); "West to the edge of the plains" (Goss); Beatrice—nesting (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county (F. A. Colby); "common summer resident, breeds in Omaha in large numbers" (I. S. Trostler).

425. **Aeronautes melanoleucus** (*Baird.*)—White-throated Rock Swift.

Harrison, Crawford—breeds (L. Bruner).

Family **TROCHILIDÆ.**—Hummingbirds.

428. **Trochilus colubris** *Linn.*—Ruby-throated Hummingbird.

West Point, Omaha, Lincoln (L. Bruner); Lincoln, June (Aughey); "Summer resident, common (Taylor); "West to the high central plains" (Goss); Omaha—nesting (L. Skow); Cherry county—breeds (J. M. Bates); "not uncommon in residence portions of Omaha, where it nests among vines on porches, etc." (I. S. Trostler).

432. **Selasphorus platycercus** (*Swains.*).—Broad-tailed Hummingbird.

Cheyenne, Wyo.—common (Allen, Coues); Black Hills—quite common (C. H. Holden); several specimens, supposed to be this bird, were seen on Pine Ridge, Sioux, and Dawes counties in the summer of 1891 (L. Bruner).

Order PASSERES.—Perching Birds.

Family **TYRANNIDÆ.**—Tyrant Flycatchers.

The various species of flycatchers, as the name implies, feed upon insects which they capture for the most part while on the wing. Flies and allied insects are quite prominent on the bill-of-fare; but these by no means are the only kinds of insects destroyed by them. Many a luckless locust, butterfly, moth or even beetle is snapped up and devoured by the different species of the family.

The "Bee-bird," or Kingbird as it is more frequently called, sometimes even catches bees. These latter, however, consist largely of

drones, and hence comparatively little harm is done. If worker bees should be persistently destroyed by some individual bird that develops an abnormal appetite, he should be killed.

443. **Milvulus forficatus** (*Gmel.*).—SCISSOR-TAILED FLYCATCHER.

Once near Lincoln, fall of 1872 (L. Bruner); "Accidental * * * Manitoba, and even at York Factory Hudson's Bay Territory" (Goss).

444. **Tyrannus tyrannus** (*Linn.*).—KINGBIRD; BEE-BIRD.

All parts of state, breeds (L. Bruner); "Abundant as far west as the middle of Nebraska" (Aughey); "Summer resident, abundant, arrive in April and May, leave in September" (Taylor); "Chiefly east of the Rocky mountains" (Goss); Beatrice, De Witt—nesting (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); Omaha, common summer resident, arrives April 20 to May 12, breeds May 16 to 30, departs about September 15" (I. S. Trostler).

447. **Tyrannus verticalis** *Say.*—ARKANSAS FLYCATCHER.

West Point, Sidney, Ft. Robinson. Lincoln, etc., breeds (L. Bruner); "This bird abounds along the wooded streams in southwestern Nebraska" (Aughey); "Summer resident, common, arrives in May" (Taylor); "Western United States, east to Missouri and western Minnesota" (Goss); Omaha (L. Skow); Cherry county—breeds (J. M. Bates); "a scarce summer visitor, one seen September, 1895" (I. S. Trostler).

452. **Myiarchus crinitus** (*Linn.*).—GREAT-CRESTED FLYCATCHER.

West Point (L. Bruner); southeastern portion of state (Aughey); "Summer resident, common" (Taylor); "East [west?] to the edge of the Great Plains" (Goss); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); Lincoln (D. A. Haggard); "a not rare summer resident—breeds in June" (I. S. Trostler).

456. **Sayornis phœbe** (*Lath.*).—PHŒBE; PEWEE.

Omaha, Lincoln, West Point (L. Bruner); breeds, along the Missouri (Aughey); "Summer resident, common" (Taylor); "West to eastern Colorado and western Texas" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common, breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "a common summer resident, earliest seen 15th—breed in late April, depart in September" (I. S. Trostler).

457. **Sayornis saya** (*Bonap.*).—SAY'S PHŒBE.

Lincoln (L. Bruner) "Have only observed it in central and western Nebraska" (Aughey); "Abundant in western Nebraska, where it breeds" (Taylor); "East to Dakota, south through middle Kansas" (Goss); Omaha—breeds (L. Skow); "Summer resident, common," North Platte (M. K. Barnum).

459. **Contopus borealis** (*Swains.*).—OLIVE-SIDED FLYCATCHER.

Lincoln (L. Bruner); "only occasionally met it in Nebraska" (Aughey); "Summer resident, rare" (Taylor); "The whole of northern North America" (Goss).

461. **Contopus virens** (*Linn.*).—WOOD PEWEE.

Lincoln, Weeping Water, Nebraska City (L. Bruner); eastern Nebraska (Aughey); "Summer resident, common" (Taylor) "West to edge of Great Plains" (Goss); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); Omaha, "a not common summer resident, breeds" (I. S. Trostler).

462. **Contopus richardsonii** (*Swains.*).—WESTERN WOOD PEWEE.

Sioux county, Dismal river (L. Bruner); "Frequently seen wherever there is woodland or timber-skirted streams in western Nebraska" (Aughey); "Given by Bayard and Aughey as a summer resident in the western part of the state" (Taylor); "East to western Nebraska and Texas" (Goss); Omaha—breeds (L. Skow).

463. **Empidonax flaviventris** *Baird.*—YELLOW-BELLIED FLYCATCHER.

Lincoln, West Point (L. Bruner); sparingly in eastern Nebraska (Aughey).

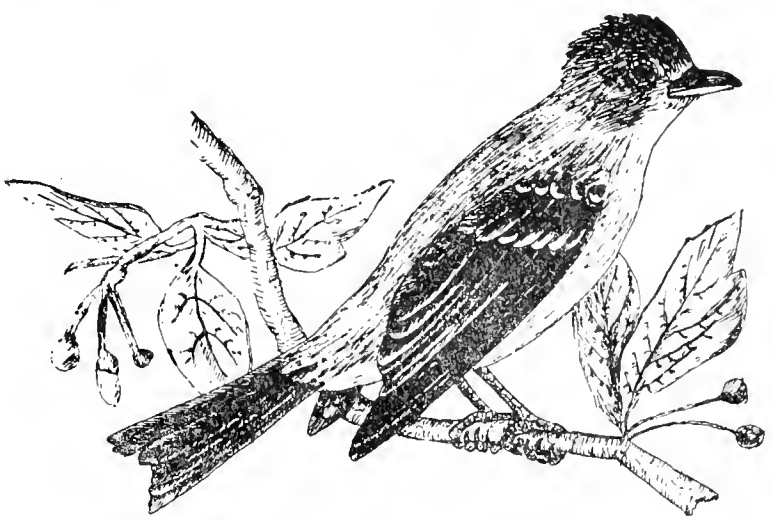


FIG. 38.—Acadian Flycatcher.

465. **Empidonax virescens** (*Vieill.*).—GREEN-CRESTED FLYCATCHER; ACADIAN FLYCATCHER.

West Point (L. Bruner); "West into Nebraska and middle Texas" (Goss); Omaha—breeding (L. Skow); "a common summer resident, breeds in June and departs in September" (I. S. Trostler.)

466*a*. **Empidonax traillii** (*Aud.*).—TRAILL'S FLYCATCHER.

Omaha, Lincoln (L. Bruner); "most abundant of the two [forms]" (Aughey); "Migratory, rare, has been seen in the western part of the state in August" (Tay-

lor); "Eastern North America, to the plains" (Goss); Omaha—breeds (L. Skow); Peru, rare—may breed (G. A. Coleman); Omaha, "a common summer resident" (I. S. Trostler).

467. **Empidonax minimus** *Baird.*—LEAST FLYCATCHER.

West Point, Omaha (L. Bruner); "Rather common in Nebraska, and occasionally breeds in northeastern portion of the state" (Aughey); "Migratory, common; summer resident, occasional" (Taylor); "West to the Yellowstone river and base of Rocky mountains in Colorado" (Goss); Omaha—breeds (L. Skow); "a rare summer visitor, one taken Aug. 2, 1892" (I. S. Trostler).

FAMILY **ALAUDIDÆ.**—LARKS.

474. **Otocoris alpestris** (*Linn.*).—HORNED LARK; SHORE LARK.

West Point, Lincoln, Omaha, etc. (L. Bruner); "A winter resident in Kansas and Dakota, and probably Nebraska" (Taylor); Covington, Nebr. (D. H. Talbot).

474*a*. **Otocoris alpestris leucolæma** (*Coues*).—PALLID HORNED LARK; WHITE-THROATED HORNED LARK.

West Point (L. Bruner); Lincoln (Aughey); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); Lincoln (F. J. Brezee, D. A. Haggard); Omaha, abundant resident—breeds (I. S. Trostler).

474*b*. **Otocoris alpestris praticola** *Hensh.*—PRAIRIE HORNED LARK.

West Point, Omaha, Lincoln—breeds (L. Bruner); "Some seasons quite abundant in eastern Nebraska" (Aughey); "Common, probably a resident" (Taylor); "West to central Dakota and Kansas" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeds (L. Skow); Peru—breeds, common (G. A. Coleman); Gage county—breeds (F. A. Colby); Omaha, "an abundant resident, found breeding March 23 to July 20" (I. S. Trostler).

474*c*. **Otocoris alpestris arenicola** *Hensh.*—DESERT HORNED LARK.

Hat creek basin, Sidney (L. Bruner); "Resident, common" (Taylor); "Resident in the western to middle portion of the state"—Kansas (Goss); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); Sioux county, Feb. 18 to 26, very numerous (L. Bruner, W. D. Hunter, L. Skow).

FAMILY **CORVIDÆ.**—CROWS, JAYS, MAGPIES, ETC.

One should be unprejudiced in order to write a fair biography of even a bird, or group of birds. To say that I am without such prejudice with reference to some of the members of the family of birds now under consideration, would be a falsehood. Still, I shall endeavor to

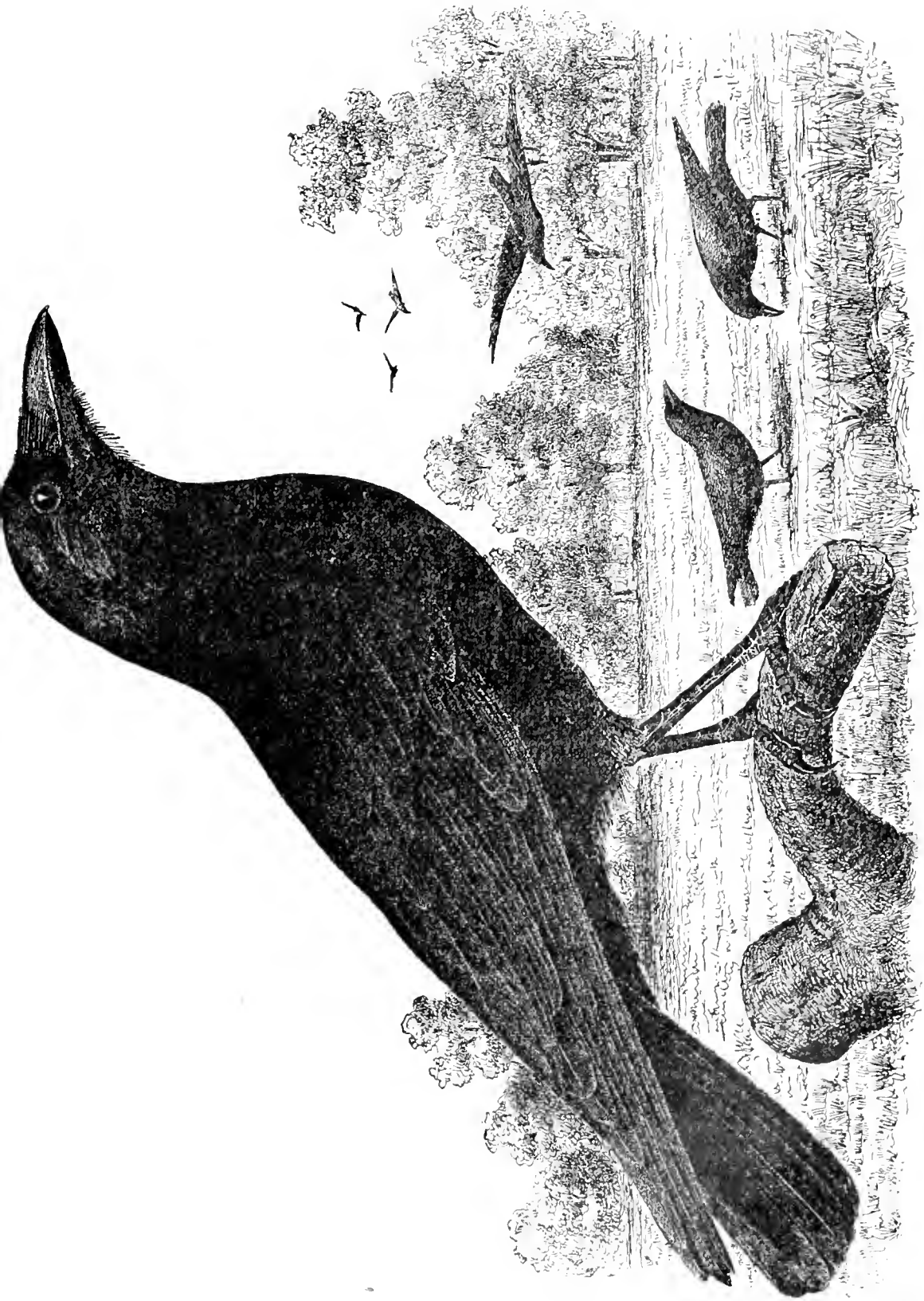


FIG. 39.—Common Crow.

give as unbiased testimony as possible with reference to their food-habits at least, and let the reader judge for himself as to what would be the proper treatment for these birds.

Taking the family as a whole, it is made up of birds like the crows, ravens, magpies, jays, nut-crackers, camp-robbers, etc., many of which have unenviable reputations at least if they are not really as bad as we are sometimes requested to believe they are.

The crows, ravens, magpies, and immediate relatives are what might be termed "omnivorous" in food-habit—eating everything that comes their way. The crows, however, have been shown to feed largely upon insects, which in a great measure, at least, offsets the harm done in other directions. They also feed upon various substances, the removal of which is for the general good.

The Raven is too rare a bird in this state to be taken into consideration in respect to food-habit, and the Magpie certainly can be put out of the question of doing any possible harm for the same reason. This leaves then to be considered, the jays, of which we seem to have six or seven distinct kinds; but only two of these are at all common. The Blue Jay is found over the entire state, and is familiar to everybody. The second species is found only in the western and northwestern portions among the pine forests, and is known as the Piñon Jay or Camp Robber—the latter name not very flattering to the bird I must confess.

For a more explicit account of each the reader is referred to the different species recorded below.

475. **Pica pica hudsonica** (*Sab.*).—AMERICAN MAGPIE.

West Point, Norfolk, Harrison—breeds latter locality (L. Bruner); "Occasional in northern and more common in western Nebraska" (Aughey); "Fall and winter visitant, somewhat rare" (Taylor); summer resident (L. E. Hicks); "East to the edge of the plains" (Goss); Cherry county—breeds (J. M. Bates); Cherry county, breeding (I. S. Trostler).

477. **Cyanocitta cristata** (*Linn.*).—BLUE JAY.

Throughout state—breeds (L. Bruner); "Comparatively few in Nebraska" (Aughey); "Resident, abundant" (Taylor); "West to the Great Plains" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "a common resident, breeds May 1 to June 15" (I. S. Trostler).

478c. **Cyanocitta stelleri annectens** (*Baird*).—BLACK-HEADED JAY.

Sioux county, April, 1891 (L. Bruner).

FIG. 40.—Blue Jay.

In writing about the Long-crested Jay, Dr. Elliott Coues says:*

"All jays make their share of noise in the world; they fret and scold about trifles, quarrel over anything, and keep everything in a ferment when they are about. The particular kind we are now talking about is nowise behind his fellows in these respects—a stranger to modesty and forbearance and the many gentle qualities that charm us in some little birds and endear them to us; he is a regular fillibuster, ready for any sort of adventure that promises sport or spoil, even if spiced with danger. Sometimes he prowls about alone, but oftener has a band of choice spirits with him, who keep each other in countenance (for our jay is a coward at heart, like other bullies), and share the plunder on the usual terms in such cases, of each one taking all he can get. Once I had a chance of seeing a band of these guerillas on a raid; they went at it in good style, but came off very badly, indeed. A vagabond troop made a descent upon a bush-clump, where, probably, they expected to find eggs to suck, or at any rate a chance for mischief and amusement. To their intense joy they surprised a little owl quietly digesting his grasshoppers, with both eyes shut. Here was a lark! and a chance to wipe out a part of the score that jays keep against owls for injuries received time out of mind. In the tumult that ensued the little birds scurried off, the woodpeckers overhead stopped tapping to look on, and a snake that was basking in a sunny spot concluded to crawl into his hole. The jays lunged furiously at their enemy, who sat helpless, bewildered by the sudden onslaught, trying to look as big as possible, with his wings set for bucklers and his bill snapping; meanwhile twisting his head till I thought he would wring it off trying to look all ways at once. The jays, emboldened by partial success, grew more impudent, till their victim made a break through their ranks and flapped into the heart of a neighboring juniper, hoping to be protected by the tough, thick foliage. The jays went trooping after, and I hardly know how the fight would have ended had I not thought it time to take a hand in the game myself. I secured the owl first, * * * and then shot four of the jays before they made up their minds to be off."

"It is difficult to describe the notes of this jay, he is such a garrulous creature and has such a variety of outcries. He ordinarily screams at the top of his voice, until he is tired or something attracts

* "Birds of the Colorado Valley."

his attention. This cry is something like that of a Blue Jay, but hoarser and heavier. * * * He has also a call sounding like the rataplan of a Flicker; and again, when greedily regaling on acorns, and hopping aimlessly about, or peering curiously down through the pine fronds to watch a suspicious character, he talks to himself in a queer way, as if thinking aloud, and chuckling over some comical notions of his own. * * *

"The Long-crested Jay will eat anything eatable. It is said jays kill and devour small birds, and doubtless they do so on occasion, though I do not think it is habitual with them. They suck eggs, despoiling many a pretty nest; and if they cannot catch winged insects, fat larvæ and beetles do not come amiss; but after all, they are principally vegetarians, feeding mainly upon seeds, hard fruits, and berries. * * * Wherever he goes he has it pretty much his own way, hated and feared by the other birds, whom he silences with a scream and subdues by a show of authority. But who of his kind has not enemies? Cassin's Flycatcher, almost as noisy and audacious, has many a set-to with him, and even the nimble little Wood Pewees pester him sometimes. The woodpeckers tease him persistently; they can scramble about faster than he can follow, and laugh at him from the other side of a bough, till he quite loses his temper. But after all, our Jay has good points, and I confess to a sneaking sort of regard for him. An elegant dashing fellow, of good presence, if not good manners; a tough, wiry, independent creature, with sense enough to take precious good care of himself, as any one who wants his skin will discover."

The above will apply equally well to our Blue Jay, only that he is more of a coward and will not attempt as many conquests as will Steller's Jay. He does much of the mischief that is laid at the door of the Robin, Oriole, thrushes, and other birds, and then sneaks away unobserved. He is a good bird to practice on, both for the sportsman and taxidermist.

480. **Ampelocoma woodhouseii** (*Baird*).—WOODHOUSE'S JAY.

"Transient visitor" at North Platte—common (M. K. Barnum); east to Montana, Wyoming, Colorado, and New Mexico (A. O. U. Check List).

484. **Perisoreus canadensis** (*Linn.*).—CANADA JAY.

West Point, Crawford (L. Bruner).

486. **Corvus corax sinuatus** (*Wagl.*).—AMERICAN RAVEN.

Sand Hills of Brown county, Sidney (L. Bruner); "Formerly frequently seen in Nebraska, especially in its northern part" (Aughey); "Resident, formerly

abundant, but at present rare" (Taylor); "Western United States" (Goss); Omaha (L. Skow).

487. **Corvus cryptoleucus** *Couch.*—WHITE-NECKED RAVEN.

Once near Sidney (L. Bruner); "Republican river near west line of state" (Aughey); "East to the edge of the plains" (Goss); "a mounted specimen seen in Cherry county,—ranchers say that they are seen occasionally during fall and winter in northwestern part of state" (I. S. Trostler).

488. **Corvus americanus** *Aud.*—COMMON CROW.

Omaha, West Point, Lincoln, Fremont, etc.—breeds (L. Bruner); "Exceedingly abundant" (Aughey); "Extremely abundant in all eastern Nebraska, resident" (Taylor); "North America, from the fur countries to Mexico" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeding (L. Skow); Cherry county (J. M. Bates); Wood River, Genoa, Omaha (D. H. Talbot); Gage county—breeds (F. A. Colby); "an abundant resident in vicinity of Omaha—breeds March 20 to May 25" (I. S. Trostler).

The common crow has recently received special study in the Division of Ornithology and Mammology of the United States Department of Agriculture, and the results have been published in Bulletin No 6 of that division. The report in question was based on the examination of the contents of nearly one thousand stomachs of these birds collected at different localities and scattered throughout the year. Dr. Merriam, in summing up the results of this study, says in his letter of submittal to the Assistant Secretary of Agriculture that "The quantity and quality of the evidence seems sufficient to justify a final conclusion respecting the economic status of the crow, although a larger number of stomachs from some parts of the country would have been acceptable.

"The most important charges brought against the crow are: (1) That it pulls sprouting corn; (2) that it injures corn in the milk; (3) that it destroys cultivated fruit; and (4) that it feeds on the eggs and young of poultry and wild birds.

"All of these charges are sustained by the stomach examinations, so far as the simple fact that crows feed upon the substances named. But the extent of the injury is a very different matter.

"In order to ascertain whether the sum of the harm done outweighs the sum of the good, or the contrary, the different kinds of food found in the stomachs have been reduced to quantitative percentages and contrasted. The total quantity of corn eaten during the entire year amounts to 25 per cent of the food of adult crows, and only 9.3 per

cent of the food of young crows. Leaving the young out of consideration, it may be said that in agricultural districts about one-fourth of the food of crows consists of corn. But less than 14 per cent of this corn, and only 3 per cent of the total food of the crow, consists of sprouting corn and corn in the milk; the remaining 86 per cent of corn, or 97 per cent of the total food, is chiefly waste grain picked up here and there, mainly in winter, and of no economic value.

"In the case of cultivated fruits the loss is trivial. The same is true of the eggs and young of poultry and wild birds, the total for the year amounting to only 1 per cent of the food.

"As an offset of his bad habits, the crow is to be credited with the good done in destroying noxious insects and other injurious animals. Insects form 26 per cent of the entire food, and the great majority of these are grasshoppers, May beetles, cut-worms, and other injurious kinds. It is shown by Mr. Schwarz that during the May-beetle season, in May and June, these beetles form the principal insect food of the crow. Only a few stomachs do not contain them, and stomachs are often filled with them. The fact that the May-beetle season coincides with the breeding season of the crow is of special importance, the principal insect food of nestling crows consisting of these beetles. Mr. Schwarz also finds that grasshoppers occur in the stomachs throughout the year; that during the May-beetle season they occur in the vast majority of stomachs, but usually in moderate numbers; that with the disappearance of May beetles toward the end of June they increase in number until in August, and throughout the fall they constitute by far the greater part of the insect food, often occurring in astonishing numbers, and often forming the only insect food.

"To the same side of the scale must be added the destruction of mice, rabbits, and other injurious rodents by the crow.

"In summing up the benefits and losses resulting from the food-habits of this bird, it is clear that the good exceeds the bad and that the crow is a friend rather than an enemy of the farmer."

491. **Nucifraga columbiana** (*Wils.*). — Clark's Nutcracker.

Sidney, Pine Ridge (L. Bruner); Ft. Kearney (Dr. Cooper); "Only found in the western part of the state" (Aughey); "To edge of Great Plains" (Goss); North Platte—abundant in town both winter of 1895 and 1896 (E. D. Snyder); "Two seen and one shot, October, 1883 (Dr. Agersborg, Birds of Southeastern Dakota).

492. **Cyanocephalus cyanocephalus** (*Wied.*).—MAXIMILIAN'S NUTCRACKER; PIÑON JAY.

Pine Ridge, near Ft. Robinson, Pine Bluffs (L. Bruner); "A rare visitant" in Kansas (Goss); Cherry county, Long Pine—winters here (J. M. Bates); Sioux county, Feb. 19, 1896 (L. Bruner, W. D. Hunter, L. Skow); do., December, 1895 (D. A. Haggard); Fullerton, Nance county, February, 1889 (Chas. E. Barker.)

FAMILY **ICTERIDÆ.**—BLACKBIRDS, ORIOLES, ETC.

The various members of the family *Icteridæ* differ so much among themselves in food-habit that it would be quite difficult to briefly summarize this. This much, however, can be said of the group, viz., that it is essentially insectivorous. The Meadowlark, orioles, Red-winged and Yellow-headed blackbirds certainly have this trait very marked indeed while with us; and, if we are to believe the results obtained by the United States in the recent examinations into the food of the Crow blackbirds, where 2,258 stomachs were examined covering the entire year with the result of 46 per cent being insects, we must acknowledge that the work of these birds is beneficial in the main.

This leaves to be considered by us the Bobolink and Cowbird, both of which as Nebraska birds are insectivorous. A more detailed account of the food-habits of these birds will be found under the respective species beyond.

494. **Dolichonyx oryzivorus** (*Linn.*).—BOBOLINK.

Omaha, Scribner, Holt county, Norfolk—breeds (L. Bruner); "abundant in Nebraska, where it breeds" (Aughey); "Summer resident, abundant, arrives in May" (Taylor); "West to the high plains" (Goss); Beatrice (A. S. Pearse); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); numerous Nebraska localities (D. H. Talbot); Gage county (F. A. Colby); a common migrant and rare summer resident in vicinity of Omaha, but common summer resident and breeder in Cherry county" (I. S. Trostler).

495. **Molothrus ater** (*Bodd.*).—COWBIRD.

West Point, Omaha, Lincoln, Thedford, Crawford, etc.—breeds (L. Bruner); "This bird is unfortunately abundant in Nebraska" (Aughey); "Summer resident, common, arrive in May and leave in October" (Taylor); "From the Atlantic to the Pacific" (Goss); Beatrice (A. S. Pearse); Fairbury (M. L. Eaton); Omaha—breeds (L. Skow); Cherry county, Holt county—breeds, "saw a nest of Redwing Blackbird at Stuart with five eggs of this bird and three of its host" (J. M. Bates); Omaha, "an abundant migrant and summer resident—May 2 to Oct. 15" (I. S. Trostler); Lincoln, Oct. 10 (D. A. Haggard).

The Cowbird is peculiarly distinct from all other species of the feathered tribe as represented in our state. Unlike other birds that seem to enjoy nest-building and caring for their young, this species is a genuine parasite, building no nest itself, "but inflicting its eggs usually on smaller birds, leaving to them the labor and care of rearing its young. It appears to be entirely devoid of conjugal affection, and practices polyandra, the small flocks in which it is found during the season of reproduction generally containing several more males than females" (Bendire). Of course the bird is harmful if we judge it from this particular feature of its life-history, but if we take into account its food-habits it is beneficial.

Living, as it does, about cattle, and including in its bill of fare a large number of various insects like flies, ticks, lice, grasshoppers, caterpillars, beetles, etc., this habit partly offsets the bad traits above referred to.

Bendire lists ninety different species and subspecies of birds in the nests of which the eggs of this bird have been taken. To this large list Mr. I. S. Trostler adds the three following, viz.: The Chestnut-sided Warbler (*Dendroica pennsylvanica*), Bell's Vireo (*Vireo bellii*), and the Grasshopper Sparrow (*Ammodramus savannarum passerinus*).

497. **Xanthocephalus xanthocephalus** (*Bonap.*). — YELLOW-HEADED BLACKBIRD.

Omaha, Lincoln, West Point, Holt county, breeds (L. Bruner); "Very abundant in Nebraska, where it breeds" (Aughey); "Summer resident, common; migratory, abundant" (Taylor); "Temperate western North America" (Goss); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); O'Neill, Holt county (D. H. Talbot); Gage county (F. A. Colby); "abundant migrant and common summer resident, abundant breeder in Cherry county" (I. S. Trostler).

498. **Agelaius phœniceus** (*Linn.*).—RED-WINGED BLACKBIRD.

Entire state—breeds (L. Bruner); "Common along water-courses in Nebraska" (Aughey); "Summer resident, common" (Taylor); "Temperate North America in general" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry and Holt counties—breeds, occasionally remains throughout winter about cattle yards (J. M. Bates); several Nebraska localities (D. H. Talbot); Gage county—breeds (F. A. Colby); "an abundant migrant and summer resident, arrives March 15 to April 1—breeds May 15 to July 4, departs Sept. 25 to Oct. 16" (I. S. Trostler); Lincoln, March 12, Oct. 10 (D. A. Haggard).

In the Red-winged Blackbird we have a friend that we little dream of when we see the large flocks gathering about our corn-fields during

late summer and early fall. During the balance of the year it is engaged most of the time in waging war upon various insect pests, including such forms as the "grub-worms," cut-worms, grasshoppers, army worm, beet caterpillar, etc. Even when it visits our corn-fields it more than pays for the corn it eats by the destruction of the worms that lurk under the husks of a large per cent of the ears in every field.

Several years ago the beet-fields in the vicinity of Grand Island were threatened great injury by a certain caterpillar that had nearly defoliated all the beets growing in many of them. At about this time large flocks of this bird appeared and after a week's sojourn the caterpillar plague had vanished, it having been converted into bird tissues. Numerous other records of the efficiency of their labor as destroyers of insect pests might be quoted in favor of these birds, but I do not believe this to be necessary, although considerable evidence has been recorded of its destroying both fruits and grains.

501. **Sturnella magna** (*Linn.*).—MEADOWLARK.

Entire state, breeds (L. Bruner); eastern form not beyond Ft. Kearney; "Resident, common" (Taylor); "West to the edge of the Great Plains" (Goss); Beatrice, De Witt—nesting (A. S. Pearse); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "probably occurs here, have heard it in Iowa opposite Omaha" (I. S. Trostler); Long Pine (J. M. Bates).

501*b*. **Sturnella magna neglecta** (*Aud.*).—WESTERN MEADOWLARK.

West Point, Lincoln, Thedford, Sidney, Ft. Robinson, Harrison, etc.—breeds. Only occasionally in eastern part, very common in western part of state (L. Bruner); "*neglecta* most abundant" (Aughey); "Resident, common" (Taylor); "From Nebraska and Texas to the Pacific coast" (Goss); Omaha—nesting (L. Skow); Peru—breeds (G. A. Coleman); Cherry county—nesting, also occasionally wintering (J. M. Bates); numerous localities in state (D. H. Talbot); "An abundant resident—breeds April 20 to Aug. 3" (I. S. Trostler); Hat creek basin, one specimen remained throughout winter (Elliott W. Brown).

506. **Icterus spurius** (*Linn.*).—ORCHARD ORIOLE.

Omaha, Lincoln, West Point, South Bend, Bellevue—breeds (L. Bruner); "Common but not abundant in Nebraska, and breeds here" (Aughey); "Summer resident, abundant" (Taylor); "West to the base of the Rocky mountains" (Goss); Beatrice, De Witt—nesting (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Newcastle (D. H. Talbot); Gage county—breeds (F. A. Colby); Omaha, "a common summer resident, arrives May 1 to 10, breeds June 10 to 20, depart in September" (I. S. Trostler).

507. **Icterus glabula** (*Linn.*).—Baltimore Oriole.

West Point, Omaha, Lincoln, South Bend, etc.—breeds (L Bruner); "Common all over eastern Nebraska where there is woodland or orchard" (Aughey); "Summer resident, abundant, arrive in April and May" (Taylor); "West to the base of the Rocky mountains" (Goss); Beatrice, De Witt—breeds (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Ponca, Hartington (D. H. Talbot); Gage county—breeds (F. A. Colby); "a common summer resident, arrives May 6 to 20, breeds June 1 to 20, depart middle of September" (I. S. Trostler).

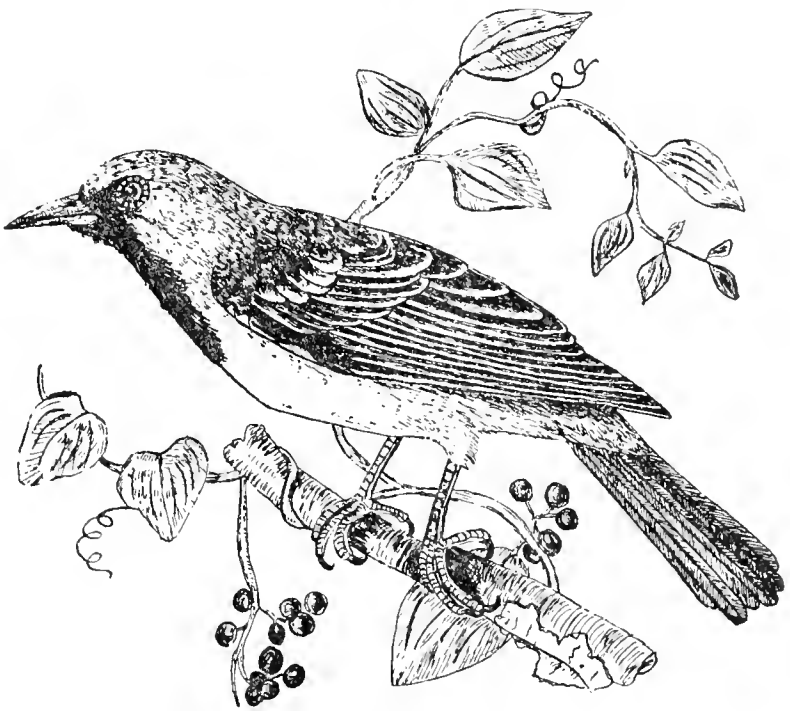


Fig. 41.—Orchard Oriole.

The Baltimore Oriole has received such a bad reputation here in Nebraska as a grape thief during the past two or three years that I feel inclined to give extra time and space in endeavoring to "clear him" of such an unenviable a charge. This, however, I hardly think necessary when the facts in the case are known. As insect destroyers both this bird and the Orchard Oriole have had an undisputed reputation for many years; and the kinds of insects destroyed by both are of such a class as to count in their favor. Caterpillars, and beetles belonging to injurious species comprising 96 per cent of the food of three specimens killed, is the record we have in their favor. On the other hand grapes have been punctured only "presumably by this bird, since he has so frequently been found in the vineyard and must be the culprit." Now, I myself have seen the oriole in apple orchards un-

der compromising circumstances, and have heard pretty strong evidence to the effect that it will occasionally puncture ripe apples. It also belongs in the same family with some generally acceded "rascals," hence I will admit that possibly some of the charges with which he is credited may be true; but I still believe that most of the injuries to grapes in this and other states must be laid to other origin.

If we take pains to water our birds during the dry seasons they will be much less apt to seek this supply from the juices of fruits that are so temptingly near at hand. Place little pans of water in the orchard and vineyard where the birds can visit them without fear of being seized by the house cat or knocked over by a missile from the alert "small boy," and I am sure that the injury to fruit, to a great extent at least, will cease. (See also account of English Sparrow.)

508. **Icterus bullocki** (*Swains.*).—BULLOCK'S ORIOLE.

West Point, Ft. Robinson—breeds (L. Bruner); "is also frequently seen in Nebraska" (Aughey); "Summer resident, common; found mostly in the western part of the state" (Taylor); "East to Dakota and Texas" (Goss).

509. **Scolecophagus carolinus** (*Müll.*).—RUSTY BLACKBIRD.

West Point, Lincoln, Lyons, a few remain with us all winter (L. Bruner); "This species abounds in early spring and in the last of September and October during its migrations" (Aughey); "Found in early spring and September and October, probably remains in the state during winter" (Taylor); "West to Great Plains" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); "An abundant migrant" (I. S. Trostler); Lincoln, Oct. 8, 10, 25 (D. A. Haggard).

510. **Scolecophagus cyanocephalus** (*Wagl.*).—BREWER'S BLACKBIRD.

West Point, Holt county (L. Bruner); "very abundant in Nebraska, where it breeds" (Aughey); "Migratory, common; summer resident, not common; arrives in April and leaves in September" (Taylor); "East to western Minnesota and Texas" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Omaha, "a common migrant, usually in company with Bronzed and Purple grackles (I. S. Trostler).

511. **Quiscalus quiscula** (*Linn.*).—PURPLE GRACKLE.

West Point, Omaha (L. Bruner); "abundant in eastern Nebraska" (Aughey); Omaha—nesting (L. Skow); "an abundant migrant and somewhat common summer resident, arrives March 20 to April 10, breeds May 10 to 20, departs last of September and early October" (I. S. Trostler).

511*b*. **Quiscalus quiscula æneus** (*Ridgw.*).—BRONZED GRACKLE.

Lincoln, West Point, Omaha, Fremont, etc.—breeds (L. Bruner); "Summer resident, common, probably remains in the state during winter" (Taylor);

"West to the Rocky mountains" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—nesting (L. Skow); Peru, breeds occasionally (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "common summer resident, dates same as the preceding species" (I. S. Trostler); Lincoln, March 25, 28 (D. A. Haggard).

Mr. Beal, in his summary of the food-habit study of the Crow-blackbirds, says of them: "From the foregoing results it appears that if the mineral element be rejected as not properly forming a part of the diet, the food of the Crow-blackbird for the whole year consists of animal and vegetable matter in nearly equal proportions. Of the

FIG. 42.—Crow-Blackbird.

animal component twenty-three twenty-fourths are insects, and of the insects five-sixths are noxious species. The charge that the blackbird is a habitual robber of other bird's nests seems to be disproved by the stomach examinations."

"Of the vegetable food it has been found that corn constitutes half and other grain one-fourth. Oats are seldom eaten except in April and August, and wheat in July and August. Fruit is eaten in such moderate quantities that it has no economic importance, particularly in view of the fact that so little belongs to cultivated varieties." * * *

"Upon the whole, Crow-blackbirds are so useful that no general war of extermination should be waged against them. While it must be admitted that at times they injure crops, such depredations can usually be prevented. On the other hand, by destroying insects they do incalculable good."

FAMILY **FRINGILLIDÆ.**—FINCHES, SPARROWS, GROSBEAKS, ETC.

Our sparrows and their allies, taken together, form a very extensive family of very beautiful as well as useful birds. Like the warblers, they occupy themselves with searching for and destroying insects; but this is not all they do that is good. In fall, winter, and early spring, when mother earth has lost her brilliant green and rests in sombre browns or beneath ice and snow, the longspurs, snow buntings, snowbirds, and some of the sparrows that have remained with us, are busily engaged in gathering for themselves a living. They hop and fly about from place to place searching for and picking up little seeds of grass, grain, and weeds, of shrubs and trees, and appropriating the same to their use, chirping merrily as they work away.

514. **Coccothraustes vespertinus** (*Cooper*). — EVENING GROSBEAK.

West Point, November 19, 1885 (L. Bruner); "a few times in winter" (Aughey); "Migratory, rare" (Taylor); "East to Manitoba, Michigan, and Illinois" (Goss); Peru, rare (G. A. Coleman); North Platte, "accidental visitant; a pair was seen in town frequently, and one killed May 11, 1895" (M. K. Barnum).

515. **Pinicola enucleator** (*Linn.*).—PINE GROSBEAK.

Grand Island (F. J. Brezee); Alda (Bull. No. 2, Div. Ornith., p. 178); "This species occurs in southeastern Nebraska in winter, but in small numbers" (Aughey); "Winter resident, rare, has been found as early as November and late as February" (Taylor); "Casually to Kansas, Kentucky, etc." (Goss); Lincoln, Nov. 11, 1895 (L. Bruner); Omaha (L. Skow); Omaha, "an irregular winter visitor—usually met with after cold north winds in midwinter" (I. S. Trostler).

517. **Carpodacus purpureus** (*Gmel.*).—PURPLE FINCH.

West Point, Omaha, Lincoln (L. Bruner); "have only seen this bird in Nebraska in October" (Aughey); "Has been found in the state in May and October" (Taylor); "West to the high plains" (Goss); Omaha (L. Skow); Peru, not common (G. A. Coleman); "An irregular migrant and winter resident—occurs about Omaha during latter October to April 15" (I. S. Trostler); Lincoln, Oct. 30 (D. A. Haggard).

518. **Carpodacus cassini** *Baird.*—CASSIN'S PURPLE FINCH.

Sioux county (J. B. White).

521. **Loxia curvirostra minor** (*Brehm*).—AMERICAN CROSSBILL.

West Point, Omaha (L. Bruner); "Entered upon authority of Baird" (Taylor); "Chiefly far northward and east of the Great Plains" (Goss); Sioux county, Dec. 14, 1895 (L. Bruner); Fairbury (M. L. Eaton); Omaha (L. Skow); Peru, rare migrant (G. A. Coleman); Gage county, (F. A. Colby); "an irregular migrant and winter resident, occurs in vicinity of Omaha from latter part of October to March 1" (I. S. Trostler); Sioux county, Feb. 19 to 27, quite common (W. D. Hunter, L. Skow); Fullerton, Nance county (C. E. Barker).

521*a*. **Loxia curvirostra stricklandi** *Ridgw.*—MEXICAN CROSSBILL.

Mr. L. Skow of Omaha reports having taken a number of specimens of what might be this Crossbill. "From eastern Kansas, Colorado, New Mexico, etc.—wintering on Agricultural College grounds, Manhattan, Kansas" (Goss).

522. **Loxia leucoptera** *Gmel.*—WHITE-WINGED CROSSBILL.

West Point, Omaha, December, 1887 (L. Bruner); "Entered upon the authority of Baird" (Taylor); "South in winter to about latitude 39°" (Goss); Fairbury (M. L. Eaton); "an irregular winter resident, rare, seen in company with the American Crossbill, but only in coldest midwinter" (I. S. Trostler).

524. **Leucosticte tephracotis** *Swains.*—GRAY-CROWNED LEUCOSTICTE.

"This bird is frequently seen in Nebraska in winter, but rarely in summer" (Aughey); Omaha (L. Skow); Sioux county, Feb. 18, 1896 (L. Bruner and L. Skow); "south in winter throughout the entire Rocky mountain region of the United States, but most abundant on the eastern slope" (A. O. U. Check List); reported by Elliott W. Brown of Hat Creek, Wyo., as living in the nests of the Cliff or Eave Swallow during very cold winter weather (W. D. Hunter).

528. **Acanthis linaria** (*Linn.*).—COMMON REDPOLL.

West Point, Lincoln (L. Bruner); "This bird appears irregularly in Nebraska" (Aughey); "Winter resident, rare, has been seen as early as November and as late as February (Taylor); "South in winter through the northern to middle United States" (Goss); Omaha (L. Skow); Omaha (F. J. Brezee); "common winter resident and migrant, earliest seen in fall at Omaha, Sept. 30" (I. S. Trostler); Sioux county, December and February, exceedingly common (L. Bruner, D. A. Haggard, F. W. Taylor, W. D. Hunter, L. Skow).

528*b*. **Acanthis linaria rostrata** (*Coues*).—GREATER REDPOLL.

"A common winter resident and migrant, a large flock seen near Omaha, Nov. 17, 1895" (I. S. Trostler).

529. **Spinus tristis** (*Linn.*).—AMERICAN GOLDFINCH.

Omaha, West Point, Lincoln, Fremont, etc.—breeds (L. Bruner); "Common in northern Nebraska" (Aughey); "Summer resident, common" (Taylor):

"Temperate North America generally" (Goss); Beatrice, De Witt—nesting (A. S. Pearse); Omaha—breeds (L. Skow); Peru—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); several localities in state (D. H. Talbot); Gage county—breeds (F. A. Colby); "an abundant resident, breeds July 20 to Sept. 1 (I. S. Trostler); Lincoln, Nov. 5 (D. A. Haggard).

533. **Spinus pinus** (*Wils.*).—Pine Siskin; Pine Goldfinch.

Omaha, West Point (L. Bruner); "In December, 1887, two specimens were collected by members of the zoology class—has been found in the state as early as September" (Taylor); "Temperate North America" (Goss); Omaha (L. Skow); Genoa, Wood River (D. H. Talbot); "an irregular migrant and winter resident—earliest seen October 10" (I. S. Trostler).

000. **Passer domesticus** (*Linn.*).—European House Sparrow; English Sparrow.

Nearly all of state in towns—breeds most of year (L. Bruner); Beatrice (A. S. Pearse); Omaha—breeds (L. Skow); Gordon, Nebr., and in towns this side—east—breeds (J. M. Bates); Beatrice (F. A. Colby); Omaha, "a very abundant resident, breeds every month in the year except December, January, and February—rapidly driving out the Purple Martin, House wrens, and Bluebird" (I. S. Trostler).

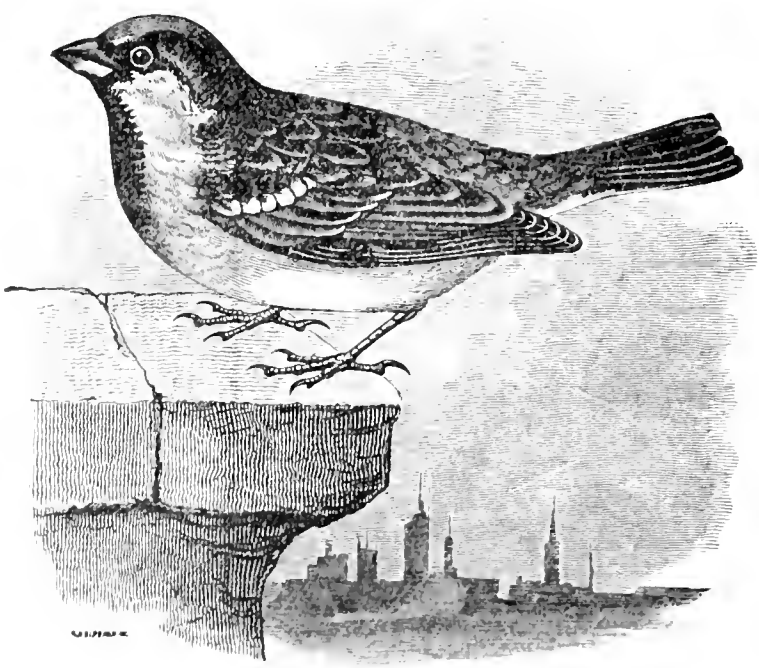


Fig. 43.—English Sparrow.

The European House Sparrow, or English Sparrow, as it is more commonly called in this country, while doing considerable in the line of destroying insects of various kinds that are common to the garden, is a nuisance in many ways. To those who are familiar with the bird

no description of its habits are necessary; but to those who are not acquainted with it a few words may be of service.

A lover of cities and towns and the company and protection of man, this bird has become exceedingly numerous. It is very pugnacious, incessantly fighting with its own kind, as well as with all other birds that it can overawe by its repeated onslaughts. In this way it soon drives away orioles, bluebirds, wrens, etc., that would otherwise make their homes in our parks. Among the many other charges that have been made against this bird is that of injury to fruits; and I believe that much of the blame that has been laid to the orioles, robins, and thrushes should be laid to him. Quoting from Bulletin No. 1 of the Division of Economic Ornithology and Mammology, United States Department of Agriculture, we have the following:

"Among fruits, grapes appear to suffer most, and, although many grapes are raised without protection in places where sparrows are considered fairly abundant, there is every reason to believe that sooner or later this bird will discover and injure them wherever its increase is tolerated. It has been shown that grape buds are frequently destroyed in the early spring, and the fact that one hundred and twenty-seven observers, representing twenty-six states and the District of Columbia, now (1888) bear witness to injury to ripening fruit, may well cause apprehension among grape-growers who have not suffered any loss as yet." * * *

"Those who have watched closely the movements of the sparrow when among the grapes agree that he pecks many more grapes than he eats, and his actions at such times, together with the fact that he frequently picks off leaves and shoots, which he does not eat, lend some color to the statements that he willfully destroys simply for the pleasure of destruction."

534. **Plectrophenax nivalis** (*Linn.*).—Snow Bunting; Snowflake.

West Point, Omaha, Norfolk, Sidney, etc. (L. Bruner); "abundant in Nebraska in winter" (Aughey); "Winter resident, common, has been seen in November and February" (Taylor); "Casually to Georgia, southern Illinois, and Kansas" (Goss); Omaha (L. Skow); Omaha, "irregular migrant and winter resident, Nov. 5 to March 1" (I. S. Trostler); Sioux county, Feb. 19, 1896 (L. Bruner).

536. **Calcarius lapponicus** (*Linn.*).—Lapland Longspur.

West Point, Lincoln (L. Bruner); "Present in Nebraska" (Aughey); "South in winter to Kentucky, southern Illinois, Kansas, etc." (Goss); Beat-

rice (A. S. Pearce); Omaha (L. Skow); Cherry county (J. M. Bates); Wood River (D. H. Talbot); Gage county (F. A. Colby); "common winter resident, Nov. 20 to March 1" (I. S. Trostler); Lincoln, Feb. 8, March 2 (D. A. Haggard).

537. **Calcarius pictus** (*Swains.*).—SMITH'S LONGSPUR.

West Point, Lincoln (L. Bruner); "Probably migratory, passing through the state in April and October" (Taylor); "From the Arctic coast to Illinois and Texas" (Goss); Lincoln, Oct. 25 (D. A. Haggard).

538. **Calcarius ornatus** (*Towns.*).—CHESTNUT-COLLARED LONGSPUR.

West Point, Grand Island, Lincoln (L. Bruner); "Abundant in Nebraska, where it breeds" (?) (Aughey); "Summer resident, common, arrives in May" (Taylor); "A bird of the plains" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); Albion, O'Neill, Wood River (D. H. Talbot); a common migrant, March 20 to April 16, Oct. 1 to 15 (I. S. Trostler); Lincoln, Oct. 25 (D. A. Haggard).

539. **Rhynchophanes mccownii** (*Lawr.*).—MCCOWN'S LONGSPUR.

West Point (L. Bruner); "A few found in Nebraska" (Aughey); "Summer resident, rare" (Taylor); "South in winter through Kansas" (Goss); Cherry county (J. M. Bates); Wood River (D. H. Talbot); "a not very common migrant, March 20 to April 16, Oct. 1 to 15" (I. S. Trostler); Lincoln, March 11 (D. A. Haggard).

540. **Poocætes gramineus** (*Gmel.*).—VESPER SPARROW; GRASS FINCH.

West Point, Lincoln, breeds (L. Bruner); "Abundant only in certain localities" (Aughey); "Summer resident, common, probably arrives in April and has been seen as late as September" (Taylor); "Eastern North America to the plains" (Goss); Omaha—breeds (L. Skow); Peru, rare—may breed (G. A. Coleman); Cherry county—breeds (J. M. Bates); several localities in east central part of state (D. H. Talbot); Omaha, "a not common summer resident, April 20 to Oct. 10" (I. S. Trostler); Lincoln, April 12 (D. A. Haggard).

540*a*. **Poocætes gramineus confinis** *Baird.*—WESTERN VESPER SPARROW.

Holt county, Sand Hills (L. Bruner); Cherry county—breeds (J. M. Bates).

542*a*. **Ammodramus sandwichensis savanna** (*Wils.*).—SAVANNA SPARROW.

West Point, Omaha, Lincoln (L. Bruner); "Migratory, common, arrives in April, May, and September" (Taylor); "West to the plains" (Goss); Omaha—breeds (L. Skow); Peru, common—may breed (G. A. Coleman); Cherry county—breeds (J. M. Bates); O'Neill, Genoa, Wood River—exceedingly common (D. H. Talbot); "a not common summer resident, arrive early in May—

breeds June 1 to 12, departs late August and September" (I. S. Trostler); Lincoln, April 19, Oct. 14, 16, 23 (D. A. Haggard).

542*b*. **Ammodramus sandwichensis alaudinus** (*Bonap.*).—WESTERN SAVANNA SPARROW.

Lincoln (L. Bruner); "Western North America in general" (Goss); Omaha —breeding (L. Skow); Lincoln, Oct. 10 (D. A. Haggard).

545. **Ammodramus bairdi** (*Aud.*).—BAIRD'S BUNTING.

Lincoln, West Point, Sioux county—breeding in latter locality (L. Bruner); "One specimen mentioned by Baird as collected at Ft. Union, Nebraska (Taylor); O'Neill, Nebr., September 1884 (D. H. Talbot); "from the plains of the Red river and Saskatchewan south to Texas" (A. O. U. Check List); "quite a common migrant—I have a set of five eggs taken by myself May 30, 1893, near Omaha that I feel positive are of this species" (I. S. Trostler).

546. **Ammodramus savannarum passerinus** (*Wils.*).—GRASSHOPPER SPARROW; YELLOW-WINGED SPARROW.

West Point, Lincoln, Holt county (L. Bruner); "Abundant in Nebraska, and breeds here" (Aughey); "Summer resident, abundant" (Taylor); "West to the plains" (Goss); Peru, abundant—breeds (G. A. Coleman); a number of east middle Nebraska localities (D. H. Talbot); "common summer resident, arrives April 10 to May 1, breeds May 15 to 25, departs Sept. 5 to 30" (I. S. Trostler); Lincoln, May 10, 17 (D. A. Haggard).

546*a*. **Ammodramus savannarum perpallidus** (*Ridgw.*).—WESTERN GRASSHOPPER SPARROW.

Cherry county—breeds (J. M. Bates).

547. **Ammodramus henslowii** (*Aud.*).—HENSLOW'S SPARROW.

Lincoln, West Point (L. Bruner); "I have only occasionally met with this bird in Nebraska" (Aughey); "Summer resident, rare, has been found in the state as late as September" (Taylor); "West to the Plains" (Goss).

548. **Ammodramus leconteii** (*Aud.*).—LE CONTE'S SPARROW.

West Point, Lincoln, Omaha, Holt county (L. Bruner); "The Great Plains, north to Manitoba" (Goss); Wood River, Ponca (D. H. Talbot); "from the plains eastward to Illinois" (A. O. U. Check List); Lincoln, May 17 (D. A. Haggard); Lincoln (B. Shimek).

549*a*. **Ammodramus cadacutus nelsoni** *Allen*.—NELSON'S SPARROW.

"From northern Illinois northward to North Dakota and Manitoba, south in winter to Texas" A. O. U. Check List); "chiefly in the Mississippi valley (Goss); Ft. Sisseton and Devil's lake, N. Dak. (Vernon Bailey).

552. **Chondestes grammacus** (*Say*).—LARK FINCH; LARK BUNTING.

Lincoln, West Point—breeds (L. Bruner); Abundant—breeds (Aughey); "Summer resident, abundant, arrives in May and remains as late as Septem-

ber" (Taylor); "Mississippi valley, north to Iowa, Wisconsin, etc." (Goss); Beatrice—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Jackson, Ponca, Newcastle (D. H. Talbot); Gage county—breeds (F. A. Colby); abundant summer resident, arrives April 1 to 10, breeds May 20 to June 10, departs Sept. 5 to 30 (I. S. Trostler); Lincoln, May 10 (D. A. Haggard).

553. **Zonotrichia querula** (*Nutt.*).—HARRIS'S SPARROW.

West Point, Omaha, Lincoln (L. Bruner); "Common in eastern Nebraska along the Missouri" (Aughey); "Common" (Taylor); "west to eastern Montana and western Nebraska" (Goss); Beatrice (M. L. Eaton); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Cherry county (J. M. Bates); Wood River, Genoa (D. H. Talbot), Lincoln (D. A. Haggard, D. F. Hall).

554. **Zonotrichia leucophrys** (*Forst.*).—WHITE-CROWNED SPARROW.

West Point, Omaha, Lincoln (L. Bruner); "Only occasionally seen in Nebraska" (Aughey); "Migratory, common; summer resident, rare" (Taylor); "North America at large" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); "a common migrant April 12 to May 1—not noted in autumn" (I. S. Trostler).

554*a*. **Zonotrichia leucophrys intermedia** *Ridgw.*—INTERMEDIATE SPARROW.

Lincoln, West Point, Omaha (L. Bruner); "From the eastern edge of the Great Plains" (Goss); Omaha (L. Skow); Cherry county (J. H. Bates); An abundant migrant and common winter resident, Omaha, Oct. 1 to April 2 to 30" (I. S. Trostler); Lincoln, Crete, April 19 (D. A. Haggard).

554*b*. **Zonotrichia leucophrys gambeli** *Nutt.*—GAMBEL'S SPARROW.

"Baird mentions two specimens taken in 1856" (Taylor).

558. **Zonotrichia albicollis** (*Gmel.*).—WHITE-THROATED SPARROW.

West Point, Lincoln, Weeping Water (L. Bruner); "abundant in Nebraska during its migrations" (Aughey); "Migratory, abundant, arrives in May, September, and October" (Taylor); "West to the edge of the Great Plains" (Goss); Omaha (L. Skow); Peru, rare migrant (G. A. Coleman); Omaha, "a common migrant April 12 to May 15, Sept. 20 to Nov. 1" (I. S. Trostler).

559. **Spizella monticola** (*Gmel.*).—TREE SPARROW.

West Point, Lincoln, Omaha, Weeping Water, etc. (L. Bruner); "Abundant in winter and a few breed here in summer" (Aughey); "West to the edge of the Great Plains" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha (L. Skow); Cherry county—winters (J. M. Bates); Gage county (F. A. Colby); "an abundant winter resident, arrives Oct. 1 to Nov. 1, departs before April 1" (I. S. Trostler); Lincoln, March 25, Oct. 21, Nov. 5 (D. A. Haggard).

559*a*. **Spizella monticola ochracea** *Brewst.*—Western Tree Sparrow.

"Possibly may be found in Nebraska, mentioned in A. O. U. Check List as 'east to Dakota and western Kansas'" (Taylor); "East to Dakota, middle Kansas and Texas" (Goss); Peru, common winter resident (G. A. Coleman); Omaha (L. Skow); Sioux county, Feb. 18, 1896 (L. Bruner).

560. **Spizella socialis** (*Wils.*).—Chipping Sparrow.

West Point, Lincoln (L. Bruner); "Very abundant in portions of Nebraska" (Aughey); "Abundant in spring and fall, and probably breeds in the state" (Taylor); "west to the Rocky mountains" (Goss); Omaha (L. Skow); Peru, rare—breeds (G. A. Coleman); Omaha, "an abundant migrant and common summer resident, arrives April 1 to 15, breeds in June, departs Sept. 10 to Oct. 1" (I. S. Trostler).

Fig. 44.—Chipping Sparrow.

561. **Spizella pallida** (*Swains.*).—Clay-colored Sparrow.

West Point, Lincoln, Rnlo (L. Bruner); "abundant in portions of Nebraska in May and October" (Aughey); "Migratory, common; summer resident, occasional; arrives in May and October" (Taylor); "Interior of North America; I am inclined to believe that the bird occasionally breeds in Nebraska" (Goss); Peru, common migrant (G. A. Coleman); Cherry county—breeds (J. M. Bates); Omaha, "a common migrant, May 1 to 25 and Sept. 20 to Oct. 25" (I. S. Trostler); Lincoln, May 17 and Oct. 7 (D. A. Haggard).

562. **Spizella breweri** *Cass.*—Brewer's Sparrow.

Cherry county—breeds (J. M. Bates).

563. **Spizella pusilla** (*Wilson*).—FIELD SPARROW.

Lincoln, West Point, Rulo, Weeping Water, etc. (L. Bruner); "Summer resident, common, arrives as early as the last of April and has been found as late as September" (Taylor); "West to the edge of the Great Plains" (Goss), Beatrice, De Witt—nesting (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G A. Coleman); Omaha, "an abundant migrant and common summer resident, arrives March 20 to May 1, breeds May 10 to Aug. 1—three broods—departs Sept. 15 to Oct. 10" (I.S. Trostler).

563*a*. **Spizella pusilla arenacea** *Chadb.*—WESTERN FIELD SPARROW.

Cherry county (J. M. Bates); "Great Plains, from Texas to Montana and Dakota" (A. O. U. Check List).

566. **Junco aikeni** *Ridgw.*—WHITE-WINGED JUNCO.

"Rocky mountains in Colorado and Wyoming, straggling east in winter to middle Kansas and Indian Territory" (Goss); Ft. Robinson, Sioux county, December, 1895 (L. Bruner, D. A. Haggard); Sioux county, Feb. 18 to 29, 1896, abundant (L. Bruner, W. D. Hunter, L. Skow).

Several specimens were taken in which the white wing-bands were wanting, and a single one with decidedly pinkish sides.

567. **Junco hyemalis** (*Linn.*).—JUNCO; SLATE-COLORED SNOWBIRD.

Lincoln, Omaha, Bellevue, West Point, Rulo, etc. (L. Bruner); "A few are found here during the whole year, but the great mass pass northward in spring" (Aughey); "Winter resident, abundant" (Taylor); "South in winter throughout the eastern United States and straggling westward to the Pacific coast" (Goss); Beatrice (A. S. Pearse); Omaha (L. Skow); Gage county (F. A. Colby); Omaha, an abundant winter resident, Oct. 10 to 30, March 20 to April 10—a few seen during summer—probably breeds here" (I. S. Trostler); Lincoln, March 25 (D. A. Haggard).

567*a*. **Junco hyemalis oregonus** (*Towns.*).—OREGON JUNCO.

West Point, Lincoln (L. Bruner); "Baird mentions two specimens taken in October, probably a rare winter resident in the western part of the state" (Taylor); "In winter straggling east to the Mississippi river" (Goss); Sioux county, December, 1895 (L. Bruner, D. A. Haggard); "In winter to middle Kansas" (Ridgeway); Omaha (L. Skow); Sioux county, Feb. 19, 1896 (L. Skow); Long Pine, April 8 (J. M. Bates).

567*b*. **Junco hyemalis shufeldti** *Coale.*—SHUFELDT'S JUNCO.

Cherry county, Nebr. (J. M. Bates); "Accidental in Michigan, Illinois, Massachusetts, Maryland, etc. (A. O. U. Check List).

568. **Junco annectens** *Baird.*—PINK-SIDED JUNCO.

Lincoln, March 11, 1895 (Student).

569. **Junco caniceps** (*Woodh.*).—GRAY-HEADED JUNCO.

Sioux county, Dec. 14, 1895 (L. Bruner, D. A. Haggard).

578. **Peucæa cassini** (*Woodh.*).—CASSIN'S SPARROW.

Summer resident in middle and western part of Kansas (Goss); central and western Kansas (A. O. U. Check List); this bird very likely reaches the Republican river valley in Nebraska (L. Bruner).

581. **Melospiza fasciata** (*Gmel.*).—SONG SPARROW.

West Point, Omaha, Lincoln (L. Bruner); "Common in certain localities" (Aughey); "Summer resident, common, arrives in April and May, and found as late as September, probably a winter resident in some parts of the state" (Taylor); "West to the base of the Rocky mountains" (Goss); Omaha (L. Skow); an abundant winter resident, also common resident, commonest Oct. 1 to March 20" (I. S. Trostler); Lincoln, March 25, Oct. 7, 23, 30, Crete, April 19 (D. A. Haggard); Crawford, Dec. 12 (L. Bruner); Long Pine, April 9 (J. M. Bates).

583. **Melospiza lincolnii** (*Aud.*).—LINCOLN'S SPARROW.

West Point, Lincoln (L. Bruner); "Great numbers pass through Nebraska in spring and fall" (Aughey); "Migratory, abundant, arrives in April, May, September, and October" (Taylor); "North America at Large" (Goss); Peru, common migrant (G. A. Coleman); Lincoln, April 22, May 8, 10, Oct. 7, 8 (D. A. Haggard).

584. **Melospiza georgiana** (*Lath.*).—SWAMP SPARROW.

Lincoln, West Point, Lyons (L. Bruner); "One specimen mentioned by Baird" (Taylor); "West to the Great Plains" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Lincoln, April 26, May 3, Dec. 15 (D. A. Haggard).

585. **Passerella iliaca** (*Merrem*).—FOX SPARROW.

West Point, Omaha, Lincoln (L. Bruner); "One specimen mentioned in the records of the Normal Science Society" (Taylor); "West to the plains and Alaska" (Goss); Beatrice (A. S. Pearse); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Gage county (F. A. Colby); Omaha, "a common migrant, Oct. 1 to 26, March 20 to April 10—occasionally seen during warm winter weather" (I. S. Trostler); Lincoln, April 9, Oct. 29 (D. A. Haggard).

585c. **Passerella iliaca schistacea** (*Baird*).—SLATE-COLORED SPARROW.

Omaha, Florence, Rockport (L. Skow).

587. **Pipilo erythropthalmus** (*Linn.*).—CHEWINK; TOWHEE.

West Point, Omaha, Lincoln, Rulo, etc.—breeds (L. Bruner); "Large numbers pass through northern Nebraska on their migration, a few stop to breed" (Aughey); "Migratory, abundant; summer resident, somewhat rare; arrive in March and April, may occasionally spend the winter in the state" (Taylor); "West to eastern Dakota and Texas" (Goss); Beatrice, De Witt—breeding (A.

S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Genoa, Wood River—abundant (D. H. Talbot); Gage county (F. A. Colby); "an abundant migrant and common resident, breeds April 20 to June 25,—two or three broods—have taken fresh eggs and two-weeks-old young in same nest" (I. S. Trostler); Lincoln (D. A. Haggard).

588. **Pipilo maculatus arcticus** (*Swains.*).—ARCTIC TOWHEE.

Sioux county (L. Bruner); "Baird mentions eighteen specimens collected in western Nebraska, ten in May, four in summer, and three the latter part of September" (Taylor); "East to Kansas, Nebraska, etc." (Goss); Cherry county—breeds (J. M. Bates); Sioux county—breeding (R. E. Dinges).

590. **Pipilo chlorurus** (*Towns.*).—GREEN-TAILED TOWHEE.

"Baird mentions several taken in August in extreme western Nebraska" (Taylor).

593. **Cardinalis cardinalis** (*Linn.*).—CARDINAL GROSBEAK.

West Point, Omaha, Lincoln Rulo, Nebraska City, etc.—breeds (L. Bruner); "Abundant in southern Nebraska, where it breeds" (Aughey); "Resident, common" (Taylor); "West to the edge of the Great Plains" (Goss); Beatrice (A. S. Pearse); Fairbury (M. L. Eaton); Omaha, Rockport—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county (F. A. Colby); "a not uncommon resident, commonest in winter, breeds in latter part of May" (I. S. Trostler); Lincoln, March 5, Rulo, April 18 (D. A. Haggard).

595. **Habia ludoviciana** (*Linn.*).—ROSE-BREASTED GROSBEAK.

West Point, Omaha, Lincoln, Bellevue, etc., breeds (L. Bruner); "Rather abundant in northern Nebraska" (Aughey); "Summer resident, common, arrives in April and May" (Taylor); "West to the edge of the Great Plains" (Goss); Beatrice, De Witt (A. S. Pearse); Beatrice (M. L. Eaton); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county—breeds (F. A. Colby); a common summer resident, arrives April 20 to May 10, "breeds May 25 to June 10, departs for the south during latter September" (I. S. Trostler).

596. **Habia melanocephala** (*Swains.*).—BLACK-HEADED GROSBEAK.

Sioux county (L. Bruner); Lincoln (R. E. Dinges); "I have seen this bird myself only along the Republican river in southwestern Nebraska" (Aughey); "Summer resident, rare, arrives in May and has been found as late as September" (Taylor); "East to middle Nebraska" (Goss); Omaha, "a rare straggler—one found dead under telegraph wire Oct. 26, 1894" (I. S. Trostler).

597. **Guiraca cærulea** (*Linn.*).—BLUE GROSBEAK.

Grand Island (Aughey); "Summer resident, rare, has been seen as late as September" (Taylor); "North occasionally to New England and southern Nebraska" (Goss); Gage county (Fred Wesphal, F. A. Colby); Omaha, "a straggler, rare, one seen Oct. 26, 1894" (I. S. Trostler).

597*a*. **Guiraca cærulea eurhyncha** *Coues.*—Western Blue Grosbeak.

"From South Dakota, Colorado," etc. (A. O. U. Check List).

598. **Passerina cyanea** (*Linn.*).—Indigo Bunting; Indigo Bird.

Omaha, West Point, Weeping Water, Lincoln—breeds (L. Bruner); "Rare in Nebraska" (Aughey); "Summer resident, common, arrives in May" (Taylor); "West to the edge of the Great Plains" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county (J. M. Bates); Gage county (F. A. Colby); "common summer resident, arrives May 1 to 10, breeds June 3 to 15, departs early in September" (I. S. Trostler); Lincoln, Aug. 15 (D. A. Haggard).

599. **Passerina amœna** (*Say*).—Lazuli Finch; Lazuli Bunting.

West Point, Sioux county—breeds (L. Bruner); "Summer resident, rare" (Taylor); "East to the Great Plains" (Goss).

604. **Spiza americana** (*Gmel.*).—Dickcissel; Black-throated Bunting.

West Point, Omaha, Norfolk, Schuyler, Lincoln, etc.—breeds (L. Bruner); "Common in eastern Nebraska, and found to the west line of the state" (Aughey); "Summer resident, abundant, found as late as September" (Taylor); "North to New England and southern Dakota" (Goss); Beatrice (A. S. Pearse); Omaha—breeds (L. Skow); Peru, abundant—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); numerous localities in state (D. H. Talbot); Gage county—breeds (F. A Colby); "An abundant migrant and common summer resident, arrives May 7 to 15, breeds June 2 to July 15" (I. S. Trostler).

605. **Calamospiza melanocorys** *Stejn.*—Lark Bunting.

West Point, Lincoln (L. Bruner); "Rather abundant in southern Nebraska, where it breeds" (Aughey); "Summer resident, common, probably arrives in May" (Taylor); "West to the Rocky mountains" (Goss); Lincoln (D. A. Haggard); Beatrice—breeding, De Witt (A. S. Pearse); Cherry county—breeds (J. M. Bates); Gage county (F. A. Colby); Thomas county—breeding (L. Bruner).

Family **TANAGRIDÆ**.—Tanagers.

607. **Piranga ludoviciana** (*Wils.*).—Louisiana Tanager; Crimson-headed Tanager.

Sioux county—breeds (L. Bruner); "Baird mentions five specimens collected in western Nebraska in August and September" (Taylor).

608. **Piranga erythromelas** *Vieill.*—Scarlet Tanager.

West Point, Omaha, Lincoln, La Platte, Weeping Water, etc.—breeds (L. Bruner); "in the southeastern part of the state" (Aughey); "Summer resi-

dent, somewhat rare" (Taylor); "West to the Great Plains" (Goss); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county (F. A. Colby); "quite common summer resident, arrives about May 1, breeds June 5 to 20, and departs early in September" (I. S. Trostler).

610. **Piranga rubra** (*Linn.*).—Summer Redbird.

Lincoln, breeds (R. E. Dinges); "Have seen this bird only in southeastern Nebraska (Aughey); "Summer resident, rare, arrives in May" (Taylor); "North to New Jersey, Illinois, and Nebraska" (Goss); Omaha (L. Skow); "a rare summer resident, one seen in western part of Douglas county, July 7, 1894" (I. S. Trostler).

Family **HIRUNDINIDÆ**.—Swallows.

All of our swallows are insect destroyers, feeding upon such forms as gnats, flies, etc., which they capture on the wing. The large colonies of different species of these birds that breed within the state, as well as those that pass through during their migrations, destroy vast numbers of these insects. They should be protected.

611. **Progne subis** (*Linn.*).—Purple Martin; House Martin.

West Point, Omaha, Lincoln, Norfolk, etc.—breeds (L. Bruner); "Rather common in Nebraska, where it breeds" (Aughey); "Summer resident, common, arrives in May" (Taylor); "The whole of temperate North America" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county (F. A. Colby); Omaha, "a common resident, formerly abundant, but being driven out by European House Sparrow; arrives March 10 to April 1, breeds April 25 to June 1" (I. S. Trostler).

612. **Petrochelidon lunifrons** (*Say*).—Cliff Swallow; Eaves Swallow; Mud Swallow.

West Point, Lincoln, Sioux county, Omaha, etc.—breeds (L. Bruner); "Occurs in eastern Nebraska in great numbers" (Aughey); "Summer resident, arrive in May" (Taylor); "North America at large" (Goss); Omaha—breeds (L. Skow); Cherry county—breeding (J. M. Bates); Omaha, "common summer resident, arrives May 1, breeds May 20 to July 1, departs Aug. 10 to Sept. 15" (I. S. Trostler).

613. **Chelidon erythrogastra** (*Bodd.*).—Barn Swallow.

Holt county, Omaha, Lincoln, West Point, etc.—breeds (L. Bruner); "various localities in eastern Nebraska, and also breeds here (Aughey); "Summer resident, common, arrives in May" (Taylor); "North America in general" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Cherry county—breeds Jan. 2, 1892 (J. M. Bates); Gage county—breeds (F. A. Colby); Omaha, "a common summer resident, arrives May 1 to 10, breeds May 25 to July 10, departs Aug. 10 to Sept. 15" (I. S. Trostler).

614. **Tachycineta bicolor** (*Vieill.*).—WHITE-BELLIED SWALLOW; TREE SWALLOW.

West Point, Lincoln, Sioux county, breeds in latter locality (L. Bruner); "found but sparingly in Nebraska" (Aughey); "Summer resident, rare, arrives in April" (Taylor); "The whole of North America" (Goss); Omaha—breeds (L. Skow); "a common migrant, but as summer resident not common in vicinity of Omaha, arrives April 10 to May 1, breeds June 1 to 10, departs Sept. 1 to 25" (I. S. Trostler).

615. **Tachycineta thalassina** (*Swains.*).—VIOLET-GREEN SWALLOW.

West Point, Sioux county—breeds in latter locality (L. Bruner); "in western Nebraska, where I found it nesting" (Aughey); "Mentioned by both Baird and Aughey as taken in the summer season in western Nebraska" (Taylor).

616. **Clivicola riparia** (*Linn.*).—BANK SWALLOW.

Entire state—breeds in suitable localities (L. Bruner); "Common in eastern Nebraska—breeds (Aughey); "Summer resident, common" (Taylor); "Northern hemisphere in general" (Goss); Beatrice, De Witt—breeds (A. S. Pearse); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "an abundant summer resident—breeds" (I. S. Trostler).

617. **Stelgidopteryx serripennis** (*Aud.*).—ROUGH-WINGED SWALLOW.

West Point, Omaha (L. Bruner); "breeding in Richardson county" (Aughey); "summer resident, common" (Taylor); "United States at large" (Goss); Peru, common—breeds (G. A. Coleman); "rare summer resident, a small colony seen nesting in bank of Elkhorn river in western part of Douglas county July 15, 1894" (I. S. Trostler).

FAMILY **AMPELIDÆ**.—WAXWINGS.

The "waxwings," both the Cedar Bird and Bohemian Waxwing, feed principally upon berries, etc., which they find throughout the year. Still, in his studies of the food contents of the stomachs of a variety of birds taken in a certain orchard that was overrun with canker-worms, Professor Forbes found that the seven specimens of the Cedar Waxwing had eaten nothing but canker-worms and a few dung beetles—these latter in such small numbers as to scarcely count. The number of caterpillars eaten by each bird ranged from 70 to 101.

618. **Ampelis garrulus** *Linn.*—BOHEMIAN WAXWING; NORTHERN WAXWING.

West Point, Omaha, Lincoln (L. Bruner); "Rare in Nebraska in winter" (Aughey); "Winter resident" (Taylor); "in North America south in winter

more or less regularly to latitude 40°" (Goss); Omaha (L. Skow); Cherry county (J. M. Bates); "a very irregular winter resident" (I. S. Trostler); Sioux county, common (George Toole); Lincoln, Dec. 7 (D. A. Haggard); Lincoln, Nov. 14, 28—fourteen specimens (J. S. Hunter); Fullerton, Nance county (C. E. Barker).

FIG. 15.—Bohemian Waxwing.

619. **Ampelis cedrorum** (*Vieill.*).—CEDAR BIRD; CEDAR WAXWING; CHERRY BIRD.

West Point, Omaha, Tekamah, Lincoln, etc. (L. Bruner); "only a few times in Nebraska" (Aughey); "An irregular resident, generally common" (Taylor); "The whole of temperate North America" (Goss); Omaha—breeds (L. Skow); Peru, common—may breed (G. A. Coleman); Cherry county (J. M. Bates);

Gage county (F. A. Colby); "not uncommon as a late migrant in autumn and early spring—probably breeds in Nebraska" (I. S. Trostler); Lincoln, March 8 (D. A. Haggard).

FAMILY **LANIIDÆ**.—SHRIKES.

The shrikes or "butcher birds" are known as veritable "brigands" or "pirates" when it comes to the destruction of other forms of life. They are true to their name, and "butcher" for pastime large numbers of insects, mice, lizards, small snakes, and even birds. They then fly to some thorn bush or barb-wire fence and impale the luckless victim and leave it for future use, or to dry up and finally blow away. The good they do will outweigh the harm.

621. **Lanius borealis** *Vieill.*—GREAT NORTHERN SHRIKE.

West Point, Omaha, Lincoln, Rulo, etc. (L. Bruner); "fall of the year sparingly" (Aughey); "Winter resident, common, arrive in September and probably leave in March" (Taylor); "South in winter to about latitude 35°" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha (L. Skow); Peru, winter resident (G. A. Coleman); Cherry county (J. M. Bates); Lincoln (R. E. Dinges, J. B. White, D. A. Haggard, etc.); Gage county (F. A. Colby); "quite a common winter resident, arriving at the same time and preying upon the smaller sparrows" (I. S. Trostler); Sioux county, Feb. 27, 1896 (W. D. Hunter).

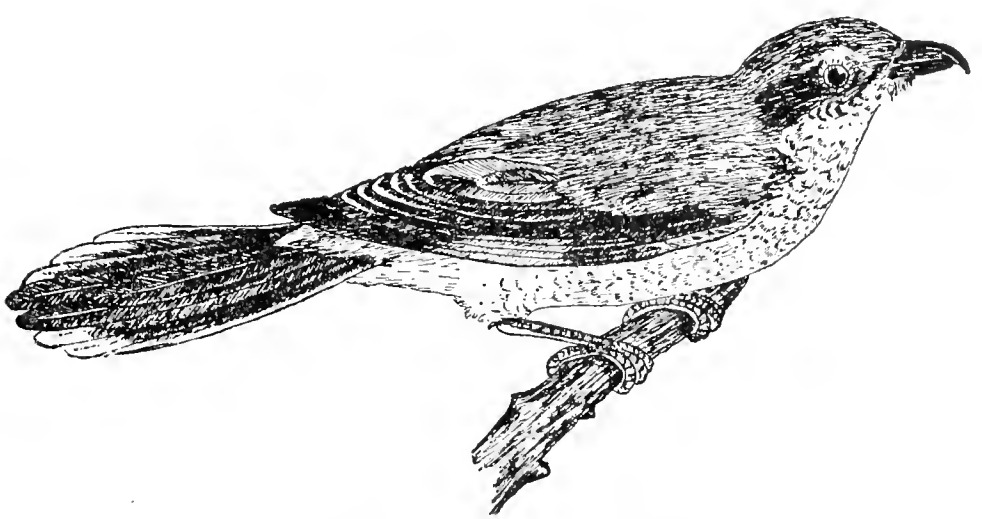


FIG. 46.—Great Northern Shrike.

622. **Lanius ludovicianus** *Linn.*—LOGGERHEAD SHRIKE; BUTCHER BIRD.

West Point—breeding, Omaha (L. Bruner); "North irregularly to Ohio, Vermont, etc." (Goss); Lincoln (Dr. F. L. Riser).

622*a*. **Lanius ludovicianus excubitorides** (*Swains.*).—WHITE-RUMPED SHRIKE.

West Point, Lincoln, Omaha (L. Bruner); Lincoln—breeding (R. E. Dinges); "Rather abundant in Nebraska" (Aughey); "Summer resident, arrive in April and found as late as September" (Taylor); "The central regions of North America" (Goss); Beatrice—nesting (A. S. Pearse); Omaha (L. Skow); Peru, breeds (G. A. Coleman); Cherry county (J. M. Bates); Gage county—breeds (F. A. Colby); "Summer resident—breeds, not common, earliest seen March 23—departs late in September" (I. S. Trostler).

FAMILY **VIREONIDÆ**.—VIREOS.

The food of the various "greenlets" or vireos is made up almost entirely of insects, of which a large per cent is composed of the caterpillars of different moths, such as infest trees and the larger shrubs. They should be protected and encouraged about the orchard in particular.

624. **Vireo olivaceus** (*Linn.*).—RED-EYED VIREO.

Common over eastern half of state—breeds (L. Bruner); "common in the timber belts along the Missouri and its tributaries in Nebraska" (Aughey); "Summer resident, abundant, probably arrives in May" (Taylor); "West to the Rocky mountains" (Goss); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); common summer resident, arrives May 1, breeds May 22 to July 1—departs Sept. 1 to 25" (I. S. Trostler).

626. **Vireo philadelphicus** (*Cass.*).—PHILADELPHIA VIREO.

West Point, Omaha (L. Bruner); "common in eastern Nebraska" (Aughey); Omaha (L. Skow).

627. **Vireo gilvus** (*Vieill.*).—WARBLING VIREO.

West Point (L. Bruner); "abundant in northeastern Nebraska" (Aughey); "Summer resident, common, arrives in May" (Taylor); "North America in general" (Goss); Omaha—breeding (L. Skow); Peru, common—breeds (G. A. Coleman); "a not uncommon summer resident, arrives, breeds, and departs same as Red-eyed Vireo" (I. S. Trostler).

628. **Vireo flavifrons** *Vieill.*—YELLOW-THROATED VIREO.

Lincoln (L. Bruner); Fairbury (Dr. Eaton); "Somewhat abundant in southeastern Nebraska, but rare north of the Platte" (Aughey); "Summer resident" (Taylor); "Eastern United States" (Goss); Omaha (L. Skow); Peru, common—may breed (G. A. Coleman); Omaha, "not rare as a summer resident, arrives about May 1, departs late in August, seen during summer, doubtless breeds" (I. S. Trostler).

629. **Vireo solitarius** (*Wils.*).—BLUE-HEADED VIREO.

West Point, Omaha (L. Bruner); "Found in the timber belts of eastern Nebraska" (Aughey); "Summer resident, rare, arrives in May" (Taylor);

"Eastern North America, migratory in Kansas" (Goss); Omaha, Child's Point (L. Skow); Omaha, "a rare summer resident, occasionally seen during May, June, and July during past six years" (I. S. Trostler).

630. **Vireo atricapillus** *Woodh.*—Black-capped Vireo.

Bellevue (L. Skow); Omaha, "a rare straggler, one seen June 19, 1894 (I was very close to this bird and positively identified it)" (I. S. Trostler).

631. **Vireo noveboracensis** (*Gmel.*).—White-eyed Vireo.

Omaha, Lincoln, West Point (L. Bruner); "Occasionally met with in Nebraska"—nesting (Aughey); "Probably a summer resident" (Taylor); "West to the Rocky mountains" (Goss); Omaha—breeds (L. Skow); Omaha, "not uncommon summer resident, arrives early in May, breeds June 24 to 30, departs Sept. 20 to 30" (I. S. Trostler).

633. **Vireo bellii** *Aud.*—Bell's Vireo.

Lincoln (L. Bruner); "This bird is sparingly present in Nebraska" (Aughey); "Summer resident, rare" (Taylor); "From Illinois and Minnesota west to the eastern base of the Rocky mountains" (Goss); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county—breeds (F. A. Colby); "a common summer resident—by far our commonest Vireo, arrives May 1 to 10, breeds May 25 to July 24, departs Aug. 15 to Sept. 1" (I. S. Trostler).

Family **MNIOTILTIDÆ**.—Wood Warblers.

In the words of that pleasing writer, Dr. Elliott Coues,* "The warblers have we always with us, all in their own good time; they come out of the south, pass on, return, and are away again, their appearance and withdrawal scarcely less than a mystery; many stay with us all summer long, and some brave the winters in our midst. Some of these slight creatures, guided by unerring instinct, travel true to the meridian in the hours of darkness, slipping past like a 'thief in the night,' stopping at daybreak from their lofty flights to rest and recruit for the next stage of the journey. Others pass more leisurely from tree to tree, in a ceaseless tide of migration, gleaning as they go; the hardier males, in full song and plumage, lead the way for the weaker females and the yearlings. With tireless industry do the warblers befriend the human race; their unconscious zeal plays due part in the nice adjustment of nature's forces, helping to bring about the balance of vegetable and insect life without which agriculture would be in vain. They visit the orchard when the apple and pear, the peach, plum, and cherry are in bloom, seeming to revel carelessly amid the sweet-scented and delicately-tinted blossoms, but never faltering in their good work.

* Key to North American Birds, p. 288.

They peer into the crevices of the bark, scrutinize each leaf, and explore the very heart of the buds, to detect, drag forth, and destroy those tiny creatures, singly insignificant, collectively a scourge, which prey upon the hopes of the fruit-grower, and which, if undisturbed, would bring his care to naught. Some warblers flit incessantly in the terminal foliage of the tallest trees; others hug close to the scored trunks and gnarled boughs of the forest kings; some peep from the thicket, coppice, the impenetrable mantel of shrubbery that decks tiny water-courses, playing at hide-and-seek with all comers; others more humble still, descend to the ground, where they glide with pretty mincing steps and affected turning of the head this way and that, their delicate flesh-tinted feet just stirring the layer of withered leaves with which a past season carpeted the ground. We may seek warblers everywhere in the season; we shall find them a continual surprise; all mood and circumstance is theirs."

636. **Mniotilta varia** (*Linn.*).—Black and White Creeping Warbler.

West Point, Plattsmouth, Omaha, Lincoln, (L. Bruner); "wooded sections of Nebraska" (Aughey); "Summer resident, common, arrives in April and May" (Taylor); "West to the Great Plains" (Goss); Omaha—breeds (L. Skow); Peru, common—may breed (G. A. Coleman); Cherry county—breeds (J. M. Bates); "common migrant and not uncommon summer resident and breeder, arrives early in April, departs Sept. 2 to 25—G. W. Sabine saw young in nest in middle of June, 1894, in northern Sarpy county—breeds about May 15" (J. S. Trostler).

637. **Protonotaria citrea** (*Bodd.*).—Prothonotary Warbler.

West Point, Lincoln (L. Bruner); "Have only seen this bird a few times in southeastern Nebraska" (Aughey); "summer resident, somewhat rare" (Taylor); "North regularly to Georgia, Iowa, and Nebraska" (Goss); Omaha—breeds (L. Skow); "a not uncommon summer resident, arrives May 1 to 15, departs Aug. 25 to Sept. 10—breeds" (J. S. Trostler).

639. **Helmitherus vermivorus** (*Gmel.*).—Worm-eating Warbler.

Omaha (F. J. Brezee); "extends to Nebraska" (Bull. No. 2, Div. Ornith.); "have only seen this species in the southeastern part of the state" (Aughey); "West to eastern Nebraska and Texas" (Goss); Omaha, "a rare summer resident, seen during July and August" (J. S. Trostler).

641. **Helminthophila pinus** (*Linn.*).—Blue-winged Yellow Warbler.

Omaha, Weeping Water, Lincoln (L. Bruner); "southeastern part of the state" (Aughey); "West to Nebraska, middle Kansas, and Texas" (Goss);

Omaha—breeds (L. Skow); Peru, rare, probably breeds (G. A. Coleman); Omaha, "a rare summer resident, probably breeds, but have never found the nest, earliest seen May 20, latest August 25" (I. S. Trostler).

642. **Helminthophila chrysoptera** (*Linn.*).—GOLDEN-WINGED WARBLER.

"It has been found a few times in Nebraska" (Bull. No. 2, Div. Ornith.); "Occasionally seen in eastern Nebraska" (Aughey).

644. **Helminthophila virginiæ** (*Baird*).—VIRGINIA'S WARBLER.

"Have only seen one specimen of this bird in southwestern Nebraska" (Aughey).

645. **Helminthophila ruficapilla** (*Wils.*).—NASHVILLE WARBLER.

West Point, Omaha, Weeping Water (L. Bruner); "This bird arrives in eastern Nebraska about May 1" (Aughey); "Summer resident, rare, arrives in May—probably common during migration" (Taylor); "West to the Great Plains" (Goss); Omaha, "a not uncommon migrant and rare summer resident—probably a rare breeder" (I. S. Trostler).

646. **Helminthophila celata** (*Say*).—ORANGE-CROWNED WARBLER.

West Point, Lincoln, Omaha (L. Bruner); "One specimen mentioned in the records of the Normal Science Society" (Taylor); "Quite common in the middle states and throughout the Mississippi valley" (Goss); Omaha (L. Skow); Pern, common migrant (G. A. Coleman).

647. **Helminthophila peregrina** (*Wils.*).—TENNESSEE WARBLER.

Lincoln, West Point, Omaha (L. Bruner); "Occurs sparingly in eastern Nebraska" (Aughey); "Migratory, common, arrive in May" (Taylor); "West to the base of the Rocky mountains" (Goss); Omaha (L. Skow); Pern, rare—may breed (G. A. Coleman); Omaha, "a somewhat common migrant, May 1 to 15, Sept. 10 to 20" (I. S. Trostler).

648. **Compsothlypis americana** (*Linn.*).—BLUE YELLOW-BACKED WARBLER; PARULA WARBLER.

"Rearing their young in various parts of Nebraska" (Bull. No. 2, Div. Ornith.); "It reaches Nebraska about the 1st of May" (Aughey); "Migratory, common, arrive in April and May" (Taylor); "West to the base of the Rocky mountains" (Goss).

650. **Dendroica tigrina** (*Gmel.*).—CAPE MAY WARBLER.

Alda (F. W. Powell).

652. **Dendroica æstiva** (*Gmel.*).—YELLOW WARBLER; SUMMER YELLOW BIRD.

West Point, Holt county, Omaha, Lincoln, etc.—breeds (L. Bruner); "Abundant in Nebraska" (Aughey); "Summer resident, abundant, arrives in May"

(Taylor); "North America at large" (Goss); Beatrice, breeding (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "an abundant summer resident, arrives May 1 to 10, breeds May 25 to July 16, departs Aug. 15 to Sept. 1" (I. S. Trostler).

654. **Dendroica cærulescens** (*Gmel.*).—BLACK-THROATED BLUE WARBLER

Omaha, West Point (L. Bruner); "Is present in spring and fall during its migrations" (Aughey).

655. **Dendroica coronata** (*Linn.*).—YELLOW-RUMPED WARBLER; MYRTLE WARBLER.

West Point, Omaha, Lincoln, Rulo, Fremont, etc. (L. Bruner); "It is frequently seen along our timber belts" (Aughey); "Migratory, common, arrives in April and May" (Taylor); "The whole of North America" (Goss); Omaha (L. Skow); Peru, abundant migrant (G. A. Coleman); "a common migrant, April 1 to 20, Oct. 1 to Nov. 1" (I. S. Trostler); Crete, Nebr., April 19 (D. A. Haggard).

656. **Dendroica auduboni** (*Towns.*).—AUDUBON'S WARBLER.

Belmont, on Pine Ridge (L. Bruner); "One specimen mentioned by Baird as found in the western part of the state" (Taylor); "east to the eastern border of the Great Plains" (Goss).

657. **Dendroica maculosa** (*Gmel.*).—MAGNOLIA WARBLER; BLACK AND YELLOW WARBLER.

Omaha (F. J. Brezee); "Occasionally seen on its migrations in northeastern Nebraska" (Aughey); "Migratory, rare, arrive the first of May" (Taylor); "West to the base of the Rocky mountains" (Goss).

658. **Dendroica cærulea** (*Wils.*).—CERULEAN WARBLER.

West Point, Blair (L. Bruner); "Abundant in eastern Nebraska along the wooded river-bottoms, where it is in the habit of breeding" (Aughey); summer resident, common" (Taylor); "West to the Great Plains" (Goss); Omaha (L. Skow); Omaha "a quite common migrant and not rare summer resident, arrives May 1 to 10, departs latter August—seen in summer and doubtless breeds" (I. S. Trostler).

659. **Dendroica pensylvanica** (*Linn.*).—CHESTNUT-SIDED WARBLER.

Omaha, Weeping Water (L. Bruner); "Rather common in eastern Nebraska during its migrations" (Aughey); "Migratory, common, arrives the last of April and in September" (Taylor); "West to the Great Plains" (Goss); Omaha—breeds (L. Skow); Omaha, "not rare migrant and an occasional summer resident, took a set of four eggs and nest June 23, 1894" (I. S. Trostler).

660. **Dendroica castanea** (*Wils.*).—BAY-BREASTED WARBLER.

"It has been found in Nebraska" (Bull. No. 2, Div. Ornith.); "Occasionally met with in eastern Nebraska" (Aughey).

661. **Dendroica striata** (*Forst.*).—BLACK-POLL WARBLER.

West Point, (L. Bruner); "Rather common in eastern Nebraska during its migrations" (Aughey); "Migratory, common, arrives in May (Taylor); "West to the Rocky mountains" (Goss); Omaha (L. Skow); Peru, common—probably breeds (G. A. Coleman); Cherry county (J. M. Bates); Lincoln (F. J. Brezee); Omaha, "quite common migrant, earliest seen May 7, returning in latter August" (I. S. Trostler).

662. **Dendroica blackburniæ** (*Gmel.*).—BLACKBURNIAN WARBLER.

West Point, Omaha, (L. Bruner); "occasionally, in eastern Nebraska" (Aughey); "Migratory, rare" (Taylor); "West to the Great Plains" (Goss); North Platte, "transient visitor, common" (M. K. Barnum).

663*a*. **Dendroica dominica albilora** *Ridgw.*—SYCAMORE WARBLER.

"Migratory, rare, may breed in the state" (Taylor); "North to southern Michigan and northern Illinois, west to eastern Kansas and Texas" (Goss).

667. **Dendroica virens** (*Gmel.*).—BLACK-THROATED GREEN WARBLER.

Omaha, Florence, Weeping Water (L. Bruner); "Migratory, rare, has been seen in June" (Taylor); "west to the edge of the Great Plains (Goss).

671. **Dendroica vigorsii** (*Aud.*).—PINE-CREEPING WARBLER.

Sioux county (L. Bruner); "passes through Nebraska in early spring, and loiters here in autumn" (Aughey); "Migratory, rare, arrives in April and September" (Taylor); "West to the plains" (Goss).

672. **Dendroica palmarum** (*Gmel.*). — RED-POLL WARBLER; PALM WARBLER.

"Abundant in eastern Nebraska in early spring while passing north" (Aughey); "Migratory, abundant, arrives in April, May, September, and October" (Taylor); "migrating through the Mississippi valley, and wintering in the Gulf states" (Goss); Omaha (L. Skow).

673. **Dendroica discolor** (*Vieill.*).—PRAIRIE WARBLER.

Omaha, West Point (L. Bruner); "eastern Nebraska (Bull. No. 2, Div. Ornith.); "Abundant in eastern Nebraska, where it breeds" (Aughey); "Summer resident, common" (Taylor); "West into Nebraska and Kansas" (Goss); Omaha (L. Skow).

674. **Seiurus aurocapillus** (*Linn.*). — OVEN-BIRD; GOLDEN-CROWNED THRUSH.

West Point, Lincoln, Bellevue (L. Bruner); "rather abundant—breeds" (Aughey); "Summer resident, common, arrives in April" (Taylor); "West to

the base of the Rocky mountains" (Goss); Child's Point, Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); "quite common summer resident, arrives May 1 to 15, breeds June 1 to 20, departs latter August" (I. S. Trostler).

675. **Seiurus noveboracensis** (*Gmel.*).—WATER THRUSH.

"Occasionally met with in northeastern Nebraska, where, near Ponca, in Dixon county, I found the young, but never saw the nest" (Aughey); "Migratory, rare, probably arrives in May" (Taylor); Omaha—breeds (L. Skow).

675*a*. **Seiurus noveboracensis notabilis** (*Ridgw.*).—GRINNELL'S WATER THRUSH.

West Point, Sioux county, Lincoln (L. Bruner); "east into the Mississippi valley, straggling to Illinois, Indiana, etc." (Goss).

676. **Seiurus motacilla** (*Vieill.*).—LOUISIANA WATER THRUSH; LARGE-BILLED WATER THRUSH.

Southeastern Nebraska (Aughey); "is rare in Nebraska" (Bull. No. 2, Div. Ornith.); "Probably summer resident" (Taylor); "west to the edge of the Great Plains" (Goss); Omaha (L. Skow); Peru, common—breeds (G. A. Coleman); Omaha, "a rare summer resident and breeder" (I. S. Trostler).

677. **Geothlypis formosa** (*Wils.*).—KENTUCKY WARBLER.

"Rather common in southeastern Nebraska" (Aughey); "summer resident, common, probably arrive in May" (Taylor); "West to the edge of the Great Plains" (Goss); Omaha—breeds (L. Skow); Peru, rare—breeds (G. A. Coleman); Omaha, "one seen by G. W. Sabine, Nov. 28, 1895, in this city" (I. S. Trostler).

679. **Geothlypis philadelphia** (*Wils.*).—MOURNING WARBLER.

"Found in eastern Nebraska, and breeds in at least the southeastern part" (Aughey); "Eastern North America, west to the Great Plains" (Goss); Omaha (L. Skow).

680. **Geothlypis macgillivrayi** (*Aud.*). — MACGILLIVRAY'S WARBLER.

"Both Baird and Aughey mention this species as seen in extreme western Nebraska in the month of August" (Taylor).

681. **Geothlypis trichas** (*Linn.*).—MARYLAND YELLOW-THROAT.

West Point, Norfolk, Omaha, Lincoln, etc.—breeds (L. Bruner); "Common in Nebraska and breeds here" (Aughey); Omaha—breeds (L. Skow); Cherry county, Sept. 23 (J. M. Bates).

681*a*. **Geothlypis trichas occidentalis** *Brewst.*—WESTERN MARYLAND YELLOW THROAT.

West Point, Sioux county, Holt county (L. Bruner); "summer resident, abundant, arrives in April and has been seen as late as September" (Taylor); "East to the Mississippi valley" (Goss); Omaha—breeds (L. Skow); Peru,

common—breeds (G. A. Coleman); Gage county (F. A. Colby); "a quite common summer resident, arrives April 20 to May 10, breeds June 10 to 20, departs middle of September" (I. S. Trostler).

683. **Icteria virens** (*Linn.*).—YELLOW-BREASTED CHAT.

West Point, Omaha, Lincoln, Bellevue, Weeping Water, etc.—breeds (L. Bruner); "Found over the greater part of Nebraska, and breeding in at least the eastern part of the state" (Aughey); "Summer resident, abundant, arrives in May" (Taylor); "west to the edge of the Great Plains, north to southern New England, Ontario, Iowa, etc." (Goss); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county (F. A. Colby); "an abundant summer resident, arrives May 1 to Sept. 1, breeds May 26 to June 24, departs Sept. 1 to 10" (I. S. Trostler); Lincoln, May 12 (D. A. Haggard).

683*a*. **Icteria virens longicauda** (*Lawr.*).—LONG-TAILED CHAT.

"Summer resident, common, arrives in May and has been seen in September" (Taylor); "East to the eastern edge of the Great Plains" (Goss); Omaha—breeds (L. Skow); Lincoln, (F. J. Brezee).

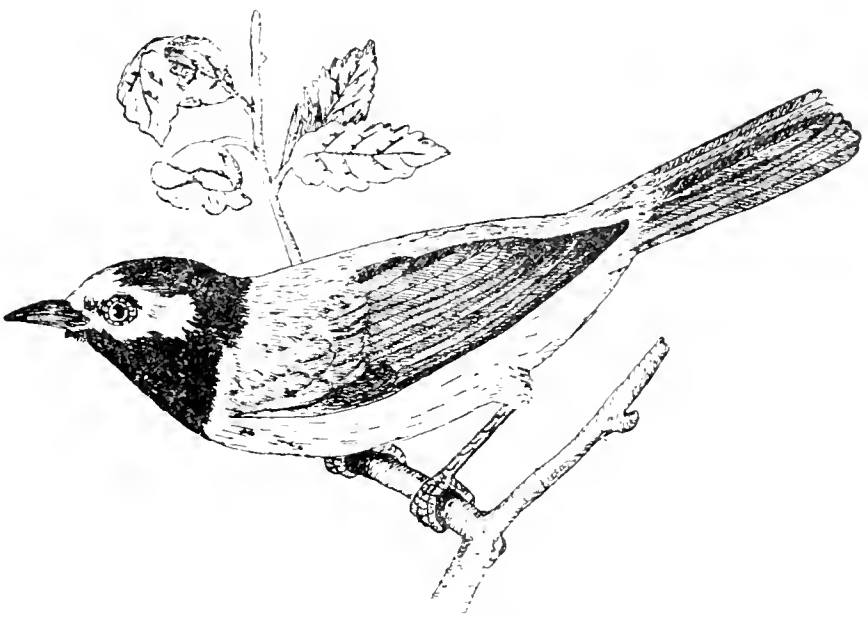


FIG. 47.—Hooded Warbler.

684. **Sylvania mitrata** (*Gmel.*).—HOODED WARBLER.

Southeastern part of the state (Aughey); "Summer resident, probably not uncommon, arrives in May, and has been seen as late as September" (Taylor); "west to eastern Nebraska and Texas" (Goss).

685. **Sylvania pusilla** (*Wils.*).—WILSON'S WARBLER; BLACK-CAPPED YELLOW WARBLER.

West Point, Omaha (L. Bruner); "Met sparingly in both eastern and western Nebraska" (Aughey); "Migratory, rare, arrive in May" (Taylor); "west to and including the Rocky mountains" (Goss).

686. **Sylvania canadensis** (*Linn.*).—CANADIAN WARBLER.

"Observed only during spring migration in eastern part of state" (Aughey); "Migratory, rare, arrive in May" (Taylor); "west to Minnesota, eastern Nebraska and Texas" (Goss).

687. **Setophaga ruticilla** (*Linn.*).—AMERICAN REDSTART.

West Point, Omaha, Blair, Bellevue, Lincoln, etc.—breeds (L. Bruner); "Common in the timbered river-bottoms of Nebraska, and breeding extensively" (Aughey); "Summer resident, common, arrive in May" (Taylor); "west to and including the Rocky mountains" (Goss); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county (J. M. Bates); Gage county (F. A. Colby); "a common summer resident, arrives May 1 to 10, breeds June 10 to 25, departs Sept. 1 to 15" (I. S. Trostler).

FAMILY **MOTACILLIDÆ**.—WAGTAILS.

697. **Anthus pensilvanicus** (*Lath.*).—AMERICAN PIPIT; TITLARK.

West Point, Lincoln (L. Bruner); Lancaster county (Aughey); "Migratory, rare, arrives in May and September" (Taylor); "The whole of North America" (Goss); Omaha (L. Skow); Omaha, "a common migrant April 10 to May 1, Sept. 20 to Oct. 10" (I. S. Trostler); Lincoln Oct. 19-25 (D. A. Haggard).

700. **Anthus spragueii** (*Aud.*).—SPRAGUE'S TITLARK; MISSOURI TITLARK.

West Point, Lincoln (L. Bruner); "One specimen mentioned by Baird" (Taylor); "Interior plains of North America, east to western Manitoba and eastern Kansas" (Goss); Omaha (L. Skow).

FAMILY **CINCLIDÆ**.—DIPPERS.

701. **Cinclus mexicanus** *Swains.*—AMERICAN DIPPER; WATER OUZEL.

White river in northwest Nebraska (L. Bruner); "Otoe county" (Aughey); "in August on the Niobrara about seven miles from its mouth" (Aughey).

FAMILY **TROGLODYTIDÆ**.—WRENS, THRASHERS, ETC.

Much could be written concerning the food-habits of the various members of this group of birds. Three of the species at least are known to be more or less destructive to fruits, viz., the Catbird, Brown Thrasher, and Mockingbird. Still if we take into account what these birds eat during the entire time spent within the state, the balance sheet stands in favor of the birds as insect destroyers.

The wrens are pre-eminently insect destroyers, and the others are not much behind them in this respect.

702. **Oroscoptes montanus** (*Towns.*).—SAGE THRASHER.

"Mentioned by Baird as collected in extreme western Nebraska" (Taylor); "Sage-brush plains of western United States" (Ridgeway); "east to Ft. Laramie and Black Hills" (Coues); Hat Creek valley, Nebr. (?) (L. Bruner).

703. **Mimus polyglottos** (*Linn.*).—MOCKINGBIRD.

Omaha, Bellevue, Weeping Water, Nebraska City, Lincoln, etc. (L. Bruner); "Rare in Nebraska" (Aughey); "Summer resident, formerly rare, but becoming common" (Taylor;) "north to Massachusetts, southern Iowa, southern Wyoming, etc." (Goss); Omaha (L. Skow).

The food-habits of the Mockingbird matter but little so far as this bird is concerned in the state of Nebraska, since it is not at all plentiful even in the extreme southeastern corner of the state. It is safe to assert, however, that the food of this bird includes an equally large per cent of insect life as that taken by either the Catbird or Brown Thrush.

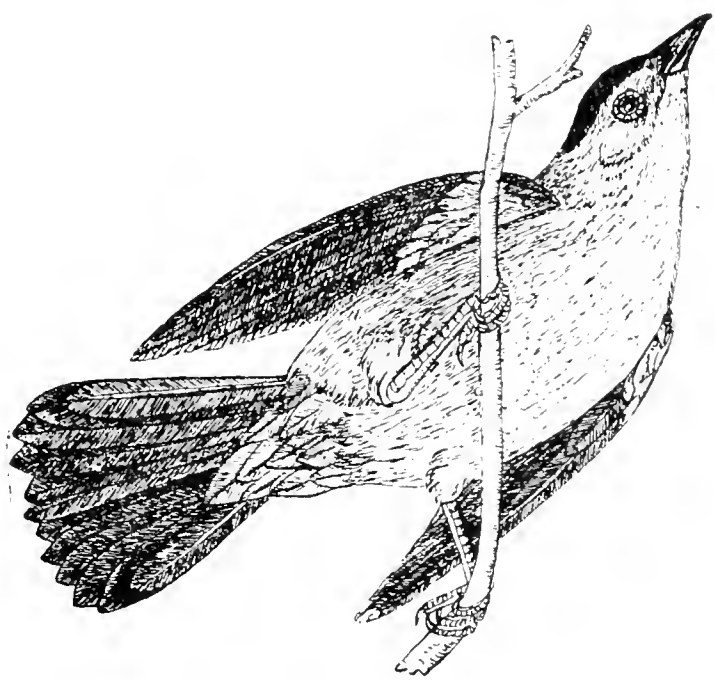


FIG. 48.—Catbird.

704. **Galeoscoptes carolinensis** (*Linn.*).—CATBIRD.

Entire state in suitable places—breeds (L. Bruner); "Abundant in the wooded portions of Nebraska" (Aughey); "Summer resident, abundant, arrives in April and May" (Taylor); "west to the western base of the Rocky mountains" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Peru, abundant—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "an abundant migrant and summer resident" (I. S. Trostler).

Professor S. A. Forbes, whom we have quoted quite extensively in this paper relative to the food-habits of different ones of our birds, says of the Catbird: "Remembering that the chief economical service of the Robin is done before and after the midsummer wealth of fruits tempts it from the chase of insects, we find it not unreasonable that the Catbird, coming later and departing earlier, scarcely anticipating the garden fruits in its arrival and disappearing when the vineyard and orchard are at their best, should be a much less useful bird than its companion. The credit I have given it must be still further reduced because of its serious depredations in the apple orchard. I have often seen it busily scooping out the fairest side of the ripest early apples, unsurpassed in skill and industry at this employment by the Red-headed Woodpecker or the Blue Jay."

The percentages of insect food taken by this bird for five months, as recorded by Forbes, are as follows, beginning with May and ending with September: 83, 49, 18, 46, 21, or an average of 43. Each farmer and fruit-grower can judge for himself as to what should be done with this bird. For my part I would protect, but chastise him.

705. **Harporhynchus rufus** (*Linn.*).—Brown Thrasher.

West Point, Holt county, Sioux county, Omaha, Lincoln, etc.—breeds (L. Bruner); "Abundant in Nebraska" (Aughey); "Summer resident, abundant, arrives in April and remains till October" (Taylor); "west to the Rocky mountains" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "an abundant summer resident, arrives April 5 to May 20, breeds May 21 to June 15, departs Sept. 15 to 30" (I. S. Trostler).

Although the Brown Thrush or Sandy Mockingbird is known to feed largely upon fruits, and even to take considerable corn and other grains, the per cent of insect food eaten by it during the time it is with us will amount to about 51. This, taken together with its reputation as a songster, will warrant us in abstaining from killing it. Especially will this be the case where we plant the Russian mulberry to supply in part the place of the more useful fruits.

715. **Salpinctes obsoletus** (*Say*).—Rock Wren.

Sioux county, West Point, Sidney (L. Bruner); "Frequent in Nebraska" (Aughey); "Summer resident, common" (Taylor); "east into western Iowa, middle Kansas, and Texas" (Goss); Cherry county—breeds (J. M. Bates).

718. **Thryothorus ludovicianus** (*Lath.*).—CAROLINA WREN.

Rulo (L. Bruner); Richardson county, "Only saw it once in Nebraska" (Aughey); southern Nebraska (Bull. No. 2, Div. Ornith.); "north to southern New England and southern Nebraska" (Goss).

FIG. 49.—Carolina Wren.

719. **Thryothorus bewickii** (*Aud.*).—BEWICK'S WREN.

"Rare in Nebraska" (Bull. No. 2, Div. Ornith.); Otoe county (Aughey); "north to New Jersey and Minnesota, west to the edge of the Great Plains and eastern Texas" (Goss).

719*b*. **Thryothorus bewickii bairdi** (*Salv. & Godm.*).—BAIRD'S WREN.

"Aughey speaks of finding a nest of *T. bewickii*, which were probably *T. bewickii bairdi*" (Taylor); "From middle Kansas, Colorado and Utah south" (Goss).

721. **Troglodytes aedon** *Vieill.*—HOUSE WREN.

West Point, Omaha, Lincoln, etc.—breeds (L. Bruner); "This species is abundant in Nebraska" (Aughey); Beatrice, De Witt—breeding (A. S. Pearse); Omaha—breeds (L. Skow); Gage county—breeds (F. A. Colby); "an abundant summer resident, arrives April 10 to 25, breeds May 25 to July 30, departs Sept. 1 to 15" (I. S. Trostler).

721*b*. **Troglodytes aedon aztecus** (*Baird*).—WESTERN HOUSE WREN.

West Point, Dawes county (L. Bruner); "common in Nebraska" (Bull. No. 2, Div. Ornith.); "abundant in Nebraska" (Aughey); "summer resident,

common" (Taylor); "east to Illinois" (Goss*); Peru, common—probably breeds (G. A. Coleman).

722. **Troglodytes hiemalis** *Vieill.*—WINTER WREN.

West Point, Blair, Omaha (L. Bruner); Lincoln (Aughey); "Winter resident, rare" (Taylor); "Eastern North America, west to the Rocky mountains" (Goss); Child's Point, Omaha (L. Skow); Peru, rare winter visitor (G. A. Coleman); Omaha, "a somewhat rare winter resident, arrives Oct. 1 and departs in early spring (I. S. Trostler).

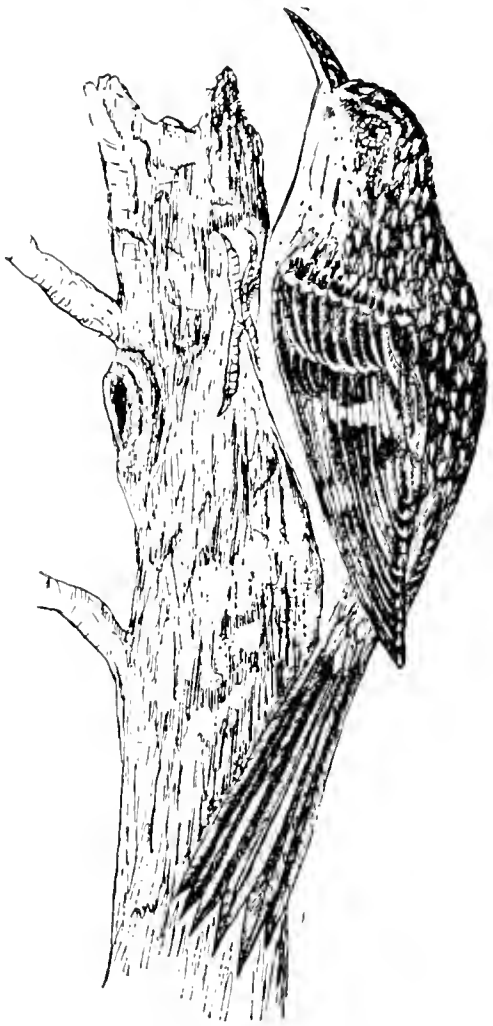


FIG. 50.—Brown Creeper.

724. **Cistothorus stellaris** (*Licht.*).—SHORT-BILLED MARSH WREN.

West Point, Omaha (L. Bruner); Dixon county, Nebraska—breeding (Aughey); "Summer resident, rare, probably arrives in May" (Taylor); "west to the Great Plains" (Goss); Omaha (L. Skow); "a rare summer resident, one pair observed June 2, 1894, at Cut-off lake near Omaha" (I. S. Trostler).

* See Goss, Birds of Kansas, p. 612.

725. **Cistothorus palustris** (*Wils.*). — LONG-BILLED MARSH WREN.

Lyons, Omaha, Tekamah, West Point (L. Bruner); "Only occasionally met with in the marshes along the Missouri" (Aughey); "Summer resident, rare, arrives in May" (Taylor); "west to the Rocky mountains" (Goss); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); "a common summer resident, arrives April 10 to 20, breeds June 20 to July 15, latest seen August 10" (I. S. Trostler); Lincoln, May 23 (D. A. Haggard).

FAMILY **CERTHIIDÆ**.—CREEPERS.

726. **Certhia familiaris americana** (*Bonap.*).—BROWN CREEPER.

West Point, Oakdale, Ponca, Rockport, Omaha, Lincoln, Rulo, etc. (L. Bruner); "Found a nest of this bird in a knot-hole, near Dakota City" (Aughey); "temperate North America, west to the Great Plains" (Goss); Omaha (L. Skow); a somewhat rare resident—breeds (I. S. Trostler); Lincoln, March 25 (D. A. Haggard).

726*b*. **Certhia familiaris montana** *Ridgw.*—ROCKY MOUNTAIN CREEPER.

Sioux county, Feb. 19, 1896 (L. Bruner, W. D. Hunter).

FAMILY **PARIDÆ**.—NUTHATCHES AND TITS.

The members of this family of hardy little birds feed for the most part on insects. But we lack very definite figures regarding the kinds and numbers of insects that each destroys. We can be sure, however, that any favors shown them will not be thrown away.

727. **Sitta carolinensis** *Lath.*—WHITE-BELLIED NUTHATCH.

West Point, Omaha, Lincoln (L. Bruner); "Recorded by the Normal Science Society as 'resident, common'" (Taylor); "resident west to the Rocky mountains" (Goss); Beatrice (A. S. Pearse); Omaha—breeds (L. Skow); Gage county (F. A. Colby); "quite common resident—breeds in June" (I. S. Trostler); Lincoln, March 23 (D. A. Haggard).

727*a*. **Sitta carolinensis aculeata** (*Cass.*).—SLENDER-BILLED NUT-HATCH.

Blair, Tekamah, Ponca (L. Bruner); "Frequently met with in the timbered tracts of eastern Nebraska" (Aughey); Sioux county, Dec. 12, 1895 (L. Bruner); "A rare resident in vicinity of Omaha—breeds" (I. S. Trostler); Sioux county, Feb. 19 to 26, fairly common (W. D. Hunter, L. Skow).

728. **Sitta canadensis** *Linn.*—RED-BELLIED NUTHATCH.

Lincoln (L. Bruner, B. Shimek, D. A. Haggard); Omaha (F. J. Brezee); "Occasionally in northeastern Nebraska" (Aughey); "Somewhat rare, has been

seen in June and September" (Taylor); "The whole of wooded temperate North America" (Goss); Sioux county, Feb. 25, 26, 1896 (L. Skow).

729. **Sitta pusilla** *Lath.*—BROWN-HEADED NUTHATCH.

Sioux county, Feb. 26, 1896, "a single specimen of a nuthatch with brown head seen but not obtained" (L. Skow).

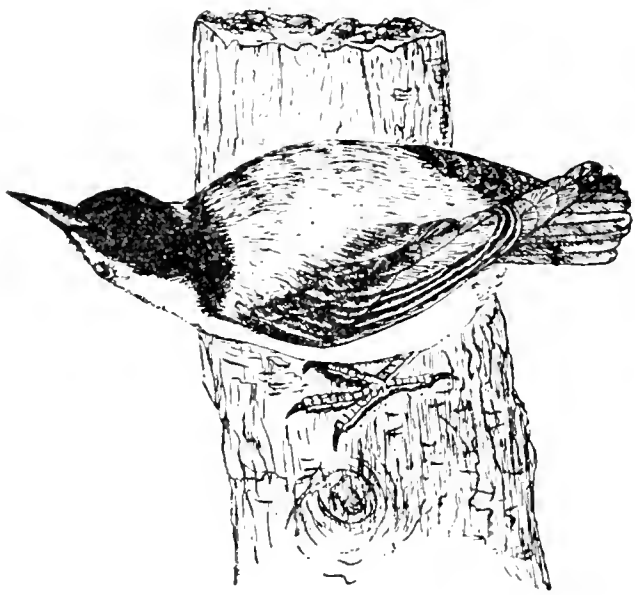


FIG. 51.—White-bellied Nuthatch.

730. **Sitta pygmæa** *Vig.*—PYGMY NUTHATCH.

Niobrara river in northern Nebraska (Aughey); Child's Point, Douglas county (L. Skow); Omaha, "a rare resident, breeds" (I. S. Trostler).

731. **Parus bicolor** *Linn.*—TUFTED TITMOUSE.

West Point, Omaha, Lincoln, Rulo, etc. (L. Bruner); "Abundant in eastern Nebraska" (Aughey); "Common in May and June, probably a constant resident" (Taylor); "north to New Jersey and southern Nebraska" (Goss); Peru, rare—may breed (G. A. Coleman); Omaha, "a rare resident, seen only in wilder parts" (I. S. Trostler); Rulo, April 18 (D. A. Haggard).

735. **Parus atricapillus** *Linn.*—BLACK-CAPPED TITMOUSE.

Omaha, Lincoln (L. Bruner); Lincoln (W. D. Hunter); "Resident, common" (Taylor); "west to the edge of the Great Plains" (Goss); De Witt (A. S. Pearse); Ft. Robinson, Sioux county, Dec. 13, 1895 (L. Bruner); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); Gage county—breeds (F. A. Colby); "an abundant resident, breeds April 22 to May 25" (I. S. Trostler).

735*a*. **Parus atricapillus septentrionalis** (*Harris*).—LONG-TAILED CHICKADEE.

West Point, Tekamah, Sioux county, Lincoln—breeds (L. Bruner); "Very abundant in eastern Nebraska" (Aughey); "Resident, common" (Taylor);

"east to eastern Kansas and Manitoba" (Goss); Ft. Robinson, Sioux county, Dec. 13, 1895 (L. Bruner); Omaha—breeds (L. Skow); Cherry county—breeds (J. M. Bates); "a not rare resident, commoner in winter" (I. S. Trostler); Sioux county, Feb. 19 to 27, common (W. D. Hunter, L. Skow); Lincoln, March 3 (D. A. Haggard).

738. **Parus gambeli** *Ridgw.*—MOUNTAIN CHICKADEE.

"Mentioned by Baird as collected in August" (Taylor).

740. **Parus hudsonicus** *Forst.*—HUDSONIAN CHICKADEE.

On Dec. 13, 1895, a bird was seen by me about nine miles northwest of Ft. Robinson that was probably this species (L. Bruner).

FAMILY **SYLVIIDÆ.**—WARBLERS, KINGLETS, GNATCATCHERS.

748. **Regulus satrapa** *Licht.*—GOLDEN-CROWNED KINGLET.

West Point (L. Bruner); Lincoln (W. D. Hunter); "Abundant during some years in northern Nebraska" (Aughey); "eastern and northern North America" (Goss); Omaha (L. Skow); Omaha, "a quite common winter resident, arrives Oct. 1 to 15, departs March 5 to 20" (I. S. Trostler); Long Pine, April 9, 1896 (J. M. Bates).

749. **Regulus calendula** (*Linn.*).—RUBY-CROWNED KINGLET.

West Point, Lincoln, Omaha (L. Bruner); "Only occasionally met with in Nebraska" (Aughey); "Migratory, rare, arrive in April and May" (Taylor); "North America" (Goss); Omaha (L. Skow); Peru, common migrant (G. A. Coleman); Omaha, "a not rare winter resident—dates same as preceding species" (I. S. Trostler).

751. **Polioptila cærulea** (*Linn.*).—BLUE-GRAY GNATCATCHER.

West Point (L. Bruner); eastern Nebraska (Aughey); "Has been seen in April and June, probably breeds in the state" (Taylor); "United States, chiefly south of 42°" (Goss); Peru, common—probably breeds (G. A. Coleman); "a rare summer resident, two were seen Sept. 10, 1895, in north part of Sarpy county" (I. S. Trostler).

FAMILY **TURDIDÆ.**—THRUSHES, SOLITAIRES, BLUEBIRDS, ETC.

The thrushes are all beneficial as insect destroyers, and might be well compared with the Robin, which is described quite fully beyond, only they are even less liable to commit injuries to fruits.

754. **Myadestes townsendii** (*Aud.*).—TOWNSEND'S SOLITAIRE.

Niobrara river (Aughey); Alda (Powell); southeastern Nebraska (Hall); "east to Dakota and Texas" (Goss); Sioux county, Feb. 19, 1896 (L. Skow).

755. **Turdus mustelinus** *Gmel.*—WOOD THRUSH.

West Point, Omaha, Lincoln, Bellevue (L. Bruner); "Abundant in all the woodlands of eastern Nebraska" (Aughey); "Summer resident, abundant,

arrives the first of May, and has been found as late as October" (Taylor); "north to Massachusetts, Ontario, Wisconsin, and eastern Dakota" (Goss); Beatrice (A. S. Pearse); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Gage county—breeds (F. A. Colby); "a quite common summer resident—breeds" (I. S. Trostler).

756. **Turdus fuscescens** *Steph.*—Wilson's Thrush.

West Point, Omaha (L. Bruner); "Occasionally in Nebraska, especially in the southeastern part of the state" (Aughey); "Migratory, rare, arrive the first of May" (Taylor); "west to the plains" (Goss); "a rare summer resident, a pair seen in East Omaha, in thicket, May 22, 1894, where they probably bred" (I. S. Trostler).

757. **Turdus aliciæ** *Baird.*—Gray-cheeked Thrush.

"Migratory, rare, arrive in May" (Taylor); "eastern and northern North America, west to the Rocky mountains" (Goss); "west to the plains (A. O. U. Check List).

758*a*. **Turdus ustulatus swainsonii** (*Caban.*).—Olive-backed Thrush.

West Point, Omaha, Lincoln (L. Bruner); "Abundant in eastern Nebraska" (Aughey); "Migratory, common, arrive in May" (Taylor); "west to and including the Rocky mountains" (Goss); Omaha (L. Skow); Valentine and Long Pine (J. M. Bates); "migratory, rare, one flock and well observed Sept. 16, 1895, near Papillion" (I. S. Trostler).

759*b*. **Turdus aonalaschkæ pallasii** (*Caban.*). — Hermit Thrush.

West Point, Omaha, Lincoln (L. Bruner); Alda—breeds (Bull. No. 2, Div. Ornith.); "Have seen a few of this species in eastern Nebraska" (Aughey); "west casually to the Great Plains" (Goss); Fairbury (M. L. Eaton); Omaha (L. Skow).

761. **Merula migratoria** (*Linn.*).—American Robin.

All of Nebraska—breeds (L. Bruner); "Resident, abundant" (Taylor); "Not abundant in Nebraska, but slowly increasing" (Aughey); "Northern and eastern North America" (Goss); Beatrice, De Witt—breeding (A. S. Pearse); Beatrice, De Witt—nesting (A. S. Pearse, F. A. Colby); Omaha—breeds (L. Skow); Peru, common—breeds (G. A. Coleman); Cherry county—breeds and sometimes winters (J. M. Bates); Gage county—breeds (F. A. Colby); "an abundant resident except in coldest winters, breeds April 23 to June 20" (I. S. Trostler).

The Robin has certainly been accused often enough of being a first-class rascal to warrant the belief that there must be at least some grounds for such accusations being made.

In his examination of 114 stomachs of this bird, taken during ten

months of the year, Professor Forbes, of Illinois, found the contents to consist of 65 per cent insects and 34 per cent of fruits and seeds.

In the estimates of these food percentages taken by the Robin, as well as by other birds, bulk for bulk is taken, *i. e.*, a quart of caterpillars or other insects is equivalent to a quart of cherries or a quart of berries.

Professor Forbes asks this question: "Will the destruction of seventeen quarts of average caterpillars, including at least eight quarts of cut-worms, pay for twenty-four quarts of cherries, blackberries, currants, and grapes?" and then answers it in these words: "To this question I, for my own part, can only reply that I do not believe that the horticulturist can sell his small fruits anywhere in the ordinary markets of the world at so high a price as to the Robin, provided that he uses proper diligence that the little huckster doesn't overreach him in the bargain."

Much more might be said in favor of this bird had I the time and space at my command.

761*a*. **Merula migratoria propinqua** *Ridgw.*—Western Robin.

"Western United States, north to British Columbia, east to the eastern edge of the Great Plains" (Goss).

766. **Sialia sialis** (*Linn.*).—Bluebird.

West Point, Omaha, Lincoln, etc.—breeds (L. Bruner); "Resident, abundant". (Taylor); "Abundant in Nebraska" (Aughey); "west to base of Rocky mountains" (Goss); Beatrice, De Witt (A. S. Pearse); Omaha—breeds (L. Skow); Peru—breeds (G. A. Coleman); Cherry county (J. M. Bates); Gage county—breeds (F. A. Colby); "a common summer resident, breeds May 1 to July 15, departs Sept. 20 to Oct. 15" (I. S. Trostler); Lincoln, March 23 (D. A. Haggard).

767. **Sialia mexicana occidentalis** (*Towns.*).—Western Bluebird.

"Once on the Niobrara" (Aughey).

768. **Sialia arctica** *Swains.*—Rocky Mountain Bluebird.

Sioux county, Dawes county—breeds, Sidney, Pine Bluffs (L. Bruner); Western Nebraska (Aughey, Baird); "east into Dakota and Texas" (Goss).*

* Persons wishing to take up the study of our birds systematically will find Ridgeway's "Manual of North American Birds" indispensable.

APPENDIX.

THE BIRD LAW OF NEBRASKA.

(Consolidated Statutes of Nebraska, Cobbey, 1891, and Sessions Laws of 1893 and 1895.)

SEC. 5664. It shall be unlawful for any person in the state of Nebraska to knowingly and intentionally kill, injure, or harm, except on the lands owned by such person, any robin, lark, thrush, blue-bird, king-bird, sparrow, wren, jay, swallow, turtle-dove, oriole, woodpecker, yellowhammer, cuckoo, yellow-bird, bobolink, or other bird or birds of like nature that promote agriculture and horticulture by feeding on noxious worms and insects, or that are attractive in appearance or cheerful in song. Any person violating any of the provisions of this section shall be fined not less than three (3) nor more than (10) dollars for each bird killed, injured, or harmed.

SEC. 5666. (As amended in Session Laws, 1893.) It shall also be unlawful for any person, at any time, by the aid or use of any swivel, punt gun, big gun (so called), or any other than the common shoulder gun; or by the aid or use of any punt boat, or sneak boat used for carrying such gun, to catch, kill, wound, or destroy, or to pursue after with intent to catch, kill, wound or destroy, upon any waters, bays, rivers, marshes, mud flats, or any cover to which wild fowl resort within the state of Nebraska, any wild goose, wood duck, teal, canvas-back, blue-bill, or other wild duck, or to destroy or disturb the eggs of any of the birds above named; and any person offending against any of the provisions of this act shall be fined in any sum not less than two ($2) dollars, nor more than twenty ($20) dollars, for each offense, or be imprisoned in the county jail not more than twenty (20) days.

SEC. 5667. (In part.) It shall be unlawful for any person to kill, ensnare, or trap any grouse between the first day of January and the first day of September in each year, or to kill, ensnare, trap, or net quail or wild turkey between the first day of January and the first day of October in each year, or to ensnare, trap, or net the same at any time of the year, or to buy, sell, ship, transport, or carry, or have

in possession any such animals or birds, between the dates within which the killing, ensnaring, trapping, or netting of such animals or birds is prohibited by law. It shall also be unlawful for any person, agent, or employee of any association, corporation, railroad company, or express company to receive, carry, transport, or ship any such animal or bird at any time of the year. It shall be unlawful for any person to go upon the premises of another person or corporation for the purpose of hunting, trapping, netting, ensnaring, or killing any animal or bird at any season of the year, unless by the consent of the owner or owners of said premises. It is further enacted that any person, agent, or employe, as aforesaid, who shall violate any provision of this section shall be deemed guilty of a misdemeanor, and upon conviction thereof shall pay a fine of fifteen ($15) dollars for each * * * wild turkey so as aforesaid killed, trapped, ensnared, netted, bought, sold, shipped, transported, or held in possession in violation of this section, and the sum of five ($5) dollars for each grouse or quail so as aforesaid killed, trapped, ensnared, netted, bought, sold, shipped, transported, or held in possession in violation of the provisions of this section. Having in possession any of the named animals or birds between said dates shall be deemed and taken as presumptive evidence that the same were killed, ensnared, netted, or trapped in violation of this section, and the civil authorities of any city, town, or precinct where any animal or bird shall have been killed, or held in possession in violation of law be found, are hereby authorized to cause the same to be seized with or without warrant, and to be distributed among the poor persons of such city, town, or precinct; and any person who shall go upon the land of another, in violation of this section, shall, upon conviction thereof, pay for such offense in any sum not less than five ($5) dollars, nor more than fifty ($50) dollars, and shall be liable to the owner of the premises in an action for trespass.

Also "An act to protect Mongolian pheasants" (Session Laws, 1895, Senate File No. 38):

Be it Enacted by the Legislature of the State of Nebraska:

SECTION 1. It shall be unlawful for any person in the state of Nebraska for and during the term of six years from and after the passage of this act, to injure, take, kill, expose or offer for sale or have in possession, except for breeding purposes, any ring-neck Mongolian

pheasant, any green Japanese pheasant, any copper pheasant, or scholmeringn, any tragopan pheasant, silver pheasant or golden pheasant, being the species of pheasants imported into the United States by the Hon. O. N. Denny, ex-United States consul-general to Shanghai, China.

SEC. 2. Any person violating the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than fifty ($50) dollars nor more than one hundred ($100) dollars, and in default of payment of the fine imposed shall be imprisoned in the county jail at the rate of one day for each two dollars of the fine imposed.

SEC. 3. The one-half of all fines imposed and collected under the provisions of this act shall be paid to the informer, and the rest into the county treasury of the county in which the crime was committed.

SEC. 4. Justice courts shall have jurisdiction of the offenses defined in this act.

SEC. 5. Whereas an emergency exists, this act shall take effect and be in force from and after its passage.

Approved March 30th, A. D. 1895.

INDEX.

OBSERVATIONS ON SOIL MOISTURE.

R. A. EMERSON.

During the past summer, the Department of Horticulture of the University of Nebraska conducted some experiments to show the amount of water retained in garden and orchard soils by different modes of treatment.

To determine the per cent of moisture in the soil, small samples of the soil were taken and the water driven off by heat. In every case soil samples were taken at the depths of six, twelve, and twenty inches, the samples from these three depths forming a "set." In every case two sets, and in some cases three sets, were taken at the same time in different parts of the plot whose moisture was to be determined. The average of these six or nine samples is taken as representing approximately the per cent of moisture of the first twenty-four inches of the soil of the whole plot at the time of taking the samples, and these averages are alone given in all the per cents of moisture below.

CULTIVATION VS. SEEDING OF ORCHARDS.

The apple orchard on the Experiment Station farm was divided lengthwise into three parts, each part being about eight rods wide. The middle part was plowed in the spring, and was cultivated to a depth of about four inches about every two weeks during the summer, eleven cultivations in all. The part of the orchard on one side of this cultivated part was left in grass and weeds. This part was mowed two times during the summer. The part of the orchard on the other side of the cultivated part was also left in grass and weeds, but was used as a hog pasture. The hogs kept the weeds down fairly well.

On August 26 and October 19 the per cent of soil moisture was determined, as above described, for each of these parts of the orchard, nine samples being taken from each part on each date. The per cent of moisture of each part is given in the diagrams (Figs. 1 and 2). The difference in moisture in favor of the cultivated part is even more

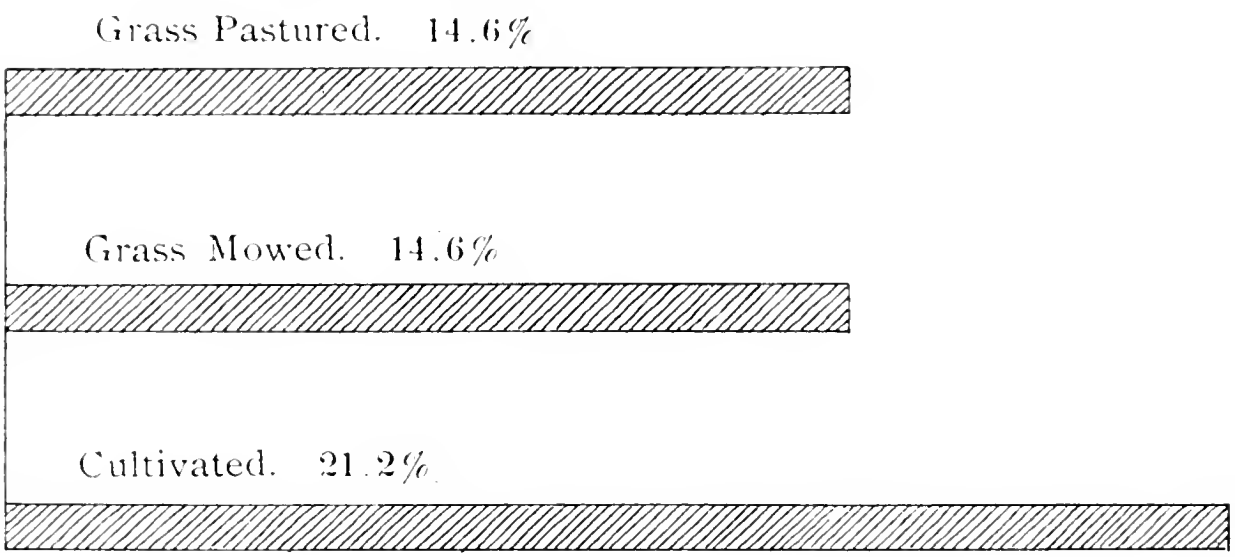


FIG. 1. Shows the per cent of moisture in the three parts of the orchard on Aug. 26, '95. $\frac{1}{6}$ inch = 1%.

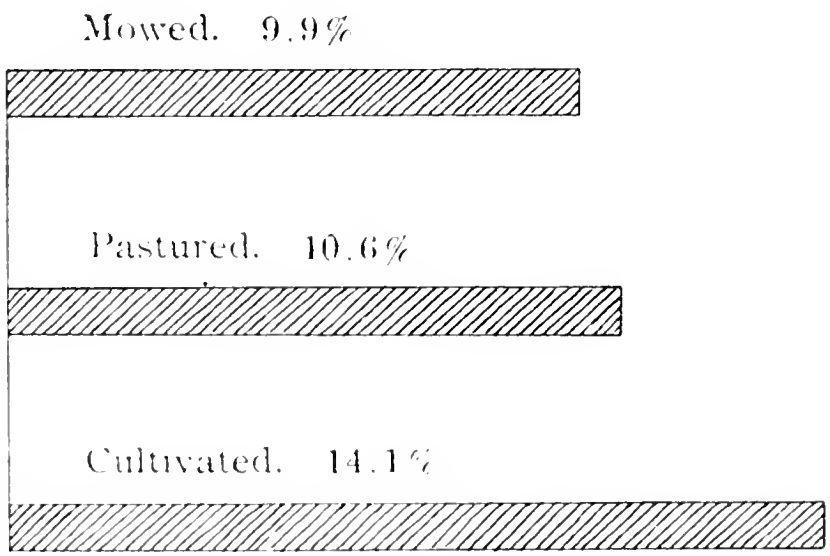


FIG. 2. Shows per cent of water in the three parts of the orchard on Oct. 19, '95. $\frac{1}{6}$ inch = 1%.

marked when the six-inch samples are considered alone. The influence of cultivation was felt, however, quite strongly even at the depth of twenty inches.

GARDEN SOIL—CULTIVATED, UNCULTIVATED, MULCHED—IN GRASS.

In order to get more uniform conditions than could be had in the orchard, three small plots were laid out in the garden. The garden was plowed to a medium depth early in the spring. On June 6 a mulch of coarse horse manure was spread on one plot. The mulch was three inches thick after having settled for two months. Another plot was cultivated about three inches deep, on an average once in two weeks during the summer. A third plot was left uncultivated. The weeds were cut off at the surface of the ground with a sharp hoe as soon as they appeared. The three plots together covered a space about three rods long by two rods wide. Adjoining these plots was the head-land of the garden, a strip about one rod wide, covered with an old, thick June grass sod. Next to this was a field of alfalfa two years old. The land here was quite level. This, together with the small size of the plots, rendered the conditions of the five plots quite uniform.

Determinations of the soil-moisture of these plots was made June 15, June 25, July 27, and September 6. Two sets (six samples) gave the average per cent of moisture for each plot at each date. The results are shown by the curves (Fig. 3). It will be seen that the mulched plot gave the highest and most uniform per cent of water. The cultivated plot came next, and the uncultivated third. The alfalfa and June grass gave very much lower per cents of moisture. On June 15 and June 25, the samples twenty inches deep gave almost no difference in per cent of water between the plots cultivated, uncultivated, and mulched. This was no doubt because the mulch had been applied so recently. By July 27 the effect of the cultivation and mulch was readily seen in the twenty-inch samples.

POTATOES—MULCHED VS. CULTIVATED.

A small plot of potatoes was mulched with three inches of straw at the time of planting. Another plot was given shallow cultivation. On June 25 the per cent of water in the cultivated plot was 19.6; in the mulched plot, 21.6.

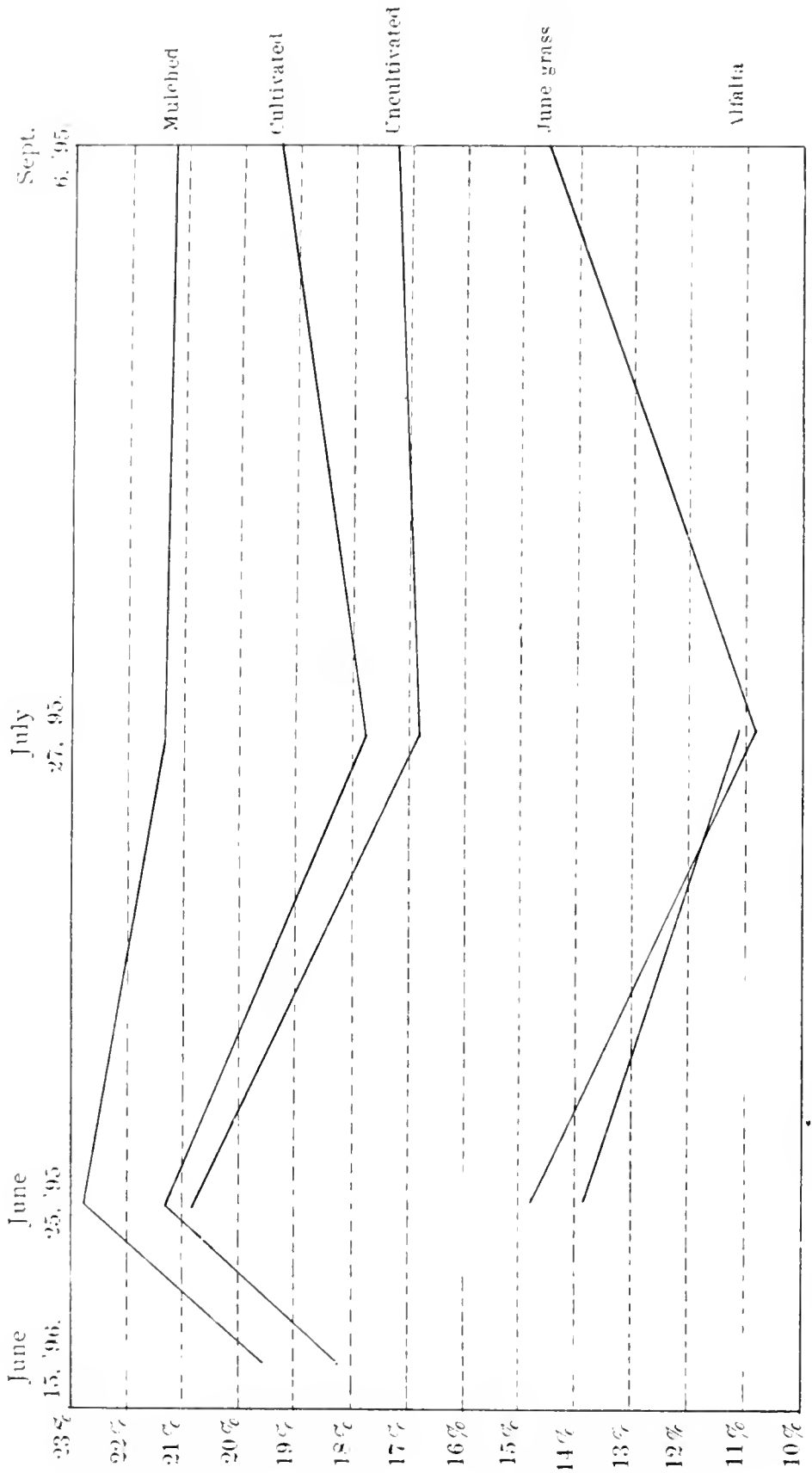


FIG. 3. Showing the per cent of water in soil June 15, June 25, July 27, and Sept. 6, 1895, in plats mulched, cultivated, uncultivated, June grass, and in alfalfa.

FALL PLOWED—SPRING PLOWED—UNPLOWED.

A piece of garden soil cultivated thoroughly without plowing for two years contained, on April 23, 18.9 per cent of water. A strip of garden near by, plowed early in the spring, contained, at the same date, but 16.6 per cent of water. On June 15 the strip plowed in the spring contained 18.4 per cent of water. The strip cultivated without plowing contained 21.5 per cent of water. And a third strip, near the others, plowed late the fall before, contained 20.3 per cent of water.

WIND-BREAKS.

By Forest Trees.

Several series of samples were taken to determine the effect wind-breaks have in checking the evaporation of water from the soil. On November 5 a series of samples was taken in a field north of a belt of forest trees, consisting of five rows of soft maple nearly thirty feet high and ten rows of catalpa about twenty feet high. The trees were from four to six feet apart in the rows, and the rows were about eight feet apart. There were very few branches near the ground. The field north of these trees had grown a crop of corn, but this had been cut and removed from the field. Duplicate sets of samples were taken every two rods, beginning one rod from the trees and going fifteen rods into the field. The averages of the six samples taken at each distance from the trees are given in the diagram (Fig. 4). It will be seen that there is a general decrease in per cent of water as the distance from the trees increases, excepting the irregularity at the distance of seven rods from the trees. The decrease in per cent of moisture is noticable for the first ten rods from the trees. From that point on the per cent is quite uniform.

It must be remembered, first, that the trees made by no means a model wind-break, having but few limbs low down; second, the corn grown on the field probably acted as a wind-break itself. The corn, by checking the wind, would probably protect the interior part of the field more than the part near the trees. The trees, on the other hand, would naturally be expected to protect most the part of the field nearest them. The two wind-breaks, while in no sense destroying each other's effect, yet would give more uniform protection to the field and thus make the effect of either wind-break less easy to be determined.

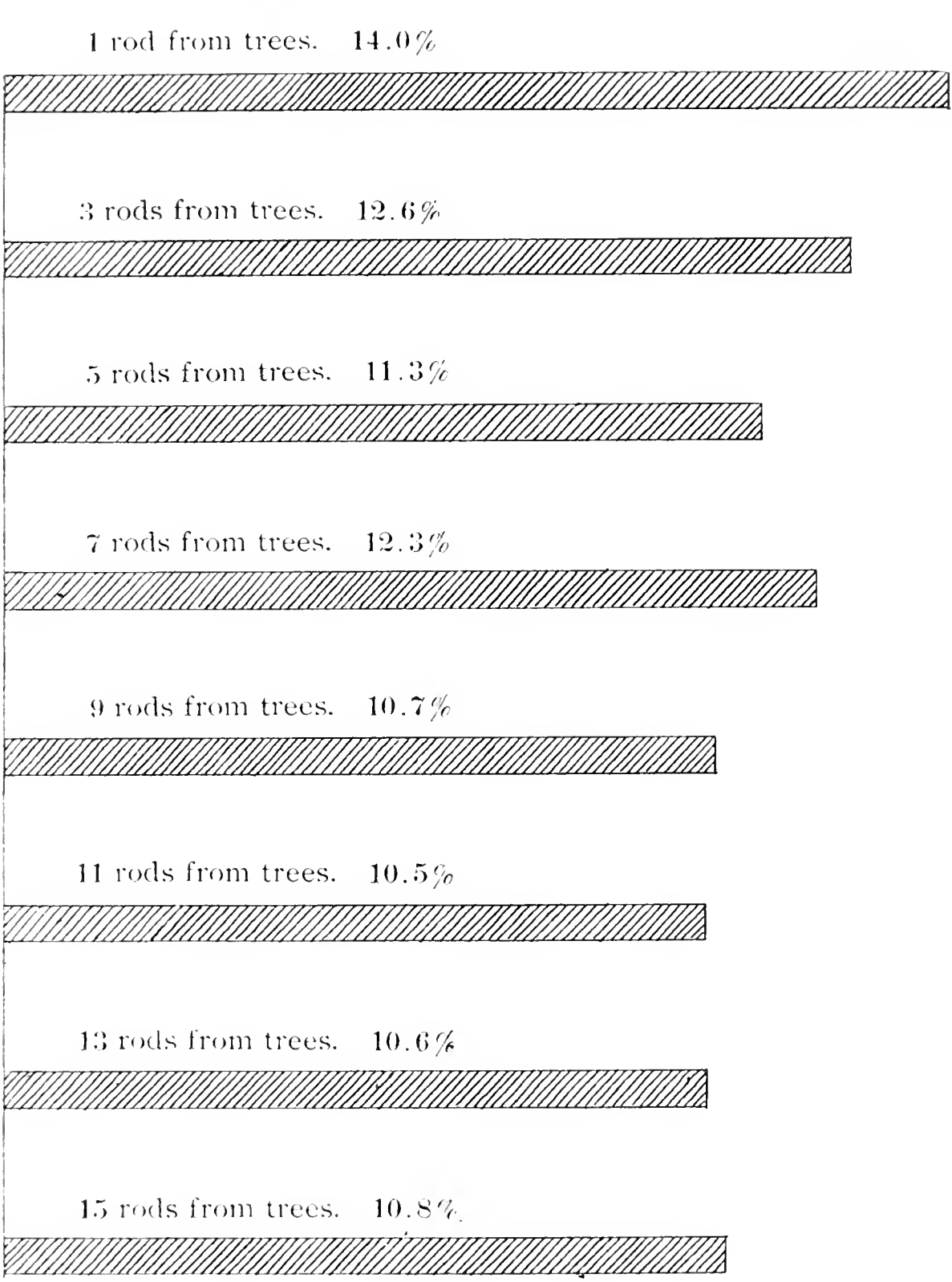


FIG. 4. Showing per cent of water in soil at increasing distances from several rows of forest trees. ¼ inch = 1%

Nov. 5, '95.

By Hedges.

During the month of September one series of samples was taken south and three series were taken north, of osage orange hedges. The hedges were about five feet high and in some places not very thick, some of the trees having died out. Although there was considerable variation in per cent of moisture at different distances from the hedges, yet there was no uniformity in the variation. The per cent of moisture at any point seemed to have no relation to the distance of that point from the hedge.

SMALL FRUITS IN DODGE COUNTY.

J. W. STEVENSON.

The drouth of 1894 and the dry, freezing winter following the drouth, have very seriously injured the plants and yield of nearly all small fruits. The frosts of May destroyed the principal part of the fruit on plants that survived the winter. Grapes, raspberries, blackberries, and strawberries were almost a failure in yielding a crop. Currants, juneberries, gooseberries, and cherries have yielded a partial crop. We will speak of some of these varieties more particularly.

STRAWBERRIES.

The drouth of 1894 and dry winter destroyed most of the plants, and those surviving were feeble plants. Where irrigated they grew finely and came through the winter in a healthy, thrifty condition. If we had commenced irrigating earlier in 1894 we would have had a better stand of plants, more uniform growth, and would no doubt have had still greater confidence in irrigating strawberry plants. We had doubts about the beneficial effect of water pumped from the well and applied directly to the plants, but soon discovered that the plants thrived the best where the most water was used. Many said that cold water would kill the plants, and that a reservoir or tank should be used to warm the water, but we are satisfied it was not necessary. The irrigation of the plants early in the spring, even before the frost was all out of the ground, was very beneficial. The prospects for an abundant crop were very flattering till the frosts of May cut short the

crop fully two-thirds. We had a fair crop on some plants we covered with the mulching that laid between the rows, but the covering and uncovering for ten or twelve days (as was the case this season) was a tedious operation, injuring the blossoms some and hindering their pollenization; the mulching seemed to wear out with so much handling and did not cover the plants as well as at first. If plants only required to be protected from one or two frosts as in May, 1894, protection in this manner would be very successful if enough of the material was on hand. Another season we will have plenty of material for covering plants conveniently placed where it can be quickly spread over the plants when there is danger of frost, if we are *not caught napping.*

Varieties whose foliage covered the fruit stems escaped the frost the best, while some varieties, such as Captain Jack and Mount Vernon, that push their fruit stems above the foliage, had nearly all their berries and blossoms frozen. Late sorts, like Wolverton, Saunders, Mrs. Cleveland, Stayman No. 1, and Great Pacific, blossomed freely after the frosts and bore a light crop of nice berries. The Warfield and Bederwood yielded the most fruit, and the former is certainly worthy of first place on the list. It is a good shipper, excellent quality, bears early and late, and abundantly. Bederwood and Enhance are our best fertilizers, the first for early, and the latter for early and late sorts. Saunders, Wolverton, and Parker Earl are good late fertilizers only. We think it advisable to plant both early and late fertilizers in same field, alternating the rows.

Bubach No. 5 has made a poor record the past two years in blossom and fruit, and must be discarded if it does not redeem itself next season. Of some of the newer sorts, Eureka, Dayton, Greenville, and Robinson give excellent promise.

RASPBERRIES.

Raspberries suffered severely by the drouths of last year and the past winter. A timely rain in the spring induced a vigorous growth which blossomed freely, but the May frosts destroyed nearly all of these blossoms. The Gregg blossomed after the frosts and yielded some fruit. We plant blackcap sorts in the apple tree rows of our orchard, running north and south. They are shaded some in this way from the sun, summer and winter, and we find they are injured

less than those exposed without shelter. Red sorts are a nuisance in an orchard and cannot be controlled by plowing out unnecessary suckers.

BLACKBERRIES.

Blackberries have yielded very little fruit for two years. Drouths and frosts have killed many of the plants and all the fruit. We find by experience they should be planted on the lowest ground, or where they can have sufficient moisture. The Snyder canes will usually stand the severest winters if the roots are in moist soil.

JUNEBERRIES.

Juneberries yielded an immense crop of juicy, plump berries. Neither drouth nor frosts of May seem to have had any injurious effect on them. They always yield a crop, and no variety of fruit is so easily cared for or yields so much very good fruit for the amount of labor spent on them. They are emphatically the lazy man's fruit, and their existence renders the laziest man without excuse for not having plenty of fruit.

CURRANTS AND GOOSEBERRIES.

The frosts of May curtailed the crops of these fully one-half. All sorts seemed to yield equally well and were equally injured by the frosts. The young plants of Fay's Prolific yield better than the old plants. The quality of fruit is fine, but the bushes are short-lived and of inferior growth. The North Star is prolific and a vigorous grower, but the berries are not as large as we would wish.

GRAPES.

For two years the grape blossoms have been killed by frosts, and many of the vines, three to ten years old, have been killed by drouth and winter freezing. Many of the vines now alive grow feebly. All varieties have suffered, though some sorts more than others. Planters are discouraged about grape growing and are disposed to invest but little in this fruit. As drouth more than freezing is to blame for this heavy loss of vines, we must seek the most successful method of overcoming this difficulty. We would recommend thorough cultivation during the summer and irrigation if possible, when needed in summer and fall, and mulching of the ground during fall and winter. The roots should freeze up in moist earth and tops be covered, after pruning, with mulching or earth.

REPORT FROM RICHARDSON COUNTY.

G. A. SLAYTON.

The year 1895 was not a very favorable one for the fruit-growers of Richardson county. The crop was far below an average one, both in quantity and quality, for nearly all kinds of fruits. The exceptions to the rule were in plums and peaches. The planting of plums has never been very extensive, but those who were fortunate enough to have trees of bearing age in 1895 received a good reward for their previous efforts in this direction, as the fruit was abundant and of good quality.

There are no extensive peach orchards in our county, and most of the trees we have are seedlings, only a very few of the better budded sorts having been planted; but trees of all varieties were loaded to the breaking down point, and the quality of the fruit was good, considering the varieties and healthfulness, or rather unhealthfulness, of the trees. Many of the trees were old and nearly ready to fall down from age and decay. More interest is being taken in peaches by our fruit raisers, and we believe the indications are that the planting of peach orchards on a more extended scale is a feature of the near future.

The cherry crop was a light one, a few varieties in favored localities only producing a full crop.

The lack of rainfall and consequent lack of moisture in the soil for three successive years has had very disastrous effect upon the small fruit plantings. Many patches of strawberries and raspberries have died out and the new plantings have been few and not very successful. The one good rain of May 30 caused excellent fruit on such strawberry vines as were in good condition, but the supply of fruit was meager, owing to scarcity of vines. Raspberries, blackberries, dewberries, and currants all suffered from drouth, and the crop was light.

Our grape crop was the nearest to a failure we have experienced in many years. Very little good fruit produced.

Our greatest disappointment in the fruit line was our apple crop.

During the early part of the season it seemed quite promising, and of some early varieties and medium early ones, as Early Harvest and Oldenburg, a fair yield was obtained and the quality was good, but of course the market price was not so favorable. Later the effect of dry weather, hot and high winds, and above all the ravages of the codling moth began to appear, and by the beginning of September the prospects for a crop of winter varieties was ebbing rapidly, and a month later, when the harvest time was fully come, not one bushel of good fruit was to be found where sixty days previous a score of bushels was seemingly a certainty. Many farmers who had expected to have a hundred or more bushels to sell had not enough for family use. Most of the crop had become windfalls, and they decayed so rapidly that very few were utilized in any way, even in the production of cider for vinegar. A few good apples were obtained from young orchards bearing first crops, especially where protected on the south by location of ground and wind-breaks. The varieties which gave the best results were the Winesap, Missouri Pippin, Little Romanite, and Ben Davis.

Only a few of our fruit-growers have given any attention to spraying for any purpose, and those who have, mostly only for the codling moth. During 1895, owing to the scarcity and inconvenience of the water supply, spraying was neglected, perhaps more generally than heretofore, which may account in part for our shortage in apples.

REPORT OF THE FRUIT CROP OF EAST CENTRAL NEBRASKA.

G. A. MARSHALL.
(Stenographic report.)

MR. PRESIDENT: I have not prepared any written report. I took it from the program that you wanted a report of the crop of the past season, consequently I am not prepared to say anything concerning the prospect for next year. Our fruit crop the past season has been very satisfactory considering everything, although some varieties of the small fruits have been a total failure, and among these is the strawberry. The main cause was that we had no strong plants. What few strawberry plants had survived the severe drouth of the year before had but very little life to begin with, and then they were injured by late killing frosts.

The raspberry crop was about 30 per cent of a full crop. They were injured to some extent by the winter, and badly injured by the late frosts. These causes combined reduced the crop to the percentage given.

The blackberry crop was a total failure; were not worth picking in any blackberry patch in Washington county that I heard of. I do not know the cause; they simply didn't blossom. In a great many instances the briers were not killed down during the winter; they leaved out well, but we had no blossoms. We took it for granted that it was the effects of the severe drouth, although I do not know that to be the cause.

The currant crop was about 60 per cent, and the gooseberry crop about 50 per cent. The juneberry crop was 100 per cent; that is always 100 per cent.

The grape crop was about 30 per cent. The vines had been injured by the dry weather, and this followed up by the work of the borers left our vines in very poor shape. Then this frost that I have spoken of cut them down to about 30 per cent.

The cherry crop was immense, there being no variety that failed. Even the Late Richmond gave us a good fair crop, and the Early Richmond and English Morello were just weeping with cherries. The plum crop was about the same as the cherries—a very full crop and very satisfactory, although some of the trees bore so heavily that the plums were under size. The effect on the market, however, was bad, as it brought the price down lower than I ever knew it before. Miner plums sold for fifty cents per bushel, and I don't know that I ever knew them to be under $1.25 before. How is that, Mr. Whitford?

MR. WHITFORD—I think some have been sold there for $1.

MR. MARSHALL—(Continuing). The summer and fall apples were very good and free from worms, full size, well colored up, and good fruit in general. The winter apples were affected by worms, especially in some orchards. Some of the younger orchards were somewhat freer from worms, and some were only moderately affected. As to the conditions for next year, I am not prepared to make any statements.

MR. HEATH—You didn't mention peaches.

MR. MARSHALL—We haven't very many trees. Wherever we had peach trees we had a good crop of peaches. Peaches in Blair at one time were as low as $1 per bushel.

MR. HEATH—What varieties of grapes are the best?

MR. MARSHALL—Concord and Worden did the best. Moore's Early and Pocklington bore a light crop. Those four are the only varieties that are planted to any extent, that bore anything. The Agawam did not bear scarcely at all. The raspberries that bloomed very early bore about 20 per cent of a crop, while those that bloomed just after them were almost a total failure on account of the frost. Those injured the worst were the Palmer; the Older came a little later and they made from 20 to 25 per cent of a crop. The Nemaha and Gregg followed these with a better crop. The fruit was very nice; I never saw finer. I think the Older is one of the coming berries. With us it winters well so far, and the fruit is extra fine. In the market the Older will sell better than the Gregg, and that is saying a good deal for a berry. I know it does not ship well, but we will have to grow a great many more raspberries before we have to ship very far, and it can easily be shipped fifty to one hundred miles. Our great trouble is to get them up into the center of town; they sell at sight.

MR. HEATH—Did the winter apples drop from the trees before they were fully matured?

MR. MARSHALL—In some instances they did, but generally they were pretty well matured before they dropped off, and they kept very well. We thought in September, during those hot, dry weeks, that our apples would not keep at all, but we have Grimes' Golden and Jonathan here that had no special care; we just picked them out of the bins. The Grimes' Golden with us is usually gone before this time, but they are in pretty good condition yet; the Jonathan is about ready to decay.

SUMMER FRUITS IN CENTRAL NEBRASKA.

W. F. JENKINS.

MR. PRESIDENT: I live in Valley county, at Arcadia, about on a line with Omaha 150 miles west from here. I have been trying to grow fruit there for the past fourteen or fifteen years, and have succeeded far beyond my expectations. I will commence with strawberries, and will say in the first place that I came from Michigan, the south central part, where we had a good fruit country, and we can

grow better strawberries in Valley county with less work than we could in Michigan. I have the credit of growing and selling the first strawberries that were ever sold in Broken Bow. I used to send two pails west to Broken Bow one day and two pails east to Loup City the next, and got twenty-five cents a quart for them.

I have grown a raspberry there that I brought from Michigan fifteen years ago. There never has been but one season until last year but that they have stood the severe winters without laying down, and I have had from half a crop to the heaviest crop that ever was grown every year. This morning Mr. Hesser mentioned the Tyler as being the best raspberry he is growing. I bought 500 plants from Mr. Hesser a few years ago and set them right adjoining those I have been growing there for fifteen years, and the difference is very marked. Those of my own raising are more than double the size in cane, and I much prefer them to the Tyler. I wish to emphasize this a little more strongly than I should have done had not the remark been made by Mr. Hartley that we were a little outside the territory for growing fruit to ship. I have invited people in there when we had fruit that would show, on purpose to let them know what we could do. I have had them come from twenty-five to forty miles in every direction, as high as thirty or forty people in a day, and have been very much encouraged by such remarks as this: "I came from one of the best fruit growing sections of the east, and I never saw anything to surpass this." This remark was frequently made in regard to the raspberries, also in regard to the grapes.

The blackberry is something we have failed to raise. I would not recommend any one to plant them in that part of the state. I had the wild Michigan blackberry, but it proved a failure. I have also tried the Snyder. Of course, by laying them down in winter we might succeed, but if we allow them to stand up as we do the raspberries we cannot succeed.

We have had good success with the gooseberry. We grow the Downing as a rule. The juneberry is a native of that part of the state and it does first rate. We have grown eight or ten varieties of currants and they have done fully as well for us as they ever did in Michigan. I regard the Red Dutch the best of the red currants for a farm garden. I have tried eight or ten other varieties of the reds, but do not like any of them as well as the Red Dutch. The White Grape, I think, is the best of the white currants.

FRUIT IN SARPY COUNTY.

E. E. SANBORN.

The season of 1895 has been a very good one for the apple crop in this locality. We have not had such nice apples for years, so free from insects and matured so well. The hot winds caused a good many to drop; then we had two days of very hard wind when the apple was about one-third size, and blew about one-third of them off, and as the trees were very heavily loaded, I think that was a benefit to the crop, for it thinned the fruit and made it better quality. The yield was better than we have had for years. From 200 Ben Davis and Winesap trees I had 2,000 bushels of apples this year. My trees are twenty-four feet apart, and about seventy-six trees to the acre, and an average yield of ten bushels to the tree would be 760 bushels per acre. My average price was sixty-five cents per bushel; that would give me $494 per acre. My orchard of 1,200 bearing trees yielded me about 5,000 bushels of apples this year. When I selected my trees, if I had chosen the right varieties, and only about twelve varieties instead of about seventy, my profit would have been much greater. I have many varieties that are worthless for a commercial orchard, and if we do not learn from others experience what to plant for profit, we must learn from our own, and the old saying that "experience is a dear teacher" is true.

In selecting varieties for a commercial orchard we must consider where our market is to be, for some varieties will not bear shipping a long distance. For this market I would select a few summer, such as Oldenburg, Red June, and Early Harvest; and a very few fall, such as Wealthy, Utter's Red, and Maiden Blush; but my main crop would be winter varieties, such as Ben Davis, Winesap, Jonathan, Grimes' Golden, Missouri Pippin, and York Imperial. This will give a list of twelve varieties, and all hardy and productive. The Ben Davis will not sell as high in the market as the Jonathan or the Grimes' Golden, but I can make more profit on the Ben Davis at fifty cents a bushel than on the Jonathan at $1. Last fall the Jona-

than sold for $1.25 when the Ben Davis sold for sixty-five cents a bushel.

If we want to get the greatest profit from our orchard we must spray our trees and cultivate and manure the ground. I put on twenty acres of ground 100 loads of barn-yard manure each year, spray twice, and keep my traps out to catch the codling moth. If we grow choice fruit we will get a good price, but if we neglect our trees we grow small, poor fruit, and we get a small price. We all know that it costs the same per bushel to gather, pack, and market a poor lot of fruit as it does a choice lot. There is where our profit comes in. Then how much better pleased our customers are, and we feel better ourselves, to have a choice lot of fruit.

We always get the best fruit from young trees. I have planted three orchards. My old orchard is now twenty-five years old, and some of the trees that are not profitable I am cutting out for fire wood. When trees get old the fruit is very small. I get one-third more per bushel for my fruit in my young orchard than the fruit in my old orchard, and that is all clear profit. Fruit trees are so cheap now, a person should plant trees every few years—at least every ten years. The trees do not come into full bearing until they are ten years old. The first ten years of bearing is where we get our greatest profit. After the trees get old, say twenty-five years, it is not always economy to let them stand, but have young trees coming along to take their place. The fruit of an old tree is small, the price is small, and the profit is small, and when a man is trying to sell it he feels small.

THE CURRANT.

J. P. DUNLAP.

All of the Dutch varieties of currants do well, but I have had as good success with the La Versailles as with any of the red varieties. The White Grape currants have been the best of the white varieties. Plant in rows five feet apart and two feet apart in the rows. Plant two year old bushes, cultivate with a hand wheel garden cultivator, from one to one and a half inches deep, as soon as the frost is out and he surface dry enough in the spring and before the spring rains have

settled the ground, as it works much easier and is better for the plants. Then cultivate after that until the middle of August as frequently as the weeds show through the ground, or about once every ten days, and if only cultivated with the wheel cultivator the ground will be smooth and the work light. A man can cultivate two acres a day. Use the hoe around the plants and in the rows where the cultivator will not reach, but do not use the hoe between the rows, as the hoe is apt to leave the surface in ridges, which allows the ground to dry worse and makes harder work for the cultivator next time.

The Dutch varieties sell better generally than the others and do well in all parts of the state, but in the extreme western part of the state they need irrigation. With irrigation they appear to do as well there as in the eastern part of the state. An acre should yield from three thousand to six thousand quarts. Market with the stems on, either in baskets or boxes to suit your trade. They yield better on rich moist land than they do on poor land, and thorough cultivation is necessary.

The black Naples currant should be planted three feet apart in the row, otherwise cultivate the same as the others. They yield well and sell well to people from England and some other parts of Europe, but Americans, as a rule, do not like them. The native currants of western Nebraska and eastern Wyoming are very hardy, and where they have sufficient moisture are prolific, and where other fruits are scarce will pay to cultivate in a limited way. They should be planted three feet apart in the rows and the rows seven feet apart. They have lobed leaves, yellow blossoms, and by using care they may be had of either black or yellow varieties. There are other varieties of the wild currant in the state, but as far as my experience goes they are not worthy of cultivation.

ADVANTAGES OF THOROUGH CULTIVATION.

D. U. REED.

[Read at the summer meeting, 1895.]

It will not be expected that in this short paper all the benefits of thorough cultivation will be answered. Thorough cultivation includes thorough preparation of the land to be used. During the fourteen years of our sojourn in Gage county we have been engaged in

tilling the soil for our particular industry. We have found it necessary and much less expensive to have land well prepared to receive the seed or plants than to use more labor after the seed was in the ground. We have practiced deep plowing (ten to twelve inches) until the advent of the subsoiler, which we find indispensable for the thorough cultivation of the land. We are speaking now of spring plowing. When it is possible we prefer to plow late in the fall, allowing the land to lay up loose until spring, except in special cases.

Experience has taught us the absolute necessity of having land well prepared. A few dollars expended in pulverizing, rubbing, and leveling the surface of the ground is well invested, giving a kind, mellow surface in which to put seeds or plants, thus giving equal advantages for all seeds to germinate, an even stand of plants, greater ease in cultivating (say nothing of the pleasure over rough, cloddy ground), and cheapness of cultivation by having a blanket of mellow soil. Hand or team work can move along without covering plants, as is the case in cloddy or poorly prepared ground.

BENEFITS.

Ease of cultivation, more rapid growth of plants, and continued growth weeks after the poorly cultivated plants have checked. The destruction of weeds while small, thus saving expense and securing good growth in dry seasons, retaining moisture through the season and into the following spring. Increasing profits by lessening expense. There can be from one-third to two-fifths expense saved in the cultivation, if well done and at the proper season. Many instances are in mind of the vast difference between ordinary cultivation and neglect, and as the thoroughness of the cultivation advances, a marked difference is shown on plant or tree. Especially is this seen in our orchards.

In our judgment the thing most needed after plant has been made is to cultivate once a week, or more frequently in some cases, and especially after rains that pack the ground and run it together. This will hold good on the farm, in the orchard, or garden.

I wish to speak here of watering trees and plants recently set. This is generally done by putting the water on the surface of the ground, and, as a rule, is of no benefit, as the moisture never reaches the roots, therefore imparts no benefit to the tree. Instances have

come under our observation where trees were supposed to be well watered, and upon raising the tree, earth would be found at the roots almost as dry as powder, under which circumstances it is almost impossible for growth to be made.

To water a tree remove a portion of the soil from over the roots two to four inches, fill this space with water, allowing it to settle. Repeat this operation until the roots are thoroughly soaked. When water is all settled replace the soil around the tree or plant. Thus you have created a reservoir for the roots to draw from for ten days to two weeks. It improves this kind treatment by putting on a vigorous growth to the satisfaction and delight of the owner.

THE DWARF JUNEBERRY.

GEO. B. GALBRAITH.

This is a subject of great importance to the people of the entire western states. It is a subject that should interest every one whether we have a large or small tract of land, and a subject that should be thoroughly discussed. If I am rightly informed, it is a plant native to the Rocky mountains, and in that rocky region it is no more tenacious to life than it is on our plains after it is cared for and brought through the first season. There seem to be two varieties that have a similar habit but still are a little different in flavor, size of berry, and growth of plant. The large size bush has the smallest berry, and the berry is a very little more tart in taste than the berry of the small bush. Neither is the large bush as productive as the smaller variety of plant.

In the spring (this year as early as the 15th of April) our entire Juneberry plant was one mass of flowers, and was as pretty a sight as any lover of fruit would wish to see. No doubt some of you who have not planted this wonderful western fruit may think the frosts we got late in April would destroy the fruit in the blossom, but on the contrary the entire plant brought through its full load, and it was certainly a heavy load. The small-sized plants that were from one to three feet high, and that bear the largest and the finest berries, were a wonder to behold. Frosts that killed potato tops to the ground had

no effect in destroying even a portion of this wonderful plant's product, even though the frost came as late as the middle of May.

The fruit of the Dwarf Juneberry, as its name denotes, begins to ripen about the 10th of June and continues ripening throughout the month in bountiful quantities, even as late as the 4th of July. The flavor of the fruit is mild, sweet, juicy, and is very pleasant to the taste. A great many people think the Dwarf Juneberry is the same thing as the New England huckleberry, but that is a mistake. Though the shape and color of the berries are the same, the time of ripening the huckleberry is at least six or eight weeks later than the Dwarf Juneberry. The huckleberry is native to the eastern states and will not thrive in the west, while the Dwarf Juneberry is native to the western states, and is not only good for Nebraska, but it is equally as good for Kansas, Oklahoma, North and South Dakota, Iowa, Missouri, Minnesota, Wyoming, and Colorado. In fact, it is a fruit for the entire west, and, as I said in the beginning, should interest every westerner. It should be planted in every home garden, whether that home is in the country or in the city. If you have room for a garden you have room for the Dwarf Juneberry, for there is nothing more pleasing and healthy for the child than the privilege of gathering at will until their appetites are satisfied with this luscious fruit fresh from the bushes. It is equally as good for the grown boys and girls, mothers, fathers, and grand-parents.

When gathered the fruit should be used at once, for unless it is used while fresh it loses a great deal of that pleasant flavor that is peculiar to this fruit. A few growers have placed the berries on sale in our stores, and I believe that practice is wrong, as the berries are generally gathered the day before marketed, and though the flavor is apparently all right on the start, it soon loses that freshness and good wholesome flavor that is retained when fresh. When this flavor is lost the berries make a poor impression on the customer. I do not call the Dwarf Juneberry a fruit for the market, but a good fruit for the western people, to be grown in every home garden and for home use.

The growth of the Dwarf Juneberry is in the form of a bush, the large variety attaining a height of about six feet, while the small variety seems to have reached its full growth at four feet. The plants grow from suckers that shoot up from the roots, about as the lilac multiplies. Plants that come up and gain a growth of twelve to

eighteen inches in one season are generally full of berries the following year. The size of the berry varies according to the time of ripening, the first fruit being as large as the ordinary cranberry and gradually get smaller as the season advances, but all are a fair size to the last picking. Color of the fruit is a blue-black when fully ripe, though it is very palatable when it reaches the reddish or purple stage. There is no better fruit for pie or sauce that can be grown so easy as the Dwarf Juneberry. There is no richer looking fruit. Dry weather does not injure it. Wet weather does not injure it. There is no insect that attacks it. The wind never blows hard enough to cause the fruit to fall. It never gets too cold or too warm for the Dwarf Juneberry. It is native to the west. It is a sure crop.

THE STRAWBERRY AND RASPBERRY.

G. N. TITUS.

When our Secretary requested that I prepare a paper for this meeting, he suggested that I deal more particularly with the different varieties that we have been testing and fruiting.

I believe that the average person is more bewildered in knowing what to plant that will furnish a succession of berries throughout the season, in abundance, than in the method of setting and cultivating, as there is plenty of information upon the subject of cultivation by writers of national ability that will apply to the country as a whole with few exceptions. This is not the case with regard to varieties, as every practical fruit-grower knows that the sort that does well in one locality may not thrive at all in another, perhaps of only a distance of a few miles, hence the necessity of the beginner or inexperienced planter in depending upon someone who has had the experience in his locality in order to get such varieties as will best succeed there. The all-important thing in starting a berry garden is beginning with the right varieties. No matter how well located, or how well planted or cultivated, if the proper sorts have not been planted, failure and disappointment must be the result.

STRAWBERRIES.

I am asked a great many times the best varieties of strawberries. This is hard to answer. But in my experience of the past ten years, during which I have tested a great many old and new sorts, if confined to only one berry, it would be without doubt the Parker Earl. This berry comes as near filling the bill as any berry I have fruited, and is bound to become popular, not only on account of its great productiveness, but also by its remarkable resistance to the drouth. It is a large berry, good quality, and one of the most vigorous, healthiest looking plants, with a great mass of roots extending out twelve to fifteen inches. It is perfect in blossom and is the berry for those that do not wish to bother with fertilizing the imperfect sorts.

Next to the Parker Earl I place the Warfield, the greatest market berry of the present time, which produces more fruit of uniform size to the square rod than any berry I have grown. It is very handsome, good in quality, and ripens a few days after the Crescent. It is a favorite everywhere. For an early berry it is hard to give up the Crescent, but we are setting it more sparingly each year. After the second year it is worthless as a market berry. The Warfield at this time is more attractive and will outsell it on any market, yet I believe it to be the berry for the family garden, as it will produce fair crops when only half tended, and sometimes when not tended at all; while other berries under similar treatment would produce scarcely any fruit.

Haverland is a very large, productive berry, but must be well cultivated and mulched. It is a very poor berry for the family garden.

I have fruited the much praised Bubach No. 5 five years, and have failed to see anything yet to recommend in it. It is nothing more than a large show berry.

Beder Wood is a medium sized berry, productive, and inclined to be small during a dry season. It is one of the best pollenizers for Warfield, Crescent, and Haverland. We set two rows of Beder Wood to four of Warfield, Crescent, or Haverland.

Michel's Early is a complete failure, also May King and Gandy. Captain Jack is a favorite with many; while we have other berries preferable, it is yet too good a pollenizer to set aside.

The low price has created a demand for a very productive, healthy, vigorous berry, so we have discarded Cumberland, Miner, Sharpless,

Edgar Queen, Great Pacific, Jewell, Stayman, Jessie, Wilson, and Enhance.

The past two seasons have been so unfavorable that it would be unjust to pass an opinion on the newer sorts that we are testing. Of the newer sorts, the Lovett did very well for the season and promises well, also Robinson, which I think will make an excellent fertilizer, and the Greenville, which I think has a good future. The Timbrell is overestimated. Of the varieties set this year, the Brandywine is making the strongest, healthiest, and most luxuriant growth, with Bissell a close second. Enormous and Cyclone are making a good supply of runners.

Another point I am frequently asked is how long will a strawberry bed continue in fruiting in paying quantities. This is owing to the season. Under ordinary conditions it should last six or seven years, with proper cultivation. Our first planting consisted of three-fourths of an acre, and we picked our largest crop the seventh season, which brought $275. Before passing the strawberry I wish to caution the inexperienced from setting plants from an old bed. Too many make this mistake in order to economize.

RASPBERRIES.

I advise the planting of raspberries in young orchards whenever possible. The trees not only help protect the bushes, but the raspberries are beneficial to the trees, occupying considerable waste land in the tree row that would otherwise be vacant. They also bear the expense of cultivating the orchard and protecting the trees from being barked by careless hands. Raspberries have always been a paying crop with us, and are a fine crop this season, the demand far exceeding the supply.

The red raspberry with us has made a huge failure during the past eight years. They have winter killed to the ground every winter, and during this time all the red raspberries picked from one-half acre would not make one good crop. They demand a sheltered place, and then their room is preferable to their company. We have tried the different methods of winter protection, and have found them unsatisfactory as well as expensive. I would also advise setting them closer in the row than we have been accustomed to. We shall plant hereafter two by six feet.

As to varieties, we have not as many sorts to choose from as the strawberry. The Palmer is by far the best early blackcap we have. It is larger than the Souhegan and a very strong, upright grower, very productive, good in quality, and has been free from disease. During the past seven years it has not winter-killed, while other well known sorts planted along side of the Palmer have been injured very seriously. We grow more favorable toward it each season. The Hopkins begins to ripen before the Palmer is picked, and is our best second early sort. It is superior in flavor and very productive; it has been very hardy with us. The Nemaha is the best and most productive large berry we have, and the best paying berry of the late sorts. It is hard to identify the berry from the Gregg, it being only superior in hardiness. The Kansas fruited for us this season and we were somewhat disappointed in it. It is not as early as we expected, nor as large as it was recommended to be. Its canes are of strong growth and came through the winter uninjured. It is larger than the Palmer and of the best quality, and promises to be one of the best paying second early sorts. The Shafer is growing more out of favor each season, having neither quality nor hardiness. It goes begging for buyers. The Muskingum is of the Shafer type, but no improvement except in hardiness. The Souhegan or Tyler, which has long held the favor of berry growers as the best early blackcap, must give way when the Palmer is better known. We shall discontinue planting the Souhegan, also the Gregg, as Nemaha is much the hardier. The Japanese wineberry is a grand humbug, at least in the west. The Mammoth Cluster is too far behind the times to continue in cultivation. Carman and Johnson Sweet too small; Pioneer not productive; Ohio the most vigorous and hardiest blackcap; would recommend it where better sorts have winter killed. Munson's Everbearing will stand more cold and dry weather than any berry we know. It is the first to ripen and very productive. I am sorry to say, however, that it is a very small berry, poor in quality, and crumbles some when picked. Would say, in conclusion, that our best paying blackcaps are Palmer, Hopkins, and Nemaha.

HOME CANNING OF FRUIT.

MRS. W. F. JENKINS.

As I have been requested to send an article on the home canning of fruit and vegetables, I give the following directions for putting up a few of those with which I have succeeded the best.

STRAWBERRIES.

Strawberries are a very juicy fruit and unless great care is taken there will, when canned, be more juice than fruit. Pick four quarts of not overripe berries, add one cup of water and two of sugar for a two-quart can. Cook slowly but thoroughly. When cooked enough, remove from the stove and wrap the can in a wet cloth to prevent breaking, after which dip the berries into it, allowing the juice to drain off, so that when the can is filled, the contents will be fruit and not all juice. Pile on all the can will hold and fasten cover. Turn can on the side, and when no juice runs out it is air tight. I use the juice left for cooking. It can be canned and kept any length of time, and makes delicious puddings, frozen ices, etc. All juicy fruits should be canned in this way. Too much sugar changes the flavor, and if not sweet enough for the taste of everyone, more can be added when the can is opened. Can all fruit as soon as possible after it is gathered.

CHERRIES.

Take out all pits. Use one cup sugar and one cup water for a two-quart can.

PLUMS.

Plums should be peeled, which can easily be done when not too ripe. One cup water and one and a half cups sugar for a two-quart can.

APPLES, PEACHES, AND PEARS.

I steam until tender, pack in can, and make a syrup and pour over them. The syrup must be boiling hot. I never cook fruit in cans except for exhibition purposes.

SWEET CORN.

Sweet corn may be successfully canned as follows: Cut from cob when just right for table use. Fill eight two-quart cans and pack the corn in as solidly as possible, just set covers on but do not screw down. Put two pieces of two-by-four across the ends of a wash boiler, then fit in a board that is full of holes to let steam through. Put in about eight quarts of water and set cans in on the board. Pack hay or cloths around them so they will not touch each other, cover with the boiler cover and boil four hours without stopping. When water gets low, fill from boiling tea-kettle. When time is up, lift from stove, and after steam passes off a little, put rubbers on and fasten down covers very tight. Leave in the boiler until cool enough to handle. If this plan is exactly carried out, you will have as fine canned corn as you ever ate. I use the Mason can.

THE LEONARD METHOD OF ORCHARD PLANTING.

I. N. LEONARD.

[This article is supplemental to one which appeared in Vol. 25, page 75.]

I am requested to submit notes on the conduct of my orchards during the years of 1894 and 1895, supplemental to my paper published in the Horticultural Report of 1894.

The trees passed through the drouth of 1894 with an abundance of soil moisture at all times. This condition was maintained throughout the season, and during the severest of the drouth was examined by representative men of the Nebraska experiment stations. The condition during the year was an abundance of soil moisture to within a half inch of the surface, so moist that the soil would ball in the hand by gentle pressure, leaving the impress of the fingers. It was thought by some that the moist condition was due to the fact that no crop was grown among the trees and the orchard had been given strictly clean and thorough cultivation.

The drouth during 1895 has been nearly as severe here as during 1894, and to include the period from September 1 to January 1, 1896, has been much worse. During the past season sweet corn, potatoes, cabbage,

and other garden vegetables were planted in one orchard, all of which made a good average yield. The corn was as good as the average corn of a good season, the potatoes made a yield of 150 bushels per acre, and cabbage, beets, tomatoes, melons, and beans were fully up to the average of our best seasons. During this season this orchard has not shown as much moisture, but had enough to make a good crop and to keep trees up to a full average growth. During September the corn and potatoes were harvested and the orchard cultivated. A two-horse cultivator would throw up an abundance of moisture that could be seen the full length of the orchard. The condition of this orchard January 1, 1896, was found to be thoroughly moist to within one-half inch of the surface. Of eighty-five trees set in the spring of 1895, three Ben Davis and one York Imperial and two Jefferies perished in the hot winds of September. These trees were badly dried out when planted and made a late start. Others of the same varieties passed through the season in good condition.

This experimental work is in its third year and they have been three of the hardest consecutive years ever known to the state, and yet trees planted when two years of age now stand eleven feet in height and nine and one-half inches in circumference one foot from the ground, and some of the trees now measure nine feet from tip to tip through the top. Many of the trees set their first fruits in 1895, some up to as high as 150 apples, but were whipped off when about the size of walnuts by sand storms in June, also many leaves.

East European plum trees have attained the heights of ten and twelve feet and have a circumference of seven to ten inches one foot from the ground. Communia, Dame Aubert, Moldavaka, Richland, Hungarian Prune, Arab No. 2, and Orel 19 and 20 have borne their first specimens of fruit. The first four named have, I believe, special value. The fruit is of excellent quality and thus far wholly free from the attacks of curculio and gougers. The last two named are a small blue plum not larger than Blue Damsel. Native plums, Wyant, Wolf, and a variety that came to me labeled Weir 49, but which is said to be by nurserymen the Weaver plum, is a freestone and of excellent quality. The Wyant is a great bearer, freestone, and of good quality. The Wolf has no value above the Miner.

East European cherries have borne their first specimens of fruit, mostly running smaller than Richmond. Abbesie appears to be slow

in coming into bearing. They are the oldest and largest trees, but have thus far borne no fruit.

East European pears are making a rapid growth, and thus far are free from blight.

Bokara peaches have borne one crop. The fruit is of good quality and some larger than the average commercial size.

[NOTE.—The following letter, from Colorado, offers some suggestions along the same line:]

LOVELAND, COLO., September 11, 1895.

Mr. I. N. Leonard, Lincoln, Neb.—DEAR SIR: In reading your Horticultural Report of 1894 (Nebraska) I see in that on page 77 a discussion of best methods of planting apple or other fruit trees. I believe I can help you very much out of your troubles in a new method which some of our board have adopted and recommended to others in planting fruit trees. That method is to dynamite your holes for trees. Take a sharp crow-bar and probe down three or four or more feet, put down a half or a whole stick of dynamite with cap and fuse attached, and carefully put in fine dirt at first on dynamite, and as nearing the top tamp as solidly as you can. Set fire to the fuse, step back a few feet. When it goes off you have a hole that is fit to set any tree in. Clear out holes a little and put surface dirt to imbed the tree. This will be worth thousands of dollars to Nebraska.

Respectfully, W. B. OSBORN.

Rev. C. S. Harrison.

THE ETHICS OF HORTICULTURE.

REV. C. S. HARRISON.

Plato and Aristotle give a good definition of ethics,—"The perfect development of a man's self in moral and intellectual excellence." As a means to this end we will look at horticulture. We want to get all the good we can out of it. It is not a matter merely of dollars and cents. We want to lift it above the plane of hogs and corn and unfold its grand mission, that it may make the world *healthier*, *better*, and elevate it.

Too often, if a man knows how to insert a graft or put in a bud, he is called a horticulturist. But the field is vast; it covers the world, and gives study for a lifetime. It reaches from the useful up to the beautiful. While it gives to the pocket it also ministers to the soul. The horticulturist is the high priest of Nature—admitted into her sanctuary, at home in her holy of holies. He is co-worker with God, the senior partner furnishing the capital while the other does the work. This makes a strong firm, as the man goes forth on his mission to make the world better and more beautiful. The man helps God give expression to his own plans and purposes for advancing the world's weal.

They tell of a London pugilist who was soundly converted. He hadn't a great deal to bring as he crossed the dividing line, but he took his pluck and muscle with him and in his own peculiar way consecrated them to the new cause. One night a company of roughs came in to disturb the meeting. Somebody went up to the minister and told him that Tom was making it lively out in the entrance. He hurried to the scene, and the stalwart convert was laying the foe right and left. Three or four were in a battered and dazed condition. "Oh," said he, "Tom! Tom! the Bible says, 'Vengeance is mine, I will repay, saith the Lord.'" "Yes," said Tom, as he dealt the bully of the crowd a staggering blow, "and I'se just a helping the Lord to give 'em vengeance, and now," said he, "lads, I'se got a new Master and I ain't going to see Him insulted, nuther," and with that he led

three or four of them up to one of the front seats where they could get the truth at short range, and turning to his minister he said: "Now, you help the Lord up to that end and I will attend to this end, and we will have a first-class meeting." *Helping the Lord.* Now, that is pretty good. I want to talk about it a little while, of this partnership of capital and labor in human and divine relationship.

Let us turn back a little. When the great coal measures were being formed and the lakes of oil were being distilled for the use of men today, there was little of beauty. The time for flowers and fruits was not yet. The huge ichthyosaurus with his dull brain didn't need roses, and he could live without strawberries. It was not neeessary to raise oranges and bananas for these huge monsters of sea and land. Mists enveloped the earth, and there was no glory of cloudland, no rainbow, none of the splendors of the air. Note this as you follow the ages down in the vast preparation for the coming of man. You will note that all along the lines everything was converging toward the coming Prince who was to be hailed by all nature as the Son of God. As His time drew near the grains and vegetables began to appear, exquisite flowers began to bloom, and luscious fruits were provided. At least the species were formed out of which sprang unending variety.

Stranger still, as we draw near the human era, those marvelous gems—earth's fadeless flowers—were formed, beautiful, rich, and imperishable. Beauty for the ages, the topaz; the opal, sea of glass mingled with fire; the emerald, in which is garnered the greenness of earth and sea; the sapphire, with the azure compressed in its marvelous blue; and the diamond, the richest of them all. These were formed in comparatively recent times. The diamond grew by accretions and has layers like an onion. Some gems are growing now. Though God made the gems, he never mines them. He does not run a lapidary. He does not polish them or give them their setting in the field of gold. There was the peacock throne of India. Every feather of the wonderful bird made of exquisite gems. It was worth fifty million dollars. It was one mingled blaze of dazzling splendor. One eastern prince had a flower garden made of jewels and they were always in bloom. Now these wonderful stones were not formed in the heart of the earth, but near the surface. They were not hung on trees where they could easily be picked. Men had to work for them.

Beauty of every type belongs to that geologic age to which man belongs. With man came the splendor of the sky and those mountains of burning amber and gold which often stand sentinel at the gates of retiring day. I never knew an ox or a horse to show the least appreciation of the beautiful, but I have seen the child of a year old go into an ecstasy of rapture over a gorgeous sunset, and apostrophize in baby glee and in his unknown tongue the loveliness with which he wished to be better acquainted. I have driven over vast areas of wild flowers where, far as the eye could reach, greenness and blossom were blended and the air was all fragrant with the breath of the sweetness, but I never knew my horse to take the least interest in it all. So we are irresistibly brought to the conclusion that all the beauty and splendor of earth and sky, the loveliness of forest and plain, and mountain sublimity are especially for man. All these things are the alphabet by which he is to study the sublimer lessons of the hereafter.

It is amazing how man can develop the useful and the beautiful and what he has done with the material given him. In the Arnold Arboretum of Boston are about six of the world's primitive apples. These in their own habitats have remained the same with no power to improve themselves, some of these apples no larger than a currant, and it is supposed that hybridization and cultivation has evolved from these the mighty and luscious apple family of to-day.

The single flower is a product of nature, the double flower the device of man to a large extent. Who ever saw a double rose growing wild? Some of the brightest intellects of the world are now at work on new species. I have a friend who is at work on developing new roses. He crossed the little single rose of Japan with the General Jack and sold the product for $300. There is an endless field for development here. We have no idea how much of talent there is given to the science of horticulture. In our eastern states they have gathered the beauty of the world, and by crossing and improving, there are almost endless varieties. I have seen 120 kinds of lilacs alone, and the work of improvement has only just begun. So with the honeysuckle. Going through a nursery in Massachusetts I saw an upright honeysuckle one flaming mass of red berries. "Where did you get that?" I asked. "Raised it from seed" was the answer.

A friend of mine saw a remarkable shrub growing in Newburyport, Mass. It was one mass of white. He took a branch down to

the meeting of the Massachusetts Horticultural Society. Only one man could name it. It was the *Viburnum tomentosum* of Japan. A single flowering snowball. What a furor it awakened. One horticulturist got a chance to cut off the twigs and he set his greenhouse at work striking cuttings. One got on the track of some in Europe and bought them all. I saw them growing and helped cut some for the greenhouse propagation. Then I thought of the future of the plant. Somebody would get seedlings from it, which would if possible be an improvement, and this would go on and on. Our French and German horticulturists are hard at work improving the beauty of the world, and some of our own propagators are doing wonders. Jackson Dawson put a trailing juniper on a red cedar and made an evergreen umbrella and sold it for $50. There is money in brains, and earth has a broader range than cattle, hogs, and hominy.

There is no science on earth which brings in such marvelous returns. Fertile brains and deft hands are sure of a reward. The high priest of nature has wonderful advantages. He goes into a new land and to him is given the eye of prophecy. He sees in the earth and air, in the sun and shower, millions on millions of bushels of luscious apples, pears, plums, cherries, grapes, and berries. He plants the trees, shrubs, and vines, and, too, the crystallization of all this unseen wealth. Around him in the viewless air and in the furrows are arches of beauty, marvelous in fullness and fragrance. He has only to plant the bushes and the bulbs and they rise before him like children of the light.

The multiplication of species and varieties is something marvelous. The facility of propagation almost surpasses belief. The stock-grower pushes his show animals till they can go no further. They are the last of their race. The horticulturist pushes his products till he has the seedless grape and pear and orange wonderful in beauty, and so with flowers. Many of the most lovely are sterile, yet by budding and grafting the process goes on with wonderful rapidity. Dr. Bull, of Concord, died only last year, but the old Concord vine is yet alive and thriving in his garden. But who can estimate the vast train loads of vines and fruits which have come from that parent vine. It almost passes belief. Why if the progeny, vine and fruit, were piled up by the pound it would be a vast mountain.

Ages ago there grew a beautiful shrub in Abyssinia; thence it was

sent to Arabia, then to Africa, thence to Ceylon. It grows to the height of fifteen or twenty feet and in springtime it is covered with blossoms of snowy white. A thousand years ago its product was unknown to commerce. Now it is one of the world's staples, the coffee tree, and its treasures are found in all lands and climes. There is a remarkable history of one plant. In 1690 there was no coffee save what was raised in Abyssinia and Arabia. Some merchants brought a few seeds to the governor-general of the East Indies. He planted them in his garden and from these Java was supplied. He sent one plant to a friend in Holland. It was planted in the Botanical Garden in Amsterdam. Plants from this stock were sent to the western continent and other parts of the world, and it is now estimated that one-half of the entire production is from that Amsterdam plant—almost a billion pounds a year coming from that one parent. About the fourth century a few plants with fair white blossoms were taken from Corea to China, and thence sprang that marvelous industry, the tea trade.

This profession is at the morning of a glorious achievement. Some of us whose hair is growing gray wish we could look well over into a new century and see the marvelous transformations. We are just ready to do something. The art of propagation is understood as never before. Improvement by hybridizing and other processes is now well underway. The choicest products of the world are being gathered within a few years. Luscious fruits by nature too tender for our trying climate have been transferred to hardier stocks, as in the case of many of our apples. The Wealthy apple alone has moved the fruit belt north 200 miles. So with other fruits. We shall have crosses which will give luscious cherries on hardy stocks. And so far as flowers are concerned, what attainments have been made? See the displays of the Massachusetts Horticultural Society every week for sixteen months and see what progress is made, with more to follow.

Horticulture is the most ancient and honorable of the employments which have come down to us. The parent of the human race was put in the Garden of Eden to dress it and to keep it, and some way the work grew upon him so he had to have an assistant, and so the mother of the human race belonged to the same calling. It had a wide range even in those far off days. There were "trees pleasant to the sight and good for food," fruit and ornamental trees. The Saviour of men

was a horticulturist also. How vivid the story of the barren fig tree which for three years disappointed the owner, "cut it down, why cumbereth it the ground," and the gardener pleads for another year, he will dig about it and fertilize it, "Oh, let it have a year more."

I am the vine, ye the branches. He pruneth it that it may bring forth more fruit.

There never was a more exquisite poem given in any language than the unmetered song of triumph Christ left for his followers:

"Consider the lilies how they grow; they toil not, they spin not:
Yet I say unto you, that Solomon in all his glory was not arrayed like one of these.
If, then, God so clothe the grass which is to-day in the field and to-morrow is cast into the oven, how much more you, oh, ye of little faith?"

Grapes of thorns. The good tree bringeth forth good fruit.

Everything the Great Teacher touched He glorified. The raven and the sparrow, the mustard seed, the tree, the seed falling from the hand of the sower, the grass, and the flower, are the mute sermons, the beauty of whose unspoken eloquence will cheer tired mortals while the ages go by.

The softening, elevating, and harmonizing influence of flowers is well known. They are messengers of peace, sympathy, and love. The little child dragging out a desolate life in the dark alley of the city, shut away from the fragrance of the greenness of a beautiful world, is wonderfully encouraged by the presence of a single flower which seems to lighten her burdens, and the life of the tired mother is freshened as she looks at the little messenger which brings sweetness and fragrance into her lowly dwelling. The flower missions in our great cities are important factors in the way of encouragement.

Some years ago Mr. Baker, then gardener of the Old Colony railroad, said, "I am carrying on one of the most important branches of city missions." He wanted the railroad company to plant every plat of ground in and near the city with flowers. They said, "It is no use, the children will destroy them." Said he, "I will see to that," and having gotten permission, he went ahead. Every spring and often in the summer he planted for a succession of flowers. Children by the hundred gathered around him. "Now," said he, "these flowers are ours—yours and mine, but they must not be picked; we want to see them bloom, and we want the people to see them as they go in and out of the city." Then he explained each kind and when they would

bloom, and having a great abundance he brought a large quantity to distribute. They were accepted by girls and boys with rapturous delight, and ever after they looked upon flowers as sacred things and their blooming was watched with an intensity of interest.

Years ago in one of our cities there was a woman who was an Amazon in wickedness. She was a most desperate character. It took half a dozen policemen to arrest her. Her huge hand, like the paw of a bear, soon made a fine uniform rags. One day she had been worse than ever. It seemed as if all the resources of power were exhausted, and she only grew worse and worse. She seemed to hate her own sex also, and often sent them from her presence with most violent language. In one of the asylums was a quiet and saintly matron who had a most intense desire to see and help the poor wayward creature. Hearing she had been arrested again, she begged a chance to see her. They said it would be madness, that she would be torn in pieces. Preparing a beautiful bouquet of flowers, she insisted on going into her cell. She found her an object of terror. Her countenance was distorted with rage, and her eyes blazed with such fierceness the janitor was glad to get out of their range. Nothing daunted, our good lady went up to her with tears of pity in her eyes and said: "My poor sister, I am so sorry you have such sore trouble. I bring you these flowers." "You call yourself my sister. How is this?" "We have the same Brother, his name is Jesus, and of course we are sisters; and see these flowers." Flowers and love prevailed, and for the first time in years she wept. Her woman-soul came back again.

The farmer should be also a horticulturist. It belongs to him to beautify the fairest lands on earth. Many a man has made his home yard a cattle-pen and a pig-sty. Everything must bend to beef and pork. The family have no rights which the hog and steer are bound to respect. That ground about the house might be adorned with supreme loveliness. A clump of evergreens here and of flowering shrubs there, graceful walks and well kept beds of flowers—an attractive instead of a repulsive home. Many a noble woman with love for the beautiful has died under the slow martyrdom of ugliness. Deformity where harmony should prevail. Home made so repulsive the children cannot and will not stay. The home, which should be a bower of beauty, becomes a weariness and detestation. We mourn the exodus from the country into the city where people climb over

each other to find work. Much of this is owing to the fact that the average farmer puts forth no effort to make home attractive, whereas a little money and a good deal of care would make home so alluring it would be hard, very hard, to leave it, and the very thought of it will be a refreshing memory. Now, it is strange that when the farmer is so very apt and intelligent about everything else he should be so deficient along this line. Why, he can tell you all about a railroad from the tie to the roundhouse, and how much it costs to run it, and all about the minutiæ of it, far better than men who have been forty years in the business. He knows all about currency. He can talk bi-metallism, silver and gold, and greenbacks till you are tired. Send him to the legislature and he is a natural detective. He will appropriate $40,000 or $50,000 to smell out a fraud and then appropriate to the horticultural department of a great state just about enough for a respectable coffin for it. But in horticulture he persists in being utterly and entirely indifferent, and so fraud comes along and preys on his ignorance.

There are two classes of men who sell trees. One is the tree fiend. No one knows whence he comes or whither he goes. One visit is enough, ultimately bringing up at the fiend's home. He used to sell Russian apples at seventy-five cents and then go over to Iowa nurseries and pick these same Russian trees out of refuse brush piles to fill his bills. He is famous for selling an immense amount of cheek and lip and very poor trees. Then there is the tree dealer. God bless him. He is a benediction. He awakens an interest and an enthusiasm. Most of our fine orchards and fine grounds are traceable to his influence. He does not get rich at it, but he is a blessing to a new land. You know where to find him. He gladly rectifies mistakes. Well, to return to the fiend. I met a fiend in Polk county one day who told me with great glee that he had "just bought twelve tree strawberries for only $3." "Is that so," said I. Then that city girl was not so far out of the way after all. She was visiting out in the country with some friends and they noticed she was constantly looking up into the tops of a stately row of elms. "What are you looking for up there?" "Oh," was the sweet answer, "I wanted to find some strawberries." Another fiend met a prominent farmer in Adams county and he took him out to see his orchard and he asked him why it didn't bear. "Well, I will examine it." He had a little magnifying glass

and he took it out and examined the buds, cut some of them open, and put them under most careful inspection. He went from tree to tree and from row to row, and he was so intent the farmer says, "Now that fellow understands his business." When he got through he said, "Have your trees ever blossomed?" "Yes, but they fell off." "Exactly just as I expected. Every tree in your orchard I find is a female tree, so the pollen or blossom dust is not fertilized. Now you must buy a lot of male trees and plant between these rows," and he actually sold the man several hundred trees at an enormous price. Too often all the recommendation the tiller of the soil wants is that the man is a total stranger. Then his influence seems to be supreme.

There is no science that makes such a speedy impression on a land as this of horticulture, and it should be studied more than it is. The magnificent Bussey institute of Boston, in connection with Harvard, sometimes will not have a dozen students. I hope the time will come when text-books will be used in all our academies and colleges. We are glad we have a department connected with this University.

A western college president once asked me to come and see his catalpas which he thought were coming up. He planted a quantity for a timber claim. I went to see them. There was not a catalpa there, only a *milkweed*. "How deep did you plant them?" "Oh, about six or eight inches, and stamped the ground solid." "Well," said I, "take off your hat and bid them an affectionate farewell, for you will never see them again." Then he pointed to a fine lot of apple trees he had just planted. The rows resembled the zigzags of a Virginia rail fence, only the "zigs" didn't match the "zags" at all. It was the worst job I ever saw. I lost all my respect for his Greek and Latin, and asked how he ever expected his students to lead straight lives with such rows of trees to look at. Many a man having no knowledge or care in the matter of tree-planting is induced to buy a dozen trees. The drouth and cattle soon make way with them, and then he is like the Irishman who wanted to try the luxury of a feather bed.

I think no material trust was ever given to a man of more importance than a good farm. It needs more than three mules to work it, one to drive and the others to pull the plow. It is against Scripture, "Be not as the horse or the mule which have no understanding." The farm gives the owner one of the grandest foundations for a full orbed and well developed character.

Floriculture gives delightful employment to ladies. It should be a field of conquest for them. It is immensely ahead of puppy culture. In this age of widening horizons, it is sad to see the soul of a young woman narrowed down to supreme affection for a little dog. Said a a very small and exquisite dude to a young lady: "Wouldn't you like a little puppy?" "Oh," said she, with a gasp of breath, "give me time; this is *so sudden.*" Another young lady sat stroking her dog. As her white fingers went flashing through his silken hair and he sat there drinking into his dog's soul the deep bliss of such kindly attention, a young fellow, looking on lovingly, said: "I wish I was a dog." "Well, you'll grow."

The noble science of which we are speaking opens wide possibilities and an endless fund of enjoyment. It permits the young enthusiast to take the blank leaves of nature and fill them up with pictures of transcendent loveliness. He is said to be a benefactor who makes two blades of grass grow where there was only one. What shall we say of the victor, who, in place of the grass, calls out from the unseen forms of loveliness which are a joy to the eye and an inspiration to the soul. "Kindly Mother Nature ever stands before us, and in the intensity of her longing would unfold before us the treasures of her store-house. Art unlocks her doors, enters her palace, and brings out her marvelous gifts."

It should be the mission of this Horticultural Society to demand some rights in the name of this great commonwealth. Having seen the wealth, culture, and energy and enthusiasm displayed in some of our older states, I am impressed with the fact that there is something sadly lacking in Nebraska, so, instead of being content with a crumb, we should now and then demand a loaf. We need a fine conservatory laid out on a generous plan, and hail proof, where our students, where the farmers and the people can come and in a short time become acquainted with the treasures of the tropical world. Such a place is needed for some of the more delicate experiments of horticulture which cannot be carried on in the turbulent climate of the outside world. Again, we should have plenty of room and plenty of means for outdoor experiments. All the past years we have as a state played a little at horticulture. Now we need to get down to business. Our state has had a hard time, but will emerge from these terrible drouths and show unwonted vigor. This long season of trial has been healthy.

It has shown what will endure trial and what will not. We are amazed at the possibilities of our soil. For three years we have seen orchards laden with fruit when in all that time it was impossible for a drop of water to reach the lower roots. Our eastern counties constitute one of the finest fruit belts of the world, and all over the state we begin to know our possibilities. Instead of yielding to discouragement it is time to sound the "forward march." Every farmer can have a select patch near his windmill, and the time to irrigate is in the winter. Let the subsoil be laden with moisture in the spring; then, with good cultivation, you can laugh at what may come. Irrigation will be used more and more. Our rivers carry off waste enough to make a whole state fruitful. Time will come when the farmer may have his greenhouse, which will be a pleasure and a profit. Very economical plants can be put in at small expense, and with a little care even exotic grapes can be raised with profit, and home can have both luxury and beauty. Art aids nature wonderfully. Our bright winter suns would aid greenhouses materially. An English horticulturist tells me that nature cannot keep up with art, that there is no climate and there are no conditions so perfect as man creates under the glass. Pineapples are made to grow twice their natural size, and the Muscat grape has been grown in clusters two feet long with the berries cut in two large enough to match the old English penny. There is very much waste time in winter which could be very profitably devoted to the greenhouse, bringing the beauty of a tropical summer into the frozen heart of winter.

But aside from this what changes can be produced? In 1884 I started a place under the 100th meridian. I raised evergreens from seed by the thousand and planted thousands more from the Rockies. I found that forty kinds of lilacs did remarkably well and there were twenty kinds of honeysuckles that were a decided success. There was a large family of a dozen kinds of syringas, also flowering almonds, and a large family of hardy roses. There were deciduous trees of forty kinds or more, and a large collection furnished by eastern friends. For some time it was an experiment station connected with this Society. It seemed almost an elysium of beauty. Farmers would come from their bleak prairie homes and wander about in astonishment that such changes could be wrought in so short a time. Well, I was obliged to leave and then came three years of drouth, and neglect, and weeds.

Weeds instead of beauty. Now you can go there after the hot wind has scorched out and smitten every tender thing, and fruit and ornamental trees have succumbed, and what is left will endure. What a weeding out of every vine. How the spruces went down! White, Norway, Black Hills, and Douglas dazed and staggered, not killed. But there is the Ponderosa in all its rugged beauty, not one missing; and there the Platte and Rocky Mountain cedars and the Concolor, and there the Chinese Arbor Vitæ. These five trees went unscathed through the fiery furnace, and perhaps I should also mention the Austrian pine. These all seemed to lift up their heads as to an old friend and said, "Did you say dronth? We have not noticed it." So there are things which will stand, and to these we give preference, and I know that amid the most adverse circumstances of hail and blizzard, and sirocco, there are things which will endure the test. I for one and with others have spent a good many thousands finding out what I could not do, but it is worth thousands more to find out what we can do, and there is no use in being discouraged. If the phlegmatic Hollander can smoke his pipe complacently while he raises his great Holsteins below the sea level, the Nebraska farmer should not be discouraged while he lives over an underground ocean. One uses a windmill to pump out the ocean, the other can use the same power, to a limited extent at least, to raise the inland sea. Artificial screen and shelters do much. I had one-half an acre under screen—an artificial forest, and thus sheltered it was wonderful how trees would grow and flowers would bloom, and how easy it was to raise seedlings and tender vegetables. Let a man think, study, read, and experiment, and with resources already at hand, he will be amazed at what he can accomplish.

I once visited the home of Webster with his old pastor, Rev. Alden, descendant of John and Priscilla. A poor piece of ground, but the touch of genius was there. There was the little office where he forged those mighty thunderbolts more vigorous than those welded by the hand of iron. There was where, while dying, he had the cattle driven by his window that he might see their honest faces and bid them goodbye. I looked over it, all that barren farm transformed into beauty, and then I wished we had the brains of a Webster to run every farm in Nebraska, and what a transformation would come over us. What we want is more brains and less weeds, smaller farms, better kept, and

fewer mortgages. Never one acre of land west of the Missouri river has ever been put to its fullest test. Yes, give us rich thought and we shall have a rich land. While genius is harnessing the powers above and around and making obedient servants of the lightnings, we want not altogether the genius which walks the air, but which will walk the earth and transform it and glorify it.

It is possible that the conditions of the other life will bear some resemblance to this. On this earth we find the key which unlocks many of the mysteries of other worlds. Here we have about seventy elements entering into combination to form this globe and some twenty-five of the same elements have been tossed upon this earth by those heavenly trumps the meteors, and the spectroscope shows that the flames burning in the mantles of the far off sun is the combustion of such material as earth affords. It may have been real gems John saw flashing in the wall of heaven. Horticulture stands looking from the fairest landscapes of earth with their wondrous adorning of shrub and tree and flowers of wondrous hue. Vast possibilities hem us in here. There will be a different world here a hundred years from now, and looking from the fields of future development, men will be impressed with the thought of more beyond. You know the legend of Gibraltar,—"*Ne plus ultra.*" The promise of more beyond meets us on every hand. You collect the fairest gems of earth and they awaken a longing for more beauty, more splendor. You listen to the strains of the sweetest song and you seem wet with the spray of a vast ocean of melody whose mighty billows roll in from the evermore. The highest art inspires an almost pensive longing for some higher art, which is to be unveiled hereafter. Beauty of gem, of foliage, and bloom are prophetic of the beauty of the Lord which is to be upon us. The poet tells of

> "Sweet fields beyond the swelling flood,
> And never withering flowers."

There the water of life's river irrigates the heavenly plains, and there is the tree of life in the fullness of its beauty and fruitage.

Sometimes there comes to the soul, as it nears the border, foretastes of the awaiting splendor. I cannot forget the vision of a little girl, who died on the frontier, who spoke in rapture of the wonderful farm filled with such beautiful trees and flowers. In October, during the great exposition, I lay at the point of death. I could almost look

over to the further shore. I remember one night we had just received news from some of our friends, and though but half conscious, I took in some of their descriptions of the beauties they saw and the raptures they awakened. There were descriptions of plants, flowers, tapestries, and adornings, and with the thought of all these things clinging about me, blending with the memory of the marvelous exhibits of the Massachusetts Horticultural Society, which I often attended, I went over into the land of dreams, and I wandered that night in an exposition which the genius and wealth of earth could never devise. I was in Elysian fields. The horizons were frescoed with the shifting and flashing splendors of the aurora borealis. Above, light itself had dissolved into rainbow hues and all the azure was aglow with unrivaled splendor. And such forests of flowers! You have seen vast bouquets of roses with their harmony of color. Such I saw, only they grew into trees of marvelous size, and from lowest twig to topmost bough one full blaze of beauty. There were vast and stately forests of azaleas and rhododendrons, strangers to our western eyes. There were forests of chrysanthemums vast as the trees of the Yosemite, and there I wandered back and forth in a very intoxication of rapture. It was the beauty of earth drawn out on a vaster scale. I awoke in the utter exhaustion of rapture. In the morning I told my friends Chicago was nowhere, and all its beauty was but dross, for I had been in a grander exposition than earth could possbly give. I do not claim the vision to have been an absolute unveiling of the reality, and yet it opened to me amazing possibilities. For beyond us is a country where our fairest dreams are verities; where the most adventurous fancy shall sit on a throne and be satisfied; where the wish shall be the reality. All things are yours; the universe is to be your university and eternity the term time. All the sciences true here are true beyond. We are destined for growth, not to be dwarfs. All truth is God's. Read his book of nature, as well as that of grace,—a book illustrated as no other volume can be, with vast nebulæ, which are cities of stars; with resplendent suns; with effulgence of the sky and ocean grandeur; with flash and sparkle of river and lake; with mountain sublimity; with glory of plain, forest, and landscape.

"THE PEACH IN NEBRASKA."—DISCUSSION.

ANSWERS BY J. M. RUSSELL.

QUESTION—I would like to ask Mr. Russell if he cannot find a freestone peach that will ripen as early as the cling?

ANSWER—Almost. I am going to show that pretty soon. I have the peach here on exhibition and will show it. This is the fruit. [Showing fruit.]

QUESTION—What name do you give it?

ANSWER—We call it "The Russell No. 1."

QUESTION—I would like to ask if there are some trees which bear one year and some another year, so that there is always some fruit?

ANSWER—No, sir; not always; some years we get none at all.

QUESTION—Is it because of the cultivation every other year?

ANSWER—No, sir.

QUESTION—Might you not get it started so that some trees would bear this year and some the next.

ANSWER—No, sir; some years all varieties will kill.

QUESTION—Is it not on account of the condition of the buds in the fall?

ANSWER—Yes, sir; I suppose the condition of the buds at that time has something to do with it.

QUESTION—I would like to ask if you think that the buds mature any better the year that you have the crop?

ANSWER—I suppose so. I cannot account for it. One year the sleet killed them. If the buds are soaked when the freezing begins it will kill them.

QUESTION—The question that I was going to ask was, what variety you would recommend if you were going to recommend but one variety. The one that would be most successful over the greatest territory.

ANSWER—I would recommend the Wright.

QUESTION—Have you ever tried early fall trimming to secure good, hardy buds?

ANSWER—I have not.

QUESTION—A man told me that he tried it, and the trees he cut back bore fruit while the same variety were a failure. He cut one-half of the limb. Is not that the California system of pruning?

ANSWER—Yes, sir; I think it is. I think they are practicing that in California quite largely.

IRRIGATION FOR ORCHARD AND GARDEN IN NEBRASKA.

I. N. FORT.

I am requested to confine myself to facts and results, as the theory of the benefits of irrigation for fruits is now acknowledged and admitted in our state.

The first successful orchard planted and grown in Lincoln county was created by a homesteader by the name of Edwin Myers, who located on a piece of government land near the mouth of Morin canyon, about twelve miles southeast of North Platte on the south side of the Platte river. Mr. Myers planted in 1876 an orchard of about one-half acre, consisting of apple, peach, pear, and other fruit trees. Not believing in the theory of the increase in rainfall, and having seen the benefits derived from irrigating while soldiering in Arizona and New Mexico, he collected all the empty barrels that he could gather from about the fort, seven miles east of his place. These he set where they could be pumped full by the windmill, and every evening about sundown the water was allowed to run off on to the orchard. Mr. Myers successfully raised quite a quantity of apples, peaches, and small fruit. He sold this place in 1886, and as the orchard passed into the hands of parties from the east who knew nothing of the value of irrigation, but little success has been the result until the past years. But since the irrigation movement has taken place, and now the owner is successfully raising fruit by the use of the old irrigation method of windmill and pump. Small fruits have borne splendidly on this place. Mr. Myers was also very successful with his garden.

In 1884 Harry Hershey, a resident of our county, moved upon the lands west of North Platte that could be irrigated by the North Platte

canal. Mr. Hershey at once planted a small orchard of two acres. The trees were of a number of the different hardy varieties, and consisted of apple, cherry, pear, and plum trees. With all these he has had splendid success. The trees have borne fruit steadily since 1889. His losses are very light. Mr. Hershey has had splendid success in growing grapes. These never fail to produce fruit every season. Mr. Hershey waters his trees twice during growing season, once immediately after the trees have blossomed and the small fruit commences to form; once when the fruit is increasing rapidly in size and give indications of ripening. Vegetables are grown between the rows, but that will be discontinued owing to the large size that the trees have now attained. With small fruits the yields of all varieties are enormous. Mr. Hershey has now about five acres in orchard.

H. Otter, whose farm is situated about six miles northwest of North Platte, is another successful irrigation farmer and fruit-grower. Mr. Otter has about ten acres now growing to fruit. His oldest trees are six years of age, and they have borne already quite a quantity of fruit. In 1895 he picked twenty bushels of apples from five of the oldest trees. All varieties of apples do well. Grapes give a very abundant yield, and Mr. Otter is demonstrating that with irrigation, Nebraska can excel in producing this class of fruit and of excellent quality.

William Park, of North Platte, has now thirty acres of fruit trees planted on his farm that is situated eight miles west of North Platte. As Mr. Park's trees have been planted but two years, it is too early to give any results. Irrigation is the method by which Mr. Park expects to raise fruit and compete with the Colorado and California fruit-growers. His orchard is planted every year to vegetables, and the water that is used to irrigate these crops also irrigates the trees. After the trees have commenced bearing, this will be discontinued in order to enable the trees to obtain all the subsistence possible from the soil. Mr. Park's trees are set out and planted on the Parker Earl block system. In his orchard he has the following varieties: Ben Davis, Jefferies, York Imperial, Maiden Blush, Red Astrachan, Baldwin, Stark, King, Shockley, Minkler, and all the standard varieties. In irrigating fruit trees no water is allowed to come in contact with the bark or trunk of the tree. On this farm the depth to water is ten feet. Mr. Park's trees are all in a healthy growing condition, and if

the success attained on smaller farms is any criterion, Mr. Park's orchard will in a few years return him a large income.

Another fruit-grower who expects to successfully raise fruit by irrigation in Lincoln county is William Conners. In 1895 Mr. Conners planted 11,000 fruit trees. Immediately after planting, the ground was well irrigated. As a result only twelve trees were lost from the whole number planted, a fraction over one per thousand; but few fruit-growers can show this result. Until the trees reach a bearing age, the land will be cultivated to crops that can be tilled.

N. B. Spurrier is another successful fruit-grower. On this farm five acres are now planted in orchard.

On the farm of Samuel Hostettor a fine orchard is now to be found with all the trees in a healthy growing condition. Mr. Hostettor's trees are as yet not of an age sufficient to show what the result will be for the larger varieties of fruit. During the past season of 1895 he sold two hundred dollars worth of grapes that were picked from his vines. His small fruits produce wonderfully under irrigation.

William White is another farmer who has now ten acres planted to fruit trees. Mr. Jenkins and David Hunter are also successfully growing fruit. All these farms lay west of North Platte, and they are irrigated by the North Platte canal.

One great difficulty the people of central and western Nebraska have met are the fallacies that have been current in relation to the proper method of growing fruit trees. The rules that were generally accepted as correct in Ohio and Indiana have been transplanted to Nebraska, with the result that failure has followed failure, and disastar succeded disaster.

The Nebraska statutes contain a law that encourages the planting of rows of trees on the north and west of each quarter section. Actual experience has shown that we should protect ourselves from the hot winds of the south and west. The north winds do us but little damage. We have discovered that in planting fruit trees a slope facing the north and east is bringing the most successful return to the fruit-grower. We have also discovered that we should trim our trees at the top so as to prevent the tree attaining any great height, the nearer we can make the tree grow in shape of an open umbrella the better the tree produces and thrives. We have also discovered that planting thickly is beneficial, and that where we can protect the soil

from the scorching rays of the sun, the growth and productiveness of the trees are accelerated and increased. We recommend that trees be planted from ten to eighteen feet apart; plums and peaches even nearer than these distances. But where trees are thus planted thickly, irrigation is imperatively required and necessary. In Lincoln county we have successfully grown peaches by this method.

There are two good examples of windmill irrigation that should be mentioned. J. C. Keen, who resides about seven miles north of North Platte, among what are known as the "sand hills," has an orchard of about three-fourths of an acre. He has been successfully irrigating this tract for about seven years. By the means of a twelve-foot windmill pumping the water from a well 120 feet deep, he has grown apples, pears, peaches, and other fruit that would compare favorably with the Grand Junction fruit of Colorado. His orchard is also in the garden and the water applied is made to do double duty. D. B. McNeal, who resides about twelve miles northwest of North Platte, whose orchard is also on a sand hill or ridge, has about an acre planted to fruit trees. He makes his water or mill do triple duty. The well is about twenty feet deep. The water is first pumped into the creamery tank, from this it flows into the cattle troughs or tanks in the corral; from thence, when any remains, it is conveyed into the orchard and garden. His trees are planted very thick, and they are protected on the south by the cattle sheds, on the west by a grove of cottonwood. The windmills used are the old-fashioned wooden pumping mills. Both these small orchards are situated on what we called "sand hill land." The garden is also situated with the orchard.

Another successful fruit-grower is William Stafford, of Big Springs, Neb. Mr. Stafford has now erected and at work six windmills, all pumping into a reservoir of about an acre in extent. His orchard occupies about five acres of land, and being young has only borne a small quantity of fruit, but he has no difficulty in maintaining a rapid and steady growth to his trees, and has demonstrated that all western Nebraska requires is water to make it the leading fruit section of the plains.

In regard to the cost of irrigation, this is difficult to state, as on all the orchards described the water is doing double duty by aiding in the growing of crops as well as trees. Our water rights cost us from $5 to $10 per acre. The annual charges vary from 25 cents to $1

annually. The cost of application amounts to about $1 per acre in labor per year applied to distributing water. A very economical method is now coming into use where trees are irrigated from wells by windmills that enables the farmer to utilize nearly every drop of water, and it is making fruit-growing by the means of windmill pumping plants practical. About four feet on each side of the tree there is set upright in the ground four joints of common drainage tile of about five or six inches in diameter and sixteen inches in length. By filling these joints with water during the growing season once or twice a day a large number of trees can be irrigated. By this method, as no water is lost by evaporation, it all goes down to the roots of the trees; the roots work down where the earth is cool and moist. By this system from ten to twenty acres could be successfully irrigated by the means of a sixteen-foot windmill pumping water from the depth of one hundred feet or more.

The results that have been obtained from irrigation by the different systems have practically proven that fruit-growing can be profitably and successfully carried on in any portion of Nebraska and crops obtained annually if the trees are properly supplied with sufficient moisture.

There have been several recommendations made when I stated the object of the inquiries. Three different farmers recommended that I advise grape growing; that grapes could be as successfully and easily grown, where the farmer would learn how, as potatoes. Plums and cherries were also recommended, and every variety of small fruits.

It is safe to assert that in the new era that is coming to Nebraska fruit-growing will become one of the most important of the leading industries of our state, and that Nebraska will successfully compete with California and Utah in the exportation of this class of farm production.

DISCUSSION.

QUESTION—At what distance from the trees are those tiles placed that you speak of.

MR. FORT—They advise placing them four feet or so on each side of the tree, from three to four feet. The advantage of that method is that none of the water is lost; it all goes down. The soil in the western part of our state during the growing season gets very hot and very dry, and a small quantity of water put upon the surface of the

ground will evaporate very quickly and the roots of the tree derive no benefit from it.

QUESTION—Have you had any success with fertilizers, or don't you use any?

MR. FORT—No, sir; the arid lands are the richest lands of America and there is no necessity for using fertilizers. They have never had the rains to leach out the mineral qualities in the soil.

MR. JENKINS—Do I understand you that on Mr. Park's land it is only ten feet to water?

MR. FORT—That is all.

QUESTION—Do the roots run down easily to water?

MR. FORT—I hardly think they would run down to water. Underlying all the land, after you get down two or three feet, is a stratum of clay mixed with alkali, and when the roots strike that they can't go through; but if you get it thoroughly saturated with water it becomes soft and the roots will work down.

QUESTION—What methods are being used for conveying the water by means of tiling?

MR. FORT—Oh, some use gas pipe, some buy this cheap locomotive boiler tubing, similar to what is used for making fences around the yards here in the city, and some use hose. I came across one man who had a hose made out of duck cloth sewed together and was irrigating his orchard and garden with that; it made a very cheap hose.

QUESTION—I asked that because I know that people when they first start in are so apt to think that it requires a very carefully constructed ditch, and that they must have all sorts of apparatus for running the water to where it is needed.

MR. FORT—Water runs down hill; we all know that. There is nothing difficult about this question of irrigation; it is the easiest thing imaginable. Just simply get your water up on the highest piece of land and let it run down hill. If you have a little valley between, throw up the earth and carry it over, or if there is higher ground, put in a siphon.

QUESTION—Would it not be a good deal of work to run the water from one pipe to another where you have two pipes, one on either side of the tree?

MR. FORT—I would arrange to run the water from one pipe to the other without too much labor. That plan is only recommended for

irrigation on a small scale where you only have to run the water one or two hundred feet, or where you are short on water and need to utilize every drop of it. It isn't practicable for a large orchard, and I do not recommend it in any case where the water is under two hundred feet. A very small amount of water will go a long ways if you handle it right.

QUESTION—Is any one using subirrigation in your country?

MR. FORT—They are using subirrigation all up along the valley of the Lodge Pole. They throw dikes across the Lodge Pole creek, along which the soil is gravelly, and the water pushes out on either side. There is a Mr. George, who lives south of Brady Island, and has a piece of land where the water is only four feet below the surface. He had a splendid crop every year, and in 1894 he had about sixty bushels of corn to the acre. This was by subirrigation; he didn't have to irrigate by ditches or canals.

DR. BESSEY—Mr. Fort, the inquiry has been made here at Lincoln and in this county whether it is possible to take water out of these streams successfully for irrigating purposes. We have a rather rolling country and our streams are rather low.

MR. FORT—In this section of the state canals would never be practicable, taking into consideration the large amount of annual rainfall and the fact that the water would have to be taken from the streams by machinery; and some of these old-fashioned machines that have been in use for three or four thousand years are just as good as the new-fashioned ones that have been patented, and they cost a good deal less. For instance, up at that Sidney convention, also at the Omaha convention, there was a man with one of those old Archimedes screws. He had gotten up what he called an invention for drilling wells with a screw for lifting the water, and he could lift more water with one of these screws for the amount of power applied than anything I have seen yet. And in the matter of pumps, the old-fashioned ship bilge pump is a good one. Mr. Coddington, of Kearney, has made a pump of that kind, though he hasn't any patent on it. The centrifugal pump will lift more water, where you have the power, than anything I know of. In Indiana last summer I saw one of those six-inch pumps lift water enough in four hours to irrigate two acres of land.

THE PRESIDENT—In this portion of the state we frequently have

frosts late in the spring. Now, I noticed this last summer, that a number of persons on the Blue river had an abundance of everything; their orchards bore well and their garden vegetables were not injured by the frosts in May. Have you noticed anything in your country that would indicate that a considerable amount of water would have a tendency to prevent injury by frost?

MR. FORT—I have never noticed anything of that kind there; I have been told that in New York along Long Island Sound they claim the moisture coming off the ocean tends to prevent any damage that might result from frost. We do not have enough moisture out where I live to judge of that question.

THE PRESIDENT—There is one point I would like to ask Mr. Fort about, that is the extent of irrigation in the state. How many miles of ditch are already constructed, and how many acres of land can be irrigated when those under construction are completed?

MR. FORT—The canals now constructed and under construction will irrigate a million acres; canals proposed, another million acres; the total irrigable area of the state—that which can be irrigated by canals, I mean—will not exceed three million acres. There are 49,500,000 acres in the state, so we have only forty-six and a half millions of acres yet to irrigate. And there is one thing I want to speak of that the people of Nebraska ought to take up, and that is windmill irrigation. We have 46,000,000 acres yet to irrigate, and there are probably not over 2,000,000 acres that will be irrigated by canals within the next twenty years, while there might be two or three or four or five million acres irrigated by pumping plants within the same length of time.

THE PRESIDENT—Can you give briefly some figures, say for five acres. What would it cost to put in a plant that would irrigate that amount of land profitably?

MR. FORT—That varies so much that it would be hard to tell. I visited about fifty pumping plants on the Platte river. One man was pumping from a well sixty feet deep three miles west of Paxton, and he told me that his entire plant did not cost him over $100; that did not include his labor; they don't count labor anything at the present time. Where the depth is not over 100 feet, in a good many cases pumping plants can be worked cheaper than you can buy water from these canal companies. Mr. Wilcox spoke about winter irrigation. I

saw an irrigated orchard of seventy acres where they pumped the water from a depth of 100 feet and it only cost from $100 to $150 to put it on the soil. Of course they have to exercise economy with water, construct reservoirs, etc. I used to be in the windmill business about twenty years ago, and I didn't have any faith in windmills irrigating any amount of land until I visited those fifty pumping plants and saw what they are doing.

QUESTION—Is the power entirely by wind?

MR. FORT—All by wind. Of course, in lifting water from wells they have to build reservoirs, and some are raising fish, and they cut ice off them in the winter time and use them for a number of different purposes. At one place they had a bath house and a little boat. That is just across the line of our state near Julesburg, Colorado.

W. F. JENKINS—My well is fifteen feet deep and I have a two-inch cylinder in it. The pipe is four feet in the gravel. I don't know how deep the gravel is below that. I would like to know how large a pipe I could sink there that would fill with water. I have a sixteen-foot mill.

MR. FORT—You would find there is a vast difference between a two or three inch cylinder and a six-inch cylinder. While you might have no difficulty in obtaining a sufficient amount of water for a two-inch cylinder, when you come to put in a six-inch cylinder it might make a great difference with that well. I don't advocate this theory of hydraulic wells for windmill purposes; I would rather dig right down and get a supply that you know will be sufficient. If you don't, something will be breaking all the time and giving you trouble. I wouldn't advocate these six or eight inch bored wells, such as they have over the state, for these large pumps at all. A sixteen-foot mill, one that runs slow, will work a five or six inch cylinder in a 200-foot well with a six to ten inch stroke, depending on the water supply—the freedom with which the water enters.

A. J. BROWN—How large a bore is necessary for a six-inch cylinder?

MR. FORT—That is a question that I cannot answer.

MR. BROWN—We have at our place two of those wells; they are ten-inch bore and have a stroke of nearly two feet. They are pumped by steam and the supply is inexhaustible.

MR. FORT—In a great many localities that might be true, but I

don't like to advocate anything of that kind unless you know you have a large supply of water.

A MEMBER—Do you advocate drive wells?

MR. FORT—No, sir; I do not. The water does not enter freely.

QUESTION—Do you find generally that the windmill is a reliable source of power so as to be depended upon?

MR. FORT—Yes, sir; I think west of the 100th meridian—west of Cozad—taking a mean average of the 365 days of the year it will average sixteen hours a day that the mill will work.

QUESTION—Would it be advisable to use these gasoline engines?

MR. FORT—I don't advocate anything of that kind that requires fuel and care.

A MEMBER—I noticed at Omaha last fall a windmill that is a marvel of simplicity and cheapness, manufactured at Silver City. Have you had any practical experience with that particular mill?

MR. FORT—I have never seen that mill. The mills are all too high priced.

A MEMBER—This mill sold for about $25.

MR. FORT—The old style Dutch mill with cross-sails that has been in use for centuries, with some few improvements, makes about as serviceable a mill for the amount of money invested in it as any I know of. Our people should be encouraged in constructing some cheap form of strong windmill suitable for irrigation plants.

A MEMBER—Why don't you call the law-makers' attention to that fact?

MR. FORT—I tried to and didn't have backing enough. I would like to have the people take that up.

A MEMBER—It seems to me the Society would back that up.

MR. FORT—The Horticultural Society of our state is the one that should push that thing. We have laws for the encouragement of canal irrigation, and windmill irrigation is fully as cheap if not cheaper. With canal irrigation you have lots of inconveniences, while with windmill irrigation those inconveniences are all your own. You have your plant and can take care of it yourself and have nobody to blame if it goes wrong. Another thing, we don't require the amount of water that they do in Colorado or New Mexico. From statements made by some of the windmill irrigators west of our town, I believe that six inches of water in connection with the rainfall would have been sufficient to insure splendid crops.

QUESTION—If you had an orchard in bearing, of course it would be forming fruit buds for the next year while the present crop is on the trees. Now, would it do to irrigate that orchard after the apples reach the size they would be at the time the fruit buds are forming for the next year?

MR. WILCOX—By irrigating an orchard after the apples are half-grown you can increase the actual size of the fruit fully one-fourth, and that is the very period at which the fruit buds are forming for the next year. That rule will apply to all kinds of fruit. Strawberries during the fruiting period should be irrigated at least every other day. We irrigate one day and pick the next. Another thing, you not only increase the size of the fruit, but you increase the yield of the tree. We never have an "off" year; our trees bear year in and year out. The trouble is we ruin our trees by growing too many apples on them.

QUESTION—Would you irrigate after the fruit was picked and the leaves had dropped so as to put the trees into good condition for winter?

MR. WILCOX—Yes, sir; we irrigate in November.

QUESTION—In this country would it be likely to bring the trees forward too early in the spring to have the ground saturated in November?

MR. WILCOX—No, sir.

QUESTION—It would do no harm to irrigate now, would it?

MR. WILCOX—It would be all right to go out to-day and irrigate.

MR. HARTLEY—About what is your average annual evaporation?

MR. WILCOX—We lose one-third of our water from evaporation.

MR. FORT—In northern Indiana this year if I saw one barrel of apples lying under the trees I saw 10,000. The apples were nearly ripened, but it kept getting drier and drier until the trees were compelled to drop their fruit. Do you have any trouble of that kind in your country, Mr. Wilcox?

MR. WILCOX—The apples never fall for us; no, sir. In regard to retarding the blossoms by means of moisture, I want to say that there is nothing in that theory whatever. We have made thorough demonstrations in western Colorado, where we piled up ice two feet deep for six or eight feet all around a tree and then mulched it to keep it frozen, and I tell you there wasn't fifteen minutes difference in the blossoming of those trees. [Laughter.]

QUESTION—If the ground under them was frozen wouldn't it make a difference?

MR. WILCOX—The ground was frozen, but we packed this ice around them as a precautionary measure. There is nothing in it whatever.

PROF. F. W. CARD—At Cornell it was demonstrated very thoroughly that the blossoming depends on the temperature of the air and not on the temperature of the soil. A branch of a tree that grew near a window was brought inside by means of raising the sash, and that branch went on and budded and blossomed inside while everything outside was frozen up.

DR. BESSEY—Mr. Chairman, just a word. This question has been settled, but I want to get in my botanical word, because science always settles these things after people have talked about them. The experiment that Professor Card refers to demonstrates exactly what Mr. Wilcox has said. The fact is that the plant has in it the means of doing its own work. This error comes from another error that I have been trying to root out of the horticultural societies of Iowa and Nebraska for a good many years. I have gotten it pretty well rooted out, but I find the question occasionally coming up. That error is the old theory that a tree in the fall runs its sap down into the ground, and then in the spring it comes up out of the ground. That is absolute error. Investigations have proved that there is more sap in a tree in the winter time than there is in the summer. In order to emphasize the absurdity of this theory of the sap going down into the ground in the fall and coming up out of the ground in the spring, I want to tell you a story. An engineer engaged in some work in one of the southern states was working up a canyon. He had observed every once in a while there was a heavy freshet which he supposed to be from a sudden rain up stream. One day, as he was working up stream, suddenly the creek began to rise rapidly, and as he passed along he met a native and said to him: "It must have been raining up the canyon."

The native looked at him and said: "Naw."

"What does it mean?"

"It's a sap-rise."

That didn't explain it to this engineer, and he said: "What's a 'sap-rise'?"

The man looked at him with a sort of pity and said: "In the fall the sap goes down into the roots, and when it gets there it comes out of the roots into the ground and runs out into the creeks and makes this rise." [Laughter.] But that we don't believe up north.

People used to think that it was absolutely necessary that the roots should be active in the spring before the tops could be, but that is not true, as you can easily demonstrate for yourself. Just cut off a few twigs that have fruit buds on them, bring them into the house and put them where they will have sufficient moisture to start them, and they will throw themselves into blossoming, although they haven't a sign of root at all. A few years ago when I wanted to have some drawings made of the flowers of the common little sand cherry I simply got some cuttings and set them in the greenhouse; they didn't strike root at all, but simply absorbed moisture enough and came out into full bloom. Then there's that old experiment made long ago at Cornell University of taking a grape-vine in the dead of winter and bringing part of it inside. The roots and all on the outside were frozen solid, but inside the buds opened and the flowers came out. So I think, Mr. Wilcox, your position is demonstrated, and there is no need of laughing at you.

QUESTION—I would like to ask Professor Bessey one question. Is there any probability that a tree would come into bloom if it were mulched and frozen around the roots?

DR. BESSEY—Yes, sir; certainly.

MR. YOUNGERS—If you lay that tree down and cover the tops over and keep them frozen, it won't blossom. [Laughter.]

QUESTION—If there is more sap in a tree in the winter time than in the summer, what is the reason the bark will slip in the summer and will not in the winter?

DR. BESSEY—There is no connection between those two facts at all. The reason why the bark slips at certain times in the year is this: There is a little belt of new cells—it has nothing to do with the sap at all—simply a little belt of new cells forming around the outside of the wood. When these are young and soft they will be easily broken; when they grow older they become hard and you can't break them.

QUESTION—What is the object in being more water in a tree in the winter than in the summer?

DR. BESSEY—There is no "object" in it at all. A plant is just

like a water tank in one respect. Suppose you had a water tank that held a million barrels of water; suppose that tank is leaking all the time; now suppose the leaks all freeze up and your pump keeps going for a while. During that time your tank will be full, but you can't have it full in the summer when it is leaking all the time. A tree has these little pumps—little roots—down in the ground at work bringing in moisture. In the summer time there are thousands of leaves all over the surface; they are porous, the water passes off, and the tree is never full in the summer time any more than a leaky water tank can be made full. In the fall the leaves drop, the buds are sealed over, and it has no chance for leaking, but these little roots are pumping away until everything is frozen up, and in that way they fill the tree. A tree is simply filled up because of the fact that the roots are pumping away. There is no object in it, but simply that's the nature of the thing and it can't help it; that's just the word, it can't help it.

NOTES ON THE BOTANY OF THE STRAWBERRY.

CHARLES E. BESSEY.

There are less than a dozen species of strawberries (*Fragaria*) in the world, more than half of which (seven) are natives of North America. They resemble one another very closely, and are quite difficult to separate, especially when they have been modified by long cultivation; in fact, it is probable that the eleven species enumerated below could be easily reduced to five or at most six.

The genus *Fragaria* may be described as follows:

FRAGARIA L., Sp. Pl., 494 (1753).—THE STRAWBERRY.—Flowers hermaphrodite or polygamo-dicœcious; receptacle enlarged, conical or spheroidal, bearing the numerous small one-ovuled pistils, which eventually become seed-like, dry, indehiscent fruits ("seed"); sepals five, green; petals five, white or rarely pinkish; stamens many, in some varieties imperfect on some of the flowers, such flowers being known as pistillate. The plants are perennial, bearing trifoliate leaves (rarely simple, lobed leaves); their lateral branches form runners which strike root and give rise to new plants. They are natives of temperate and Alpine regions throughout the northern hemisphere, and occur in the mountains of

South America. They do not occur otherwise in the southern hemisphere, except under cultivation.

The species taken up in this paper may be summarily characterized as follows:

	Original Home.			
	Europe.	Asia.	North America.	South America.
A. "Berry" smooth; "seeds" superficial.				
1. Silky hairy plant.....*F. vesca*.....	*	*	*	
2. Silky hairy plant; leaves thin.....*F. collina*.....	*			
3. Softly villose plant; leaves thin.....*F. americana*...	.....	.....	*	
4. Somewhat villose plant; leaves thin.....*F. californica*..	.....	.....	*	
5. Leaves smooth above, silky below.....*F. canadensis*...	.....	.....	*	
6. Smooth plant.....*F. dalloniana*..	.....	*		
7. Very villose plant.....*F. nilgerrensis*.....	.....	*		
B. "Berry" pitted; "seeds" in little hollows.				
8. Densely villose plant.....*F. chiloensis*...	.....	.....	*	*
9. Villose plant; leaves coriaceous, *F. virginiana-illinoiensis*.....	.....	.....	*	
10. Silky plant; leaves coriaceous.....*F. virginiana*..	.....	.....	*	
11. Smooth plant; leaves subcoriaceous.....*F. moschata*....	*			

1. *Fragaria vesca* L., Sp. Pl., 494 (1753).—Alpine Strawberry.—Leaflets usually stalkless, one to two inches long, obliquely ovate or oblong, coarsely toothed or serrate on the margin, plaited, the lateral sometimes cleft; flower-stalks, with silky-appressed hairs; flowers hermaphrodite, one-half to three-fourths of an inch in diameter, on a slender scape, which bears a small involucre; fruit borne above the leaves, the receptacle ("berry") small, sweet, smooth, not pitted, bearing the "seeds" superficially.—Native of Europe, Asia, and probably of North America also.

This sweet strawberry is still somewhat grown in Europe, but its "berries" are much too small for practical use.

2. *Fragaria collina* Ehrh., Beitr., VII, 26 (1792).—Leaflets plicate, thin, silky above, hairy below; flowers hermaphrodite; fruit ("berry") erect, bearing superficial "seeds."—Native of northern, central, and southern Europe.

3. *Fragaria americana* (Porter) Britton, Bull. Torr. Club, 19, 122 (1892).—Plant softly villose; leaves thin, becoming smooth with age, sharply serrate-dentate; flower-stalk slender, with a small involucre;

flowers small; fruit ("berry") ovoid, of a light pink color, smooth and shining, not pitted; "seeds" prominent, and barely attached.—North America, from the Appalachian mountains to Michigan, Virginia, and probably farther west and south.

4. *Fragaria californica* Cham. & Schlecht., in Linnæa, II, 20 (1827).—Low, somewhat villose, with spreading hairs; leaves thin, the leaflets cuneate-obovate, and rounded, sparingly villose on the upper side, somewhat appressed-hairy below; flower peduncles usually slender; flowers small, half an inch broad, calyx-lobes often toothed or cleft; fruit ("berry") small, with superficial "seeds."—Native of the western region, from New Mexico to Mt. Diablo and Oakland, California.

5. *Fragaria canadensis* Michx., Fl. Bor. Am., I, 299 (1803).—Plant slender; leaflets oblong (or middle one obovate) and cuneate at base, all obtuse, rather sparingly and not deeply toothed, averaging an inch and a quarter long by a little more than half an inch wide, quite smooth on the upper surface when young, pale and more or less pubescent beneath; flowers few, about half an inch or a little more in diameter, on slender pedicels; hairs on the flower-stalk appressed.—A native of Canada and Arctic America, occurring also in the Black Hills of South Dakota.

6. *Fragaria daltoniana* J. Gay, in Ann. Sci. Nat., ser. IV., vol. 8, 204 (1857).—A low plant with small leaves; leaflets elliptical, dentate, almost smooth; fruit three-fourths of an inch long, erect, conical, minutely hairy between the small, superficial "seeds."—Native of Sikkim, Asia.

7. *Fragaria nilgerrensis* Schlecht. ex J. Gay, in Ann. Sci. Nat., ser. IV, vol. 8, 206 (1857).—A robust, large-leaved, very villose plant; leaflets elliptical, sessile; "berry" hairy, with superficial "seeds."—Native of the East Indies.

8. *Fragaria chiloensis* Duchesne, Hist. Nat. Frais., 165 (1766).—CHILIAN STRAWBERRY.—Plant usually low, and densely villose, with silky hairs, which are spreading upon the petioles and flower-stalks, and appressed on the under side of the leaves; flower-stalks and petioles rather stout; leaflets thick, perfectly smooth above, cuneate-obovate, rounded at the apex; flowers large (often one inch broad); fruit ("berry") with small pits on the surface in which the "seeds" are sunken.—Native of Western, North, and South America.

This species, known as the Chilian strawberry, or Pine strawberry, was introduced in Europe in 1712, and from this a little more than a hundred years later sprang the earlier of our American varieties after having been imported again to this country. These earlier varieties were the Hovey, Boston Pine, and Wilson. The appearance of other varieties of this species has brought about the practical extinction of these early varieties.

9. *Fragaria virginiana-illinoiensis* Prince, Gray's Man., Ed. 5, 155 (1867).—PRAIRIE STRAWBERRY.—A large plant with spreading hairs on the petioles and flower-stalks; leaflets firm and coriaceous; flowers often with imperfect stamens (pistillate); sepals, after blossoming, erect; fruit ("berry") with small pits, containing the sunken "seeds;" fruit-clusters below the large leaves.—Native of North America, from western New York to Minnesota and westward.

10. *Fragaria virginiana* Duchesne, Hist. Nat. Frais., 204 (1766).—LARGE EASTERN STRAWBERRY.—A smaller plant than the preceding, with the hairs on the petioles and flower-stalks silky-appressed; leaflets firm and coriaceous; sepals, after blossoming, erect; fruit ("berry") with a narrow neck at base, the surface deeply pitted.—Common in the eastern United States.

11. *Fragaria moschata* Duchesne, Hist. Nat. Frais., 145 (1766).—HAUTBOIS STRAWBERRY.—Leaflets plicate, subcoriaceous, smooth, green; flowers often with imperfect stamens (pistillate); sepals, after blossoming, reflexed; fruit ("berry") firm, adhering slightly to the calyx, its surface bearing few "seeds, which are sunken in pits.—Native of central and southern Europe.

This species is still somewhat cultivated in Europe and this country, but only to a limited extent. In the books this is generally known under the name of *Fragaria elatior*, but Duchesne's name has priority and must be used.

It will be noticed that I have not made mention of *Fragaria grandiflora*, to which reference is so generally made in horticultural works, but upon more careful study of all the species, it appears that there is no such thing as *grandiflora*. Certain forms, probably resulting from the crossing of species, have given rise to the notion that there must be such a species, but it has no foundation in Nature.

THE BOTANY OF THE BUSH FRUITS.

FRED W. CARD.

The term "bush fruits" is a comprehensive name, including small, shrubby, fruit-bearing plants in general. The most important of these are the raspberry and blackberry family, the currant and gooseberry family, the juneberry, the buffalo berry, the tree cranberry, and the goumi.

Several botanical forms of the juneberry are in cultivation. The one which is perhaps the most promising of all for the west is that known as *Amelanchier alnifolia* Nutt. This is primarily a western species, being found in the Rocky mountains and westward, but it also extends eastward into Nebraska, Minnesota, and even northern Michigan. It is a shrub ranging from three to eight feet in height, and differs from the eastern juneberries chiefly in its broadly elliptical or roundish-obtnse leaves, which are coarsely toothed toward the summit.

The other prominent type in cultivation is that known as *A. canadensis*, var. *oblongifolia* Torr. & Gray. This is a dwarf form of the juneberry or shad-bush of the eastern states, differing from the latter chiefly in its blunt and woolly leaves and woolly racemes which appear with the leaves, while in the species itself the flowers come in advance of the leaves. The variety known as Success belongs to this type. The genus *Amelanchier* is a difficult one from a botanical point of view and there seems to be some confusion in regard to the different forms.

The tree-cranberry, so called, is a species of *Viburnum*, not a cranberry in any sense of the word. The particular species is *Viburnum opulus* Linn. In cultivation this has been made to vary in the direction of having its flowers changed into enlarged corollas and is planted for ornament under the names Gnelder-rose and Snowball Tree. Such flowers are sterile and produce no fruit. The fruit of the wild form resembles that of the cranberry in shape and color, but is quite different in flavor. Its chief drawback is to be found in the large seeds.

It is well worthy of attention as an ornamental plant, the berries remaining until late in autumn or winter. When grown for this purpose it will well repay the attempt, but no one should purchase it expecting it to be a substitute for the true cranberry as a fruit plant.

The buffalo berry belongs to the Oleaster family, its scientific name being *Shepherdia argentea* Nutt. It is widely distributed over the plains and mountains in the western and northwestern parts of the country. Its dicecious character, having staminate flowers on one plant and pistillate flowers on another, make it necessary to see that plants of both sorts are growing together in order to insure fruit. Its fruit possesses a sprightly and very agreeable flavor, but is small and borne among numerous thorns, so that it is not very promising from an economic standpoint. This plant has also ornamental characters which give it some recommendation.

The goumi is more commonly known under its scientific name, *Elœagnus longipes* Gray. It is a near relative of the buffalo berry and still more closely related to the "Russian olive" which has proved such a hardy and reliable ornamental tree in the west. The fruit of this is borne on long slender stems hanging thickly along the under side of the branches. It ripens in July in middle latitudes and is about one-half by three-fourths of an inch in diameter, containing one large shapely seed. It is relished by some but is generally thought to be too acid for desert use, being used in much the same way that cranberries are. Altogether it seems to be a plant worthy of trial, but attempts to get it established at the Experiment Station farm have thus far failed.

The Raspberry and Blackberry Family.

The genus *Rubus*, to which the raspberries, blackberries, and dewberries belong, is a very large genus, widely scattered over the earth. Like most of our fruits this genus belongs to the Rose family. It is more liberally represented in the old than in the new world, yet even in our own country there are far too many species to be included within the limits of the present paper. The following list, therefore, will include, in the main, only such species and botanical varieties as are known to be in cultivation in the United States.

RUBUS.

§ 1. Fruit parting from the receptacle when ripe. (Raspberries.)

* Leaves simple; flowers large; no prickles.

Rubus odoratus L.—PURPLE FLOWERING RASPBERRY; THIMBLEBERRY.—This is an upright, shrubby, branching bush, growing from three to five feet in height, with large three to five lobed leaves, cordate at base. The buds and flower stems are densely covered with clammy glandular hairs, which extend down to the upper parts of the stem. The flowers are large and showy, of a purplish-rose color. The fruit is broad and flat, red, with a pleasant flavor. The species is found throughout the eastern part of the country from Nova Scotia to Florida and westward as far as Michigan.

This is much prized as an ornamental plant in England, and is cultivated in a limited way in this country. If we had to import it from across the water it would doubtless be in many more gardens than it is. It blooms and fruits throughout a long portion of the season, which is a strong point in its favor. It is said not to fruit well in cultivation, but this might not prove true with more extended trials, especially if plants were grown from seed. It is to be doubted whether it can be made to thrive well in the hot and dry climate of the interior.

Rubus parviflorus Nutt.—SALMON BERRY.—This is more commonly referred to under the name *R. nutkanus*, but that is a later name and must give way to the one first given. The common name salmon berry is also applied to a different species along the Pacific coast. Practically speaking this may be considered as a white flowered *Rubus odoratus*, since it bears white instead of purple flowers, though differing in some of its botanical characters. It is found from Monterey to Alaska, and eastward to New Mexico and Lake Superior.

This, too, has received some attention in England and is a very attractive shrub and well worthy a place where it can be grown. Although found in severe climates it is reported as not hardy at the Arnold Arboretum, but the plants there growing were from seeds collected in a mild climate.

Rubus deliciosus James.—This is an upright, branching, woody shrub, three or four feet high. The canes are thornless, often with the bark loosened and shredded. The leaves are roundish kidney-

shaped, but somewhat three to five lobed, slightly rough, and measuring from one to two inches across. The flowers are white, one to two inches across, and are mostly borne alone. The fruit somewhat resembles a red raspberry, but has a dull reddish or dirty wine color. It is found in the Rocky mountains, about the sources of the Missouri and canyons of the Colorado.

Although the fruit of this beautiful species was originally described as delicious, it is not likely to be called so by any except a hungry collector, climbing over the boulders of the Rockies. To most palates it is decidedly insipid, and lacking in flavor, though in no sense disagreeable. The seeds are rather large, without a proportionate amount of pulp. The plant deserves a high place for its ornamental qualities, however, and the scent of the foliage and flowers may well receive the designation delicious if the fruit does not merit it. Its desirable qualities have been long known in England, where it seems to be better appreciated than here, since it has been frequently figured and described in English horticultural journals. It is said to be perfectly hardy at the Arnold Arboretum, though seldom bearing fruit. It is somewhat difficult to propagate, since it does not throw up suckers. This has doubtless had much to do with its being so little known. It can be propagated from seeds, root cuttings, or stem cuttings, though the cuttings are said not to root very readily.

** Leaves simple; flowers small; canes more or less prickly.

Rubus crataegifolius Bunge.—CHINESE RASPBERRY.—This is a shrubby plant, three to six feet in height, and not unlike the preceding species in habit of growth. Its canes are armed with a few straight prickles. The leaves are three to five lobed, the lobes sharp pointed and jagged, the middle one long and often narrowed at the base. The veins beneath, and leaf-stalks bear scattering, minute recurved prickles. The leafy shoots are terminated by clusters of small white flowers, nearly half an inch across, but quite inconspicuous. The fruit is bright red or orange-scarlet in color, and is made up of few grains, acid, but not unpleasant in flavor. This species is a native of Manchuria, northern China, and Japan.

Like the preceding species, it cannot be recommended for its fruit, though it might have some value used as a parent in hybridizing. Its chief merit is as an ornamental, to which purpose its many good characters render it well adapted. It is especially promising for the west-

ern plains, where satisfactory ornamentals are at a premium. Further trials may develop some weaknesses not yet shown, but it seems to thrive well in the hot dry summers for which this region is noted. Its habit of growth is pleasing, forming free and graceful clumps, its foliage bright and attractive, and furthermore it presents quite desirable autumn tints, a thing much lacking in this particular region.

*** Leaves made up of three to five leaflets.

Rubus idæus Linn.—EUROPEAN RASPBERRY.—This is so similar to our own common red raspberry that it is difficult to distinguish them by strictly botanical characters, especially in the variable forms found under cultivation. It differs quite distinctly from the American species in its horticultural characters, however. It is less hardy, poorly adapted to our climate, and continues in bearing during a longer period. Wild forms appear to be less glandular and the calyx is more woolly than in the American raspberry. In its native state it is widely distributed throughout Europe and western Asia.

This is the parent of all the older garden varieties imported from Europe which ushered in the great raspberry industry of the United States. Its history in this connection is an interesting one, being not unlike that of many other European fruits. Over 100 varieties of this species are known to have been introduced in this country, but none of them have taken kindly to our climate and few of them are now known. The quality of their fruit is considered superior to that of varieties belonging to the American species, and they are occasionally grown in a small way by amateurs. It is to this class that the Falstaff, Fontenay, Red and White Antwerp, Brinckle's Orange, and others belong.

Rubus strigosus Michx.—WILD RED RASPBERRY.—This is the common red raspberry of the United States. Its stems are a little more slender than those of *Rubus idæus*, usually brown or reddish-brown in color and beset with stiff, straight prickles. The flower and leaf-stalks and calyx are covered with glandular tipped hairs in the wild type, though these largely disappear in the cultivated forms. The leaves of the bearing canes have three leaflets, and those of the young canes mostly five. The fruit ripens quite unevenly, but not through as long a period as that of the European varieties. It is found growing wild from North Carolina to New Mexico and far

northward. It is also said to occur in Siberia from Altai to Kamchatka, in Manchuria, and northern Japan.

Although apparently starting so much behind in the race for recognition, its inherent hardiness and susceptibility to improvement has enabled it to far outstrip its European relative in popularity. All of the important commercial varieties of the present day, such as the Turner, Marlboro, and Cuthbert, belong here. A white form is occasionally found growing wild, and is represented in cultivation by the variety known as Meredith Queen. The fruit of this is small, soft, amber-white, with prominent grooved drupes.

Rubus neglectus Peck.—This is the name given to the forms intermediate between the black and red raspberry. Although the above specific name has been given to the typical form, it is quite probable that all are hybrids between these two species. The habit of the different forms varies, but in the typical one it resembles the black raspberry in habit of growth, with long canes rooting at the tips. The leaves of the bearing canes have three leaflets, those of the young canes from three to five. The fruiting cluster partakes of the intermediate character between the black and red, being somewhat aggregated at the tip, but extending downward more than in the blacks. While the typical form is of this character, propagating by tips, there are others like the red raspberry in habits of growth and propagating by suckers. The form is probably quite generally distributed with the two species which it connects.

This type was early brought into cultivation in the old variety known as Purple Cane. At least twenty-five varieties with characters intermediate between the reds and blacks have been introduced. They form quite distinct variations among themselves, some approaching very near to the red raspberry in character, while others are still closer to the blacks than the ordinary type.

Rubus occidentalis Linn.—Black Raspberry; Blackcap.—In this species the canes are long and recurved, at length taking root at the tips. The prickles are strong and recurved, and the leaves as a rule have only three leaflets on both the bearing canes and the young shoots. The flower cluster is aggregated in a close cluster at the tip of the flowering branches. The fruit is hemispherical, firm, and black, though yellow forms are found. The species is widely distributed, extending from the mountains of Georgia westward to Mis-

souri and the sources of the Oregon, and far northward into British America.

The black raspberry was first brought under garden culture about 1850, being much younger in cultivation than the other raspberries, but in spite of this fact it is to-day of much greater importance than the others. This is largely due to the fact of its greater productiveness, its wider adaptation, and the fact that it can be grown as a farm crop for evaporating purposes.

Rubus leucodermis Doug.—This species is very similar to the black raspberry, differing from it chiefly in the color of the fruit, which is yellowish-red. In forms which are supposed to be typical the leaflets are more coarsely toothed and the prickles stouter and more strongly hooked, though these latter characters do not always hold. Practically speaking it is a yellow-fruited black raspberry, though its distribution is entirely different from that of the black raspberry. It is found in the mountains of Arizona, California, Oregon, Washington, and northern Utah. It seems never to have been introduced into cultivation.

Rubus phœnicolasius Maxim.—JAPANESE WINEBERRY.—This resembles the raspberries in habit, but its canes are densely covered with reddish glandular tipped hairs. Occasional, long, straight prickles intermingle with these, becoming recurved on the leaf-stalk and veins of the leaves beneath. The leaf is made up of three broadly ovate and sharp-pointed leaflets, which are whitened downy on the under side. The hairy calyx clasps the fruit closely until the berry is nearly ripe, when the calyx folds back exposing the fruit. The fruit is usually small, red, sour, and somewhat crumbly. The plant is found wild on the islands of Yezzo and Nippon in Japan. It was first described by a Russian botanist in 1872. Since that date it has been frequently mentioned both in English and American horticultural journals. It is chiefly valuable as an ornamental plant, owing to its striking appearance. It is not generally hardy in the northern states and is not likely to succeed in the trying climate of the plains.

Rubus spectabilis Pursh.—SALMON BERRY of the Pacific coast.—This is a rather robust bush five to ten feet high, armed with straight or ascending prickles. The leaves consist of three leaflets or are occasionally simple, glossy beneath. The leaflets are sharp-pointed with doubly cut edges, and often two to three lobed. The flowers are

borne singly or in pairs, are red or purple, large and showy. The fruit is large, shaped somewhat like a blackberry, red or yellow, but too sparingly produced to be of great value. The plant is found along the Pacific coast from California northward to Alaska.

This is a desirable ornamental plant, both owing to the abundance of its foliage and the beauty of its flowers. It was long ago introduced in England, and is said to have become naturalized in Kent, where it is known under the name of Woodman's Rose. It propagates from suckers. Although known as Salmon Berry on the Pacific coast, it is an entirely different plant from the *R. parviflorus* which bears the name Salmon Berry in other parts of the country, especially the Rocky mountain region.

§ 2. Fruit adhering to the receptacle.

* Stems upright; naturally propagating by suckers.

Rubus villosus Ait.—Common or High Blackberry.—A shrubby plant, one to six feet high, stems upright or reclining, armed with stout curved prickles. The young branches, together with the leaf and flower stalks, are covered with glandular tipped hairs. The leaves usually have three leaflets on the fruiting canes and five on the young canes. The flower cluster is a long, leafless raceme, with the individual flowers standing out at almost right angles from the central stem. The fruit is normally oblong or thimble-shaped, though sometimes nearly globular. It is sweet, dull black in color, with small drupelets, closely packed together. In cultivation, and even in the wild state, it varies widely, however. The species is very common throughout the eastern portion of the United States, extending far northward into British America.

Although young in cultivation, this has come to be one of our most important garden fruits. The first variety to be introduced was the Dorchester which was exhibited before the Massachusetts Horticultural Society in 1841. This was followed by the Lawton, while from that time on varieties have increased rapidly.

Var. *albinus* Bailey.—White Blackberry.—In this form the canes are nearly round, yellowish-green, with the leaflets mostly three even on the young canes, while the fruit is pinkish-cream or amber colored. Although apparently never very abundant, this form is frequently found growing wild. It has also been introduced into cultivation at times, but has never proved really valuable.

Var. *frondosus* Torr.—In this form the plant is lower and more bushy, the leaflets narrower, and the flower cluster shorter, having simple leaves intermingled with the flowers, giving a leafy appearance. This type is more or less commonly found wild and is represented in cultivation by the Early Harvest. The Dorchester, which was the first blackberry introduced, also seems to belong to this type.

The blackberries as a whole are wonderfully variable, and several other forms have been described as botanical varieties, but they are either of comparatively little importance or are not represented in cultivation. Among the commoner cultivated varieties the Taylor seems to resemble the original specific type most closely, at least in character of fruit.

Rubus villosus × *canadensis.*—Various intermediate forms between the blackberry and the dewberry are frequently found where these two species are growing together. The forms possess various intermediate gradations, sometimes closely resembling the blackberry and in other cases more closely approaching the dewberry.

This type is represented in cultivation by the Early Wilson, Wilson, Jr., and Thompson's Early Mammoth. These propagate either by suckers or by tips, though not very freely by either method.

Rubus millspaughi Britt.—Thornless or Mountain Blackberry.—This species is characterized by its smooth, unarmed canes, being wholly thornless except on the smaller branches and veins of the leaflets. The leaflets are narrower, sharp-pointed, with the upper ones borne on long, slender leaf-stalks. The flower cluster is generally shorter and more compact than in *Rubus villosus* and not glandular. The fruit is bright glossy black, short and roundish, with larger drupes. It is sour until fully ripe, often possessing something of a bitter taste. It ripens later than the common form and is not so well liked.

This species is common in the Alleghany mountains, and probably descends to lower elevations northward. It is as common as the ordinary blackberry in the regions where it is found. It seems never to have been introduced into cultivation.

Rubus cuneifolius Pursh.—Sand Blackberry.—This is a sturdy little shrub from one to three feet high, armed with vicious recurved thorns. The leaflets are inverse wedge-shaped, whitened woolly be-

neath, three on the bearing canes and five on the young canes. The clusters are few-flowered, opening from the center outward. The fruit is roundish and of excellent quality. The species is found in sandy woods from southern New York and Pennsylvania to Florida, and west to Louisiana and Missouri.

This species is represented in cultivation by the Topsy, or Child's Tree blackberry.

** Stems trailing; propagating naturally by tips.

Rubus canadensis Linn.—DEWBERRY; LOW BLACKBERRY.—This plant has shrubby, long, trailing stems, sparsely and lightly prickly. The leaflets are three as a rule, both on the bearing canes and young canes. The clusters are few flowered, opening from within outward, the lower flowers borne on long stems so that they are nearly even with the center one. These flower-stalks may be slightly fuzzy but are not glandular. This habit of the flower-cluster, opening from within outward, is one of the chief distinguishing features between this species and *Rubus villosus*, which blooms from below upward as a rule. The fruit resembles the blackberry, though ripening earlier. It appears to be variable in quality, in some cases surpassing the blackberry, in others being inferior. The species is found from Newfoundland to Virginia, and westward to eastern Kansas and central Minnesota.

This species, with its botanical varieties, forms the foundation type to which most of our cultivated dewberries belong. It is one of the most recent members of the family to make its acquaintance in our gardens, and it is yet almost too soon to predict what its future will be. It has received widely varying reports, in some cases giving good satisfaction to the grower, in others proving a failure. We shall doubtless reap better results with it when we come to know it better. The species proper is represented in cultivation by the Windom, Lucretia's Sister, and Geer.

Var. *roribaccus* Bailey.—This is the botanical name given to the Lucretia dewberry. It is a stronger plant, with wedge-ovate jagged leaflets, long flower-stalks, and large flowers. The sepals are also large and leaf-like, often an inch long. It is said to grow wild in West Virginia.

Var. *invisus* Bailey.—In this form the stems are stout and stiff, often

partially ascending, with *straight* reflexed prickles. The leaflets are larger than in the wild type, with large and simple teeth. The flower-stems are long and straight, glandular in the wild type. The buds before opening usually bear a noticeable tip, formed by the ends of the sepals clasping around it. The flowers are large and overtop the leaves. The fruit is globular oblong and of good size. This is found wild at Ithaca, N. Y., and probably elsewhere. It is represented in cultivation by the Bartel, General Grant, and Never Fail varieties.

Rubus trivialis Michx.—Southern Dewberry.—This species has round, shrubby, trailing stems, beset with strongly recurved or reflexed prickles and glandular tipped hairs and bristles. The leaves are evergreen, leathery, and smooth, with numerous stout recurved or reflexed prickles on the veins and petioles as well as on the flower-stems. The fruit is oblong, black, and good. It is found wild in sandy soil from Virginia to Florida, and west to Texas and Missouri. This, as will be seen from its distribution, is the common dewberry of the south, and is represented in cultivation by the Manatee and Wilson's White.

Rubus vitifolius Cham. & Schlecht.—Pacific Coast Dewberry. —This has round woody stems, usually weak and trailing, but sometimes upright. The fruiting branches are numerous, armed with slender prickles, the smaller parts of the plant often being densely covered with them. The fruit is oblong, black. The species is common in the coast ranges of California and Oregon, the valley of the Willamette, also in Idaho. It is an exceedingly variable species, as shown by the fact that different forms of it were described on succeeding pages by the same authors as different species. Some plants bear perfect flowers, some pistillate flowers, with abortive stamens, and others staminate flowers with abortive pistils. Some are wholly trailing, while others have strong, nearly upright stems. The staminate forms are said to be the stouter as a rule, while the pistillate forms have narrower, more sharply serrate, thinner and smoother leaves with smaller flowers. The Skagit Chief and Belle of Washington dewberries belong to this species.

Rubus laciniatus Willd.—Cut-leaved Blackberry.—This has round trailing stems, armed with strong recurved prickles. The leaves are much parted and divided, giving rise to the name "Cut-leaved or Parsley-leaved." They are persistent and evergreen in mild climates or when protected. Fruit resembling a common blackberry.

This is generally supposed to be a form of the European blackberry, though its origin is somewhat in doubt. It has long been known in cultivation in the United States. It is reported to be very productive in England and in certain parts of our own country, particularly on the northwest coast. As a general rule, however, it is a complete failure so far as fruit production is concerned, and can be recommended only for its ornamental qualities, which are due to the peculiar character of its foliage. It has hailed from the west at times as the Oregon Evergreen, Sandwich Island, and Nevada blackberry.

The Currant and Gooseberry Family.

The genus *Ribes*, to which belong the currants and gooseberries, is a large genus, and primarily an American one, being much more largely represented on this continent than in the old world. Unlike the genus *Rubus*, it is not a member of the Rose family, but belongs to the Saxifrage family. The species are so numerous that it would be wholly impracticable to attempt to discuss them all here. Only those will be touched upon, therefore, which are known to be in cultivation, and it is quite possible that some of those not touched upon are also cultivated to some extent.

RIBES.

§ 1. Stems with one to three thorns below the clusters of leaves, often with numerous scattered prickles on the branches, sometimes upon the berry also. Leaves plaited in the bud. (Gooseberries.)

Ribes speciosum Pursh.—Fuchsia-Flowered Gooseberry.—This species is quite distinct from all other members of the genus, in that the flowers are long, red, and showy. The stamens are two or three times as long as the flower itself, giving it some resemblance to a fuchsia. The thorns are long and slender, the leaves small and shining, three-lobed, with coarse rounded serrations, and narrowed at the base. The berry is prickly and few seeded. The species is found on the Pacific coast from California northward into British Columbia. It is planted in a limited way as an ornamental, and is said to be prized in England for growing against walls. It certainly seems worthy a place among ornamental plants.

Ribes oxyacanthoides Linn.—Common Gooseberry.—In this species the flowers are small and yellowish-green in color, the calyx tube

is nearly cylindrical, with segments upright, scarcely spreading, longer than the tube, thin and membranaceous or petal-like. The petals are broadly ovate or spatulate, reaching half way to the anthers. The thorns are rather slender and very finely pointed, one-fourth to three-eighths of an inch long. The bearing twigs carry more or less fine bristles and the berry is smooth. It is distributed from Newfoundland to the middle Atlantic states and far westward.

This is the species to which our common American varieties like Downing and Houghton belong. It has proved itself so much better adapted to our climate that the commercial gooseberry industry of the present day is almost wholly dependent upon this species. While it cannot rank with the European gooseberry in size of fruit, its quality is equally good, if not superior, and its power to resist disease and yield uniformly heavy crops of fruit has given it an easy lead.

Ribes grossularia Linn.—EUROPEAN GOOSEBERRY.—This species is so like the preceding in its botanical characters that it is difficult to distinguish them, though there are minor differences. The calyx tube is broad, bell-shaped, thickish and leaf-like, strongly pubescent with broad ovate segments, at length reflexed. The petals are obovate, reaching to the base of the anthers. The stamens do not project beyond the calyx segments. The spines are mostly in threes, heavy and thick at the base, the central one three-eighths to one half-inch long. The fruiting twigs are free from bristles, and the fruit is commonly armed with prickles or glandular hairs. This species is very generally distributed over the eastern hemisphere. It is the parent of the gooseberries which have reached such magnificent development in England, where they commonly attain the size of ordinary plums. Many varieties have been introduced into the United States but none of them have proved adapted to our conditions. Except in some unusually favored location they always suffer from mildew. The recent advances in the art of spraying have enabled us to overcome this disease to a great extent, however, so that it is now possible to grow varieties of this species successfully in many locations if the requisite attention is given to their care in this regard. As in the case of the red raspberry, though the botanical differences between the American and the European species are but slight, the horticultural differences are very evident. From specimens at hand the above characters seem to fairly discriminate the wild forms from a botanical standpoint, but many of these

characters may disappear in cultivation and cannot be taken with implicit confidence. The character of the thorns seems to be one of the most constant points of difference.

The Industry is a hybrid between these two.

§ 2. Thornless and prickless; leaves plaited in the bud; racemes few to many flowered; stamens short.

* Calyx dilated immediately above the ovary.

Ribes nigrum Linn.—EUROPEAN BLACK CURRANT.—This is a comparatively low growing, upright bush, bearing greenish-yellow flowers, with a broad urn-shaped calyx. The leaves are sprinkled with resinous dots on the under side. Fruit black. The whole plant emits a strong, peculiar or disagreeable odor when cut or wounded, and the fruit also partakes of the same odor. The plant is widely distributed throughout the northern portions of the eastern hemisphere, and commonly cultivated. It possesses very little importance in this country, since its flavor and odor are too disagreeable to most persons to render it popular. This is said to largely disappear with cooking and by many it is thought a superior fruit for jelly.

Ribes rubrum Linn.—GARDEN CURRANT.—This is a low bush with straggling or reclining stems. The leaves are without resinous dots beneath and the flowers are borne in long, drooping racemes. They are smaller and the calyx much narrower than in the preceding species. The fruit, which is commonly smaller than the preceding, is red, white, or even striped. The species is widely distributed over the northern portions of both hemispheres wild as well as in cultivation. Being a native of this as well as the eastern hemisphere, there is no trouble in regard to its adaptation to our climate and conditions, for it seems to thrive nearly or quite as well here as in Europe, though the better culture often given there may secure larger fruit.

** Calyx prolonged above the ovary into a campanulate or cylindrical tube.

Ribes sanguineum Pursh.—RED-FLOWERED CURRANT.—This species reaches six feet in height, the young twigs are covered with short brown, bristly hairs, which fall away with the bark at the end of the first year, and the leaves are downy beneath. The flowers are red, in nodding racemes, being quite showy, though not very large.

The calyx tube is small and narrow, while the fruit is small, brownish black, glandular, and insipid. The species is found on the Pacific coast from British America southward through California and also in the mountains of Mexico and South America. Although possessing no value as a fruit plant, it has been long known in cultivation and very generally prized both in Europe and America, though apparently not widely known. It is said to render the woods gay with its bloom in its native haunts early in springtime, giving somewhat the effect of a large bush covered with verbena flowers, though differently arranged. Unfortunately it does not prove hardy in the northern Atlantic states, being reported tender at Boston and Rochester, N. Y.

The form known in cultivation as *Ribes gordonianum* is considered to be a hybrid between *Ribes sanguineum* and *Ribes aureum*, being intermediate between the two in general characters. It resembles *Ribes sanguineum* in the character of its blossoms, though they are lighter in color. It also seems to be considered somewhat hardier than this species, being reported hardy at the Arnold Arboretum and at Rochester, N. Y.

Ribes americanum Mill.—Wild Black Currant.—This is a stocky little bush, three to five feet high, with sharply three to five-lobed leaves, which are resinous dotted on the under side. The flowers are white or yellowish, in showy racemes, the bract at the base of each flower being longer than the stem of the flower. Fruit black. This is very similar to the European black currant, being distinguished from it chiefly by the larger and more showy flowers, with longer calyx tube, and by the longer bracts at the base of each flower. The species is distributed from Canada, southward to Virginia and westward to the Rocky mountains.

This species is seldom if ever cultivated, yet it is quite possible that if it were brought under amelioration it would soon surpass its European relative, as has so often happened in other cases. The fruit possesses the same characteristic odor however, which, being distasteful to so many people, has served to detract attention from it. In the northwest the fruit is sometimes used, and since its disagreeable qualities disappear with cooking it really has considerable value. The plant has also some ornamental value, though seldom grown except for botanical interest.

§ 3. Thornless and prickless; leaves rolled up in the bud; racemes several flowered; calyx-tube elongated.

Ribes aureum Pursh.—MISSOURI, FLOWERING, GOLDEN, OR BUFFALO CURRANT.—This is a free growing bush four to six feet high, throwing up suckers from the roots. The leaves are rounded and three-lobed. The flowers are bright yellow with a spicy fragrance, the tubes of the calyx much longer than its spreading lobes. Fruit black with a bluish bloom. Var. *chrysococcus* Ryd. has yellow fruit. This is found wild from Missouri westward to the Rocky mountains and is widely cultivated as a flowering shrub, both in this country and Europe. It has been long known and under many different names, having been at times called the Utah or Utah Hydrid Currant. More recently it has been introduced as the Crandall. It is decidedly variable in the size of its fruit. Some plants sent out as Crandall bear fruit nearly or quite as large as a Downing gooseberry, while that of other plants is no larger than a common red currant. Its peculiar flavor and the fact that the berries ripen irregularly and must be picked one by one is against it as a fruit plant. It is a very attractive ornamental plant in the early part of the season and is well adapted to the dry climate of the western plains. Its chief fault in this regard lies in the fact that it loses its foliage early.

PRESIDENT'S ADDRESS.

E. F. STEPHENS.

Fellow-Members of the State Horticultural Society, Ladies and Gentlemen: Another year has passed since we last convened in annual session. It is gratifying to me to meet again with those who are mutually interested in horticultural development and advancement of the state. Since we model the future by the profitable experience of the past, it may not come amiss to review the lessons of the past year.

The spring of 1895 opened with abundant promises for the horticulturists. In May, however, severe frosts caused serious damage in portions of the state. The unusual heat and drouth of September resulted in a premature ripening of apples. Not having prepared to retain our fruit by cold storage, the main portion of the apple crop

changed hands at moderate prices, which were succeeded in from sixty to ninety days by rates raising from $2.50 to $3.50 per barrel.

Our exhibit at Omaha in September, while far below the standard we hope to attain in future years, was reported by the correspondent of the *Orange Judd Farmer* as the best exhibit yet seen at any state fair in the west. With an increasing membership and a widening number of exhibitors to draw from, we feel confident that our exhibit in 1896 will far surpass any yet made.

Over the greater portion of the state we have suffered from a lack of sufficient rainfall, compelling us to study more closely, year by year, such preparations of the soil, and methods of obtaining and conserving moisture, as shall give success in our work. We have listened this afternoon to practical men who demonstrated how cheaply and effectively to secure the water needed, through ditches and by use of windmills and reservoirs. Doubtless we are entering upon a large and practical application of these methods. It is estimated by the close of the current year more than one million acres in the state of Nebraska will be under constructed lines of ditches. Many will make use of windmills and reservoirs in securing needed moisture for orchards and gardens. So successfully have our American inventors applied themselves to these problems that the expense of raising and storing water has been very materially lessened. In the near future it will be practicable, I believe, to secure and store by these methods an abundance of water for orchards, gardens, and lawns. For many years to come, no doubt, the majority of our orchardists will rely on the cheaper and more convenient method of preparing the soil for storing moisture with the plow, and retaining it by use of the cultivator. It is our privilege to listen this evening to those who will explain the necessary process.

Seasons like the last greatly emphasize the value of cold storage. To place choice fruit in cold storage usually carries it forward to a time when it realizes in market an advance of fifty to one hundred per cent. In October good winter apples sold in the orchards at from thirty-five to fifty cents per bushel, selling since December 15 at from eighty cents to one dollar and twenty cents per bushel. One of our Lincoln firms packed twenty-five thousand barrels. In our own experience we have found that closing the cellars during warm days and opening them for ventilation on cold nights has enabled us to keep

the cellar at so low a temperature as to preserve the better grades of apples until January and February, realizing then the higher prices. Perhaps one of the most important subjects before us is how to so store our fruit as to realize the better rates. We have with us one of our successful orchardists who will explain his methods of storage by which he is able to market his fruit in a more profitable manner. Perhaps he will also tell us how to utilize the waste products of the orchard in which there has hitherto been serious loss. We are led to believe that evaporators will soon come into more general use, and that a larger amount of pure cider vinegar will be made.

FINANCES.

The expenses of the past year have been much greater than the income. Our allowance from the state has been reduced from $2,000 to $1,000 per year. The removal of the state fair from Lincoln to Omaha increased our expense in the fitting of new buildings. The problem before us is how to do more work with less money.

One method of economizing is for officers and members to do a large part of the work of preparing for and handling our exhibits at fairs, instead of hiring workmen and police. Until the legislature can be impressed with the value of our work and be induced to appropriate a reasonable amount of money, it will be necessary for us to rely largely on individual effort.

Something can be saved both in printing and in officers' salaries. I would recommend—

First—That the allowance made the President and the Superintendent of Halls be cut off. About $60 can be saved in this way.

Second—That $100 be stricken from the salary of the Secretary, and that the amount allowed the Secretary for postage, stationery, and express on the reports be limited to $150.

To enable us to make a smaller amount of money do a greater amount of work I would suggest,

Third—That the number of single plate premiums be increased.

Some method should be devised to keep the exhibition tables free from fruit that is imperfect and discreditable in quality. This could be accomplished by a revision of the rules of exhibit and by insisting that fruit in bad order have no place on the tables. Special exertions should be made to bring out exhibits from the northern, central, and

western counties. The older and more experienced members can render efficient aid by assisting the officers in helping those who have not yet had experience in exhibiting to name and place their fruit on the tables in such manner as to encourage them, and make a creditable exhibit for the Society.

The terms on which admissions shall be issued by the State Agricultural Society to the State Horticultural Society is worthy of discussion, and should be definitely settled on some equitable basis. I would suggest, therefore,

Fourth—That after frank discussion of the question a committee be appointed to confer with the executive board of the Agricultural Society.

Both Arlington and York invite the Society to meet with them the coming summer.

Words fail to express just what we would wish to say in regard to the loss from our midst of such a man as D. U. Reed. Taken from us without a moment's warning, it will be long before we recover from the shock of his removal. He was in his prime. His cheerful face and pleasant companionship has passed on. He was a light in our councils and a grand oak in our horticultural forest. The good work he has done can never die, but shall live on forever, a shining example of what we may strive to imitate.

Let us look forward hopefully to the year before us. Profiting by the lessons of the past, let us so apply their teaching that another annual meeting may see us far in advance of where we now stand.

TREASURER'S REPORT.

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No. 1, D. C. Mosher	23 00
No. 2, F. Westermann	75
No. 3, J. H. Hadkinson	40 00
No. 5, W. J. Hesser	2 50
No. 6, E. F. Stephens	4 00
Total warrants paid	2,408 77

NEBRASKA STATE HORTICULTURAL SOCIETY,

IN ACCOUNT WITH PETER YOUNGERS, JR., TREASURER.

1895.	
Jan. 15, Balance on hand	$1,789 69
Sept. 23, Cash from Agricultural Society	1,000 00
Sept. 25, Cash, state appropriation	1,000 00
Oct. 20, Cash, Mrs. J. H. Reed	5 00
Dec. 31, Cash, D. U. Reed, membership fees	36 00
1896.	
Jan. 14, Cash, F. W. Taylor, membership fees	25 00
Total amount received	$3,855 69
Total warrants paid	2,408 77
Balance on hand January 14, 1896	$1,446 92

PROCEEDINGS.

SUMMER MEETING.

The summer meeting was held at Wymore on July 23d, 24th, and 25th, the following program being carried out.

The papers and discussion have been inserted with the similar subjects from the report of the winter meeting.

It is believed that this arrangement is better than to follow the order in which the papers were delivered:

TUESDAY AFTERNOON, 2:30, AT GREENWOOD'S HALL.

Address of welcome.
Response.
Music.
Birds of Nebraska.....Professor Lawrence Bruner
Ornamenting Home Grounds.....J. H. Hadkinson
Irrigation as a Factor in Horticulture.....J. L. Hoops
Fruit Notes by a Veteran Horticulturist.....R. N. Day
Small Fruits in Sarpy County.....E. E. Sanborn
Small Fruits in Washington County ..... G. A. Marshall
Bees the Friends of the Horticulturists.....Edward Whitcomb
The Dwarf Juneberry.....G. B. Galbraith

TUESDAY EVENING, 8 O'CLOCK.

Music.
Reminiscences of Frontier Horticulture in Nebraska,
Hon. R. W. Furnas
The Effect of Local Factors on Soil Moisture.....Prof. F. W. Card
Paper by Prof. G. D. Swezey, of State University Weather Service.
Music.
Paper by Prof. Chas. E. Bessey.
Cultivation an Important Factor in Management of Orchards and Gardens.....L. M. Russell
Advantages of Thorough Cultivation..... .....D. U. Reed

Benefits of Subsoiling for Fruits and Field Crops.....A. J. Brown
The Peach in Nebraska.....J. M. Russell
All Manner of Trees .....W. R. Laughlin
New Fruits .....J. H. Masters

WEDNESDAY EVENING.

Music.
Small Fruits for the Average Farmer.....G. A. Dayton
The Raspberry and General Fruit Notes .....G. N. Titus
Small Fruits and General Outlook for Central Nebraska,
W. F. Jenkins

THURSDAY MORNING, 8 O'CLOCK.

Fruit Prospects for Lancaster County.....J. G. Neff
Fruit Prospects for Pawnee County.....C. H. Barnard
Ornamental Trees and Shrubs for Street and Lawn Planting,
E. F. Stephens

Exhibitions of fruits and plants, room for which will be provided, are solicited.

Arrangements have been made with the railroads for a rate of a fare and one-third on the certificate plan, provided there is an attendance of 100. Be sure and take a receipt from the agent for your fare, which will entitle you to the benefit of the reduced rates.

D. U. REED, *Secretary*,
Blue Springs, Nebraska.

WINTER MEETING.

The twenty-seventh annual meeting of the Nebraska State Horticultural Society was called to order in room 15, Nebraska Hall, State University, at 2 o'clock P. M., by President E. F. Stephens.

Announcement was made that the program would be carried out as printed as nearly as possible. Following is a copy of the program:

Program of the Twenty-seventh Annual Meeting of the Nebraska State Horticultural Society to be held at State University, Lincoln, on Tuesday, Wednesday, and Thursday, January 14, 15, and 16, 1896.

EXHIBITS.—It is hoped that horticulturists and others interested will bring in large exhibits of fruits, vegetables, flowers, trees, seeds,

horticultural appliances, traps, pickers, pruners, dryers, sprayers, etc., more especially such as can be made at home.

The headquarters of the members will be at the Lindell Hotel, Thirteenth and M streets. Reduced rates have been granted.

E. F. STEPHENS, *President*, Crete, Neb.

MRS. JENNIE F. REED, *Secretary*, Blue Springs, Neb.

FIRST DAY—TUESDAY, JANUARY 14, 1896.

MORNING, 10 O'CLOCK.

Renewing acquaintances and receiving memberships.
Placing fruit on the tables.

AFTERNOON, 2 O'CLOCK.

Irrigation for Orchard and Garden,
Hon. I. A. Fort, North Platte, Neb.

Chartical Lecture on Orchard Irrigation and Cultivation..... ..Lute Wilcox, Editor of *Field and Farm* and author of "Irrigation Farming," Denver, Colo.

Water Supply of Nebraska.....Prof. O. V. P. Stout

Strawberry Growing with Irrigation,
J. W. Stevenson, North Bend, Neb.

How I Obtained and Use Water.....John Tannahill, Columbus, Neb.

Question box.

EVENING, 7:30 O'CLOCK.

Report of Secretary.
Report of Treasurer.
President's address.
Appointing of committees.

Sunshine and Cloudiness in Relation to Crops,
Prof. G. D. Swezey, of State University Weather Service

Conservation of Soil Moistures...Prof. T. L. Lyon, State University

Preparation of Soil for Orchard and Garden Work...P. Younger, Jr.

Benefits to be Derived from Thorough and Clean Cultivation,
Discussion led by S. W. Perin

Cultivation for Irrigation.....J. M. Russell, Wymore

Observations on Soil Moisture.....R. E. Emerson, University Place

Report on Fruit Crop of East Central Nebraska.....G. A. Marshall
Report on Fruit Crop, Northeast Nebraska.....R. N. Day
Report on Peach Crop for 1895.....J. M. Russell, Wymore
Report on Fruit Crop, 1895.....Paul Nemechek, Humboldt
Report on Fruit Crop, 1895.....E. E. Sanborn, Springfield
Report on Fruit Crop.....Geo. L. Allen, Leigh, Neb.
Question box.

Second Day—January 15, 1896.

morning, 9 o'clock.

Report of committees.
The Raspberry.....W. J. Hesser, Plattsmouth
Botany of the Bush Fruits.....Prof. F. W. Card, State University
Botany of the Strawberry.....Dr. C. E. Bessey
Are the Birds Friends of the Horticulturist?...Prof. Lawrence Bruner
Neglected Native Fruits.....P. Youngers, Jr.
Most Profitable Varieties of Gooseberry and Currants,
A. J. Brown, Geneva
Summer Fruits in Central Nebraska.....W. F. Jenkins, Arcadia
At eleven, Election of Officers for Ensuing Year.
Report from Fillmore County.....P. A. Murphy, Exeter
Report from Richardson County.....G. A. Slayton, Salem
How to Plant a Tree.....W. F. Jenkins
Question box.

afternoon, 2 o'clock.

Experiments in Hybridizing Plums.....Theodore Williams, Benson
The Farmer's Fruit Garden.....C. A. Whitford, Arlington
Strawberries: Planting, Cultivation, Varieties,
L. O. Williams, Council Bluffs, Iowa
Raspberries and Blackberries, Varieties and Cultivation,
R. D. McGeehon, Atlantic, Iowa
How We Grow Small Fruits in Washington County...G. A. Marshall
Shade and Shelter for the Farm.....G. A. Slayton, Salem
Orcharding in Cass County,
Statistics on Commercial Orcharding in Nebraska,
E. M. Pollard, Nehawka
Fruit Packages.....W. R. Harris

Subjects for Discussion:

Cultivate the Local Market.
Winter Protection.
Experience with New Fruits.
Cost and Methods of Packing Small Fruits.
Home Canning of Fruits.

Is the Tree Vender a Necessary Evil .....J. H. Hadkinson
What Can the Horticultural Society do for the State?
Orcharding in Eastern Nebraska.....E. T. Hartley, Lincoln
The Blackberry .....C. H. Barnard, Table Rock
The Currant .....J. P. Dunlap, Dwight
Some Lessons of the Drouth.....C. H. Barnard

EVENING, 8 O'CLOCK, UNIVERSITY CHAPEL.

Vocal Solo .....Miss Florence Worley
An address—The Ethics of Horticulture .....Rev. C. S. Harrison

The State Horticultural Society combines with the University Lecture Course for this evening.

THIRD DAY—THURSDAY, JANUARY 16, 1896.

MORNING, 9 O'CLOCK.

Deferred Papers and Discussions.
Report of Committee on Revising Rules for Exhibits.
Revision of Premium List.
Revision of Recommended Fruit List.
Appointing Standing Committees.

PREMIUMS TO BE AWARDED.

As the resources at the command of the Society are less than the annual expenses, the officers of the Society have offered the following special premiums to assist in securing an exhibit of fruit. It is earnestly desired that those who have been favored with a crop will bring at least a basket of their best.

By Youngers & Co., Geneva:

Best collection of apples, not less than five varieties	$5 00
Best five varieties winter apples.....	3 00
Second best five varieties winter apples.....	2 00

By Marshall Bros., Arlington:	First Premium.	Second Premium.
Best plate Winesap	$1 00	50c
Best plate Missouri Pippin	1 00	50c
Best plate Gano	1 00	50c
Best plate Janet	1 00	50c
Best plate Walbridge	1 00	50c
Best plate Roman Stem	1 00	50c
Best plate Minkler	1 00	50c
By Crete Nurseries, Crete:		
Best plate Ben Davis	$1 00	50c
Best plate Jonathan	1 00	50c
Best plate Grimes' Golden	1 00	50c
Best plate Iowa Blush	1 00	50c
Best plate Rome Beauty	1 00	50c
Best plate Talman's Sweet	1 00	50c
Best plate winter pears	1 00	50c

These premiums are payable in nursery stock, trees or plants, to be selected from the catalogues of the above mentioned parties.

Reduced Rates

Cannot be had unless one hundred purchase tickets and secure certificates at starting point.

Life memberships, five dollars; annual memberships, one dollar. Both classes are entitled to copies of the printed reports.

A large part of the program is devoted to small fruits this year as the third year on this plan. It is urgently requested that such careful preparation be given topics assigned as will fit them for a manual on topics treated. It is hoped discussions will be full, as they will be reported by a capable stenographer. Special effort is being made to make our coming meeting one of the best of the series. There will be carefully prepared papers by experts, and addresses by men of national reputation. Live discussions on the first day will be very interesting to all who would know more of irrigation or of cultivation as a substitute for it available to all. Stand by the State Horticultural Society. Become members and help extend its work. You will find its officers earnest in developing the work of horticulture in our state. Do not miss this opportunity.

The entire session of Tuesday afternoon was taken up with papers and discussions on the subject of irrigation and water supply.

BUSINESS OF SECOND SESSION, TUESDAY EVENING, JANUARY 14.

The Secretary and Treasurer read their respective reports, as given elsewhere in this volume, which, on motion of Mr. G. A. Marshall, were referred to the following committee: G. A. Marshall, D. C. Mosher, and J. H. Hadkinson.

MR. YOUNGERS—Before my report goes into the hands of the committee, I wish to state that before I could get the state appropriation I had to deposit with Auditor Moore warrants aggregating $1,000. I have here the list of warrants left with Mr. Moore, together with his receipt for the same, dated September 23, 1895.

The President read his annual address, as given elsewhere in this report, and on motion of Mr. Youngers it was referred to the following committee: C. H. Barnard, G. A. Marshall, and F. W. Taylor.

BUSINESS OF THIRD SESSION, WEDNESDAY MORNING, JANUARY 15.

MR. YOUNGERS—I understand we have with us Mr. L. O. Williams, of Council Bluffs, Ia., delegate from the Iowa State Horticultural Society, and Mr. J. W. Hess, president of the Southwestern Iowa Horticultural Society. I move you these gentlemen be made honorary annual members of our Society. Carried.

MR. MARSHALL—Mr. Silas Wilson, of Atlantic, Ia., is also with us, and I move that he be made an honorary annual member of our Society. Carried.

The committee appointed to examine the reports of Secretary and Treasurer made the following report:

Mr. President: We, your committee appointed to examine the reports of the Secretary and Treasurer, beg to submit the following report: We have carefully examined the same and find them correct.

Respectfully submitted,

G. A. MARSHALL.
D. C. MOSHER.
J. H. HADKINSON.

On motion of Mr. Barnard the report was received and adopted, and the committee discharged.

The Committee on President's Address reported as follows:

Mr. President: We, your committee appointed to report on the President's address, would respectfully submit the following:

On that part of the President's address which refers to recommendation No. 1, as applies to Superintendent of Halls and President, we would recommend that the expenses of the officers be allowed in the fair work.

No. 2: That the salary of the Secretary be cut $100; that the Society pay the expenses of the stenographer; that the recommendation in regard to allowing $150 for stationery, postage, and express be adopted, but this is not intended to include blanks, tags, etc., as required for fair work.

No. 3: That the matter of single plate premiums be referred to the committee on revision of premium list.

We further recommend that that part of the President's address in regard to admissions be referred to a committee of three to confer with the State Board.

We further recommend that a committee of three be appointed to draft appropriate resolutions on the death of our esteemed co-laborers, D. U. Reed, H. T. Kelsey, and Prof. Chas. L. Ingersoll.

All of which is respectfully submitted.

C. H. BARNARD.
G. A. MARSHALL.
F. W. TAYLOR.

On motion of Mr. Barnard the report was taken up and adopted section by section, as read, except that part of recommendation No. 2 referring to Secretary's salary, which, being a change in the constitution, was laid over till the afternoon session.

At 11 o'clock the election of officers came up.

George A. Marshall nominated E. F. Stephens, of Crete, for President. On motion the rules were suspended and the Secretary instructed to cast the unanimous vote of the Society for Mr. Stephens.

A. J. Brown nominated G. A. Marshall, of Arlington, for First Vice President and moved that the rules be suspended and the Secretary instructed to cast the unanimous vote of the Society for Mr. Marshall. Carried.

For Second Vice President Mr. Taylor nominated D. C. Mosher, of Lincoln, and moved that the rules be suspended and the Secretary instructed to cast the unanimous vote of the Society for Mr. Mosher. Carried.

For Secretary to fill the unexpired term of D. U. Reed, Mr. Barnard placed in nomination J. H. Hadkinson, of Lincoln, and moved that the rules be suspended and Mr. Hadkinson declared duly elected. Carried.

For Secretary for the full term beginning June 1, 1896, Mr. Barnard nominated Mr. Hadkinson and moved that the rules be suspended and the Secretary instructed to cast the vote of the Society for Mr. Hadkinson. Carried.

For Treasurer, F. W. Taylor nominated Peter Youngers, Jr., of Geneva, and moved that the rules be suspended and the Secretary instructed to cast the vote of the Society for the nominee. Carried.

For Board of Directors the following were elected, there being no opposing candidates: J. W. Stevenson, North Bend; C. H. Barnard, Table Rock; E. C. Erfling, Omaha.

Mr. A. J. Brown offered the following resolutions, which were laid over till the afternoon session:

1. *Resolved*, That article IV of the Constitution be amended by striking out all that part following the word "year" in the sixth line, and in place thereof inserting the words "commencing on the first day of June following."

2. That article V be amended by striking out all that part following the word "require" in the sixth line.

3. That article VII be amended by striking out all that part following the word "Society" in the eighth line.

4. That article VIII be amended by striking out all that part following the word "President" in the fourth line.

5. That article XI be amended by striking out the words "five hundred" in the fifth line and inserting in place thereof the words "four hundred."

6. That By-Law No. 2 be amended by striking out all that part following the word "Society" in the first line and inserting in place thereof the following: "Shall assume the duties of their respective offices on the first day of June following their election and continue in office for the period of one year, or until their successors are elected and qualified."

7. That By-Law No. 3 be stricken out and the following substituted therefor: "The officers elected at the January meeting, 1895, shall hold their respective offices until the first day of June, 1896."

8. That By-Law No. 4 be stricken out and the following substituted therefor: "The amount allowed the Secretary for express, postage, and stationery shall not exceed one hundred and fifty dollars per annum, and it shall be the duty of the Board of Directors to employ a competent stenographer to report the proceedings of meetings of this Society, whose fees shall be paid by the Society."

BUSINESS OF FOURTH SESSION, WEDNESDAY EVENING, JANUARY 15.

Mr. E. C. Erfling presented the claims of florists for damage done to plants at the fair in Omaha on account of tent blowing down, as follows: B. Haas, $15; Paul Floth, $10; Omaha Floral Co., $7.

On motion of Mr. Youngers the claims were referred to the Board of Directors with power to act.

Mr. A. J. Brown called up his proposed amendments to the Constitution and By-Laws, which were adopted as read.

Professor Bessey's resolution in regard to forest tree plantations was here introduced, and letter of Professor Keffer read.

E. C. Erfling introduced Mr. W. R. Adams, president of the Douglas County Horticultural Society, who presented the following resolutions:

OMAHA, NEB, January 10, 1896.

At a meeting of the Douglas County Horticultural Society, held on January 10th, in the city of Omaha, the following resolutions were passed:

1st. That as the accommodations furnished by the State Fair Association of Omaha for the exhibition of plants and cut flowers was entirely inadequate for the proper exhibition of plants and cut flowers, etc.

Resolved, That we respectfully request the State Board of Horticulture to use their influence in seeing that ample accommodations be provided before the next state fair is held, so that the many exhibitors who were debarred from "exhibiting and competing" last year will not have the same fault to find in the future.

W. R. ADAMS, *President.*
JOSEPH CHALMERS, *Secretary.*

On motion of Mr. Youngers the resolutions were referred to the Board of Directors.

The location of the summer meeting being next in order, Mr. George Marshall gave the Society an earnest invitation to meet at Arlington.

Mr. Stilson, of York, invited the Society to hold its summer meeting at that place, and supported his invitation by a number of resolutions passed by the citizens of York. A ballot was taken, resulting in favor of holding the summer meeting at York.

Mr. Taylor moved that the sum of $50 be placed at the disposal of Professor Bruner for the purpose of buying material and having cuts made to illustrate his article to be inserted in the coming report.

Mr. Barnard moved to amend by adding that Professor Bruner be allowed so much space in the report as is necessary to accommodate his article. The amendment was accepted by Mr. Taylor, and the motion as amended carried.

BUSINESS OF FIFTH SESSION, THURSDAY MORNING, JANUARY 16.

Mr. Pollard introduced the following resolution:

Resolved, That it is the sense of this Society that the executive officers be authorized to draft resolutions setting forth the views of the Society on the subject of the manufacture and sale of acid vinegar, artificial jellies, etc.

On motion of Professor Bessey the resolution was adopted.

The President announced the following committee on obituary: Prof. F. W. Taylor, Peter Youngers, Jr., and Dr. C. E. Bessey.

BUSINESS OF SIXTH SESSION, THURSDAY EVENING, JANUARY 16.

The Committee on Revision of Premium List made the following report:

Mr. President: We, your Committee on Revision of Premium List, beg to report as follows: In making changes we have endeavored to extend the fruit list so as to obtain the best possible results without increasing the amount of the premium list. The total changes, if adopted by the Society, will only add two dollars to the premium list as awarded last year. We have consulted with our florist friends and adopted the changes recommended by the florists as presented by Mr. Erfling.

We recommend the adoption of the following special rules:

6. It shall be the duty of the superintendent to appoint two assistants, and they acting in the capacity of a committee shall remove all fruit not in a fit condition for exhibition at any time during the progress of the exhibition.

7. No more than one plate of seedlings of any variety of fruit shall be recognized by the judges in any individual or county display when awarding premiums.

We further recommend that the Society offer the following premiums:

For most artistic fruit design by county, first premium $10, second premium $5, third premium $3.

For most artistic fruit design by any individual, first premium $10, second premium $5, third premium $3.

All of which is respectfully submitted.

PETER YOUNGERS, JR.
G. A. MARSHALL.
E. C. ERFLING.

On motion of Mr. Slayton the report was adopted as read.

Mr. Slayton moved that the Society request the family of Mr. Reed to furnish a photograph from which to have a cut made to be inserted in the coming volume, and solicit from them the privilege of placing it there. Carried.

Professor Card moved that the Society appropriate $30 to the farmers' institute work. Seconded by Professor Taylor. Carried.

Moved by Professor Taylor that the Society appoint President Stephens visiting member to the Experiment Station. Carried.

The Committee on Obituaries reported, their report appearing elsewhere.

Mr. Youngers moved the adoption of the following resolution:

Resolved, That it be the sense of this Society that the legislature should provide adequate funds for running the farmers' institute work.

Carried.

Adjourned.

FRUIT DISTRICTS.

No. 1—SOUTHEASTERN.

No director appointed. Embraces the following counties: Polk, Butler, Saunders, Cass, Lancaster, Seward, York, Clay, Hamilton, Fillmore, Saline, Otoe, Johnson, Nemaha, Richardson, Pawnee, Gage, Jefferson, Thayer, and Nuckolls.

No. 2—NORTHEASTERN.

Director, C. W. Gurney, Concord. Embraces the following counties: Knox, Dixon, Dakota, Cedar, Wayne, Pierce, Antelope, Madison, Stanton, Cuming, Burt, Platte, Colfax, Dodge, Washington, Douglas, Sarpy, and Thurston.

No. 3—EAST-CENTRAL.

Director, W. F. Jenkins, Arcadia. Embraces the following counties: Wheeler, Garfield, Loup, east half of Custer, Valley, Greeley, Boone, Nance, Merrick, Howard, Sherman, Buffalo, and Hall.

No. 4—WEST-CENTRAL.

Director, E. Schroeder, Logan. Embraces the following counties: Blaine, Thomas, Hooker, Grant, Arthur, McPherson, Logan, west half of Custer, Dawson, Lincoln, and Keith.

No. 5—LOWER REPUBLICAN.

Director, G. A. Strand, Minden. Embraces the following counties: Adams, Kearney, Phelps, Gosper, Frontier, Red Willow, Furnas, Harlan, Franklin, and Webster.

No. 6—SOUTHWESTERN.

Director, John H. Powers, Trenton. Embraces the following counties: Perkins, Chase, Hayes, Hitchcock, and Dundy.

The figures on the above map indicate the Horticultural Districts into which the state of Nebraska is divided. Through an oversight the name of Keya Paha county, lying north of Brown and Rock, was omitted.

No. 7—LOWER NIOBRARA.

Director, A. D. Beebe, Long Pine. Embraces the following counties: Holt, Keya Paha, Rock, Brown, Boyd, and Cherry.

No. 8—NORTHWESTERN.

Director, J. J. Adams, Crawford. Embraces the following counties: Sheridan, Dawes, Box Butte, and Sioux.

No. 9—WESTERN.

No director appointed. Embraces the following counties: Scott's Bluff, Banner, Kimball, Cheyenne, and Deuel.

LIST OF SPEAKERS AND CONTRIBUTORS.

The following list contains the names of the speakers and contributors, as well as of some from whom quotations are made:

Difference of opinion regarding the value of certain fruits or plants will often come from the different localities in which they have been tried, and reference to this list will enable the reader to make due allowance for this factor. The number following the name is that of the fruit district in which the person lives.

Beltzer, L. A.—1.
Bessey, C. E.—1.
Brown, A. J.—1.
Bruner, L.—1.
Card, F. W.—1.
Dunlap, J. P.—1.
Emerson, R. A.—1.
Fort, I. N.—4.
Galbraith, G. B.—1.
Harris, W. R.—1.
Harrison, C. S.—1.
Hartley, E. T.—1.
Heath, H. E.—1.
Hesser, W. J.—1.
Jenkins, W. F.—3.
Jenkins, Mrs. W. F.—3.
Leonard, I. N.—1.
Lyon, T. L.—1.
Marshall, G. A.—2.
McGeehon, R. D., Atlantic, Ia.
Osborn, W. B., Loveland, Colo.
Reed, D. U.—1.
Russell, J. M.—1.
Sanborn, E. E.—2.
Slayton, G. A.—1.
Stephens, E. F.—1.
Stevenson, J. W.—2.
Stilson, L. D.—1.
Swezey, G. D.—1.
Titus, G. N.—1.
Whitcomb, E.—1.
Whitford, G. M.—2.
Wilcox, L., Denver, Colo.
Williams, L. O., Glenwood, Ia.
Youngers, P., Jr.—1.

OFFICERS AND STANDING COMMITTEES, 1896.

OFFICERS AND DIRECTORS.

E. F. Stephens, President.....Crete
G. A. Marshall, First Vice President.....Arlington
D. C. Mosher, Second Vice President.....Lincoln
J. H. Hadkinson, Secretary.....Lincoln
Peter Youngers, Jr., Treasurer.....Geneva
E. C. Erfling.....Omaha
C. H. Barnard.....Table Rock
J. W. Stevenson.....North Bend

STANDING COMMITTEES.

SYNONYMS.

J. H. Masters.....Nebraska City
A. J. Brown.....Geneva
J. M. Russell.....Wymore

METEOROLOGY.

Prof. G. D. Swezey.....Lincoln

ENTOMOLOGY AND ORNITHOLOGY.

Prof. Lawrence Bruner.....Lincoln

VISITING COMMITTEE TO THE UNIVERSITY OF NEBRASKA EXPERIMENT STATION.

E. F. Stephens.....Crete

GEOLOGY.

Prof. E. H. Barbour.....Lincoln

FORESTRY.

E. T. Hartley.....Lincoln

VEGETABLE CULTURE.

Prof. F. W. Card.....Lincoln

ORNAMENTAL GARDENING.

J. H. Hadkinson.....Lincoln

LEGISLATION.

E. F. Stephens.....Crete
Peter Youngers, Jr.....Geneva
E. C. Erfling.....Omaha
F. W. Taylor.....Lincoln
E. T. Hartley.....Lincoln

MEMBERS OF THE SOCIETY.

ACTIVE LIFE MEMBERS.

Alexander, G. W.....Friend
Barnard, C. H.....Table Rock
Beaver, Elias.....Falls City
Beltzer, L. A.....Osceola
Bessey, Charles E.....Lincoln
Blodgett, H. H.....Lincoln
Bowers, W. B.....513 n. 9th st., Omaha
Brown, A. J.....Geneva
Brown, D. W.....Lincoln
Brown, G. K.....Lincoln
Brown, J. L.....Kearney
Camp, Charles B.....Cheney
Card, F. W.....Lincoln
Carpenter, G. J.....Fairbury
Chapin, H. A.....Lincoln
Chapin, L. C.....Lincoln
Chowins, Charles E.....Lincoln
Colvin, W. E.....Pawlet
Craig, Hiram.....Ft. Calhoun
Crist, J. W.....Box 761, Lincoln
Damrow, Charles F.....Lincoln
Davey, R. H.....Omaha
Davis, W. H.....Fullerton
Day, R. N.....Tekamah
De France, C. Q.....Fairbury
Deweber, H. N.....Pawnee City
Dillon, J. W.....Crete
Dugan, John.....Portal
Dunlap, J. P.....Dwight
Eicke, Henry.....Box 41, Omaha

Erfling, E. C.....1150 Sherman av., Omaha
Fox, B. C.....Lincoln
Fredenburg, B.....Johnson
Frey, C. H.....Lincoln
Frey, H. H.....Lincoln
Furnas, R. W.....Brownville
Gage, J. A.....Fairbury
Gaiser, A.....Tecumseh
Galbraith, G. B.....Jansen
Godfrey, A. S.....Lincoln
Grennell, E. N.....Ft. Calhoun
Gurney, C. W.....Concord
Hadkinson, J. H.....Lincoln
Harris, W. R.....Tecumseh
Harrison, C. S.....Weeping Water
Hartley, E. T.....Lincoln
Hartman, Chris.....Omaha
Heath, H. E.....Lincoln
Helin, J. F.....1612 Farnam st., Omaha
Hess, Jacob.....Omaha
Hesser, W. J.....Plattsmouth
Hogg, J. A.....Shelton
Jenkins, W. F.....Arcadia
Kent, H. J.....Box 961, Lincoln
Langdon, J. N.....Seward
Leonard, I. N.....Lincoln
Loughry, James.....Geneva
Marshall, G. A.....Arlington
Masters, J. H.....Nebraska City
Masters, J. W.....Lincoln
McIntosh, H. F.....Omaha
Miller, S. L.....Saltillo
Morsch, C. H.....Greeley Center
Mosher, D. C.....Lincoln
Mosher, P. C.....Lincoln
Murphy, P. A.....Exeter
Neff, J. G.....Raymond
Nemechek, Paul.....Humboldt

Newberry, H. J.....Lincoln
Nutter, W. W.....Blanche
Perin, L. W.....Lincoln
Peterson, Frank.....Bancroft
Pollard, E. M.....Nehawka
Pollard, Isaac.....Nehawka
Randell, J. C.....Hamburg, Iowa
Reed, Mrs. Jennie H.....Blue Springs
Riley, Alfred.....Crete
Roberts, B. A.....Albion
Russell, J. M.....Wymore
Sanborn, E. E.....Springfield
Schamp, L. D.....Lincoln
Schumacher, A.....York
Slayton, George A.....Salem
Smith, H. C.....Falls City
Smith, H. L.....Geneva
Smith, O. F.....Willow Springs, Mo.
Stephens, E. F.....Crete
Stevenson, J. W.....North Bend
Stilson, L. D.....York
Strand, G. A.....Minden
Swezey, G. D.....Lincoln
Taylor, Frederic W.....Lincoln
Tiffany, M. D.....Lincoln
Titus, G. N.....Nemaha City
Walker, J. W.....Crete
Warren, G. F.....Harvard
Wheeler, D. H.....Omaha
Williams, Theodore.....Benson
Wilson, W. H.....Box 17, Lincoln
Woods, A. F.....Washington, D. C.
Youngers, Peter, Jr.....Geneva

HONORARY LIFE MEMBERS.

Budd, J. L.....Ames, Iowa
Brackett, G. B.....Denmark, Iowa
Bruner, L.....Lincoln
Campbell, George W.....Delaware, Ohio
Crounse, Lorenzo.....Ft. Calhoun
Earle, Parker.....Ocean Springs, Miss.
Garfield, C. W.....Grand Rapids, Michigan
Gideon, Peter M.....Excelsior, Minnesota
Lyon, T. T.....South Haven, Michigan
Morton, J. Sterling.....Nebraska City
Saunders, Alvan .....Omaha
Van Deman, H. E.....Parksley, Va.

ANNUAL MEMBERS.

Adams, Wm. R.....Omaha
Anderson, A. C.....Leigh
Christy, G. S.....Johnson
Cole, John.....De Bolt
Daniels, A. P.....Clarks
Dement, G. W.....Crab Orchard
Dovell, O. P.....Auburn
Hague, W. A.....
Hanchett, A. P.....
Hughes, Alvin .....Ord
Komps, H. F.....Reynolds
Lockwood, J. E.....
Longsdorf, H. A.....Bellevue
Pibel, E.....Pibel
Powers, J. H.....Trenton
Rohmer, Claus .....De Soto
Spise, S. S.....Wymore
Stoltenburg, Paul .....Florence
Tannahill, Wm.....Columbus

Tyrrel, A. C.....Madison
Whitford, G. M.....Arlington
Wilson, John.....Webster

HONORARY ANNUAL MEMBERS.

Hess, J. W.....Council Bluffs, Iowa
Williams, L. O.....Glenwood, Iowa
Wilson, Silas.....Atlantic, Iowa

Active Life Members.....	101
Honorary Life Members.....	12
Associate Members.....	22
Honorary Annual Members....	3
Total.....	138

CONSTITUTION.

ARTICLE I.—*Name.*—This association shall be known as the Nebraska State Horticultural Society.

ARTICLE II.—*Object.*—This Society shall have for its object the promotion of Pomology, Arboriculture, Floriculture, and Gardening.

ARTICLE III.—*Membership.* — The membership of this Society shall consist of four classes, viz., active, associate, annual honorary, and life honorary. The active membership shall consist of persons practically engaged in fruit culture, forestry, floriculture, or gardening, who shall be admitted to life membership on the payment of a fee of $5 at one time; to associate membership, by the payment of a fee $1 annually. The honorary members shall consist of such persons as may be elected at any meeting of the Society by a two-thirds vote of the members present, and shall have all the privileges and benefits of the Society except those of voting and holding office, which privileges shall belong exclusively to active members.

ARTICLE IV.—*Officers.*—The officers of this Society shall be a President, First and Second Vice Presidents, Secretary, Treasurer, and a Board of Directors of eight members, said board consisting of the officers enumerated in this article and three additional members. These officers shall be elected by ballot at the annual meeting of the Society in January, and the term of office shall be for one year, commencing on the first day of June following.

ARTICLE V.—*Duties of President.*—It shall be the duty of the President to preside at all meetings of the Society, appoint all committees not otherwise provided for, countersign all orders drawn on the Treasurer by the Secretary; in conjunction with the Secretary he shall arrange all programs for the meetings of the Society, and perform such other duties as the Society or Board of Directors may require.

ARTICLE VI.—*Duties of Vice Presidents.*—The Vice Presidents shall superintend all exhibits of the Society, and in case of vacancy

in the office of President at any meeting of the Society or Board of Directors, shall perform all the functions of that office in the order of their rank.

ARTICLE VII.—*Duties of Secretary.*—The Secretary shall keep an accurate record of the proceedings of all meetings of the Society and Board of Directors, draw all warrants on the Treasurer, and keep an accurate record of the same as countersigned by the President, prepare for publication and edit all reports of the Society requiring publication by the statutes of the state; in conjunction with the President prepare all programs and make all other necessary arrangements for all meetings of the Society.

ARTICLE VIII.—*Duties of Treasurer.*—The Treasurer shall be the custodian of all moneys belonging to the Society, and shall pay from such funds all warrants drawn on him by the Secretary and countersigned by the President.

ARTICLE IX.—*Duties of Board of Directors.*—The Board of Directors shall have general management of all the affairs of the Society, for which no specific directions are otherwise provided in the Constitution and By-Laws.

ARTICLE X.—*Bonds of Officers.*—The President and Secretary shall each give a bond in the sum of $5,000, and the Treasurer in the sum of $12,000 for the proper performance of his duties, which bond must be approved by the Board of Directors.

ARTICLE XI.—*Salaries of Officers.*—The President, Vice Presidents, Treasurer, and members of the Board of Directors shall receive such per diem pay for their services in attendance upon the meetings of the Society as the Society or Board of Directors may from time to time determine. The Secretary shall receive an annual salary of $400.

ARTICLE XII.—*Reports of Officers.*—The President, Secretary, and Treasurer shall each present an annual report in writing at the January meeting of all the business matters pertaining to their respective offices during the annual term expiring at that time.

ARTICLE XIII.—*Meetings.*—The Society shall hold two or more meetings each year. The annual meeting shall be held in Lincoln on the first Tuesday after the second Monday in January, as provided by statute, and the other meeting shall be held at the same time and place as the annual exhibition of the Nebraska State Board of Agriculture.

ARTICLE XIV.—*By-Laws.*—By-Laws not in conflict with the provisions of this Constitution may be enacted by the Society at any regular meeting.

ARTICLE XV.—*Amendments.*—This Constitution may be amended at January meetings of the Society by a two-thirds vote of the members present, such amendment having been presented in writing and read before the Society at a session preceding the one in which the vote is taken.

BY-LAWS.

1. All the officers of this Society shall be elected at the January meeting.

2. All officers of this Society shall assume the duties of their respective offices on the first day of June following their election, and continue in office for the period of one year, or until their successors are elected and qualified.

3. The officers elected at the January meeting, 1895, shall hold their respective offices until the first day of June, 1896.

4. The amount allowed the Secretary for express, postage, and stationery shall not exceed $150 per annum, and it shall be the duty of the Board of Directors to employ a competent stenographer to report the proceedings of the meetings of the Society, whose fees shall be paid by the Society.

5. The first business of the Society shall be on each morning the reading of the minutes of the previous day's proceedings, and submitting the same to the approval of the meeting.

6. There shall be elected at each winter meeting nine District Directors, one from each horticultural district in the state.

Also a standing committee of three on Synonyms.

Also a standing committee of one in each of the following: Meteorology in its relation to Horticulture, Entomology, Ornithology, Geology, Forestry, Vegetable Culture, and Ornamental Gardening.

7. These By-Laws may be amended at any general meeting of the Society by a majority of the members present.

REPORT OF COMMITTEE ON OBITUARIES.

David Underwood Reed was born October 12, 1842, at Carlisle, Pennsylvania, and met accidental death at Glenwood, Iowa, September 27, 1895. At the age of six years Mr. Reed moved with his parents to Port Byron, Illinois. When nineteen years of age he volunteered his services to his country and joined Company H, Fifty-first Infantry, and was in the service four years, seeing a great deal of hard service. He has tasted of prison life and was honorably discharged at the close of the war. After the war he removed to Hamburg, Iowa, where he remained until 1881, when he removed to Blue Springs, Nebraska. At this place he conducted a successful nursery business and was always a hard worker, an enthusiastic fruit-grower, and one of the most wide-awake and energetic citizens. A man of noble character, possessed of such a kindly nature that won him hosts of friends everywhere, who greatly miss him both in his every-day walk in life and in his chosen pursuit, horticulture.

Mr. Reed rendered good service to our state in 1893, collecting fruit for the Nebraska exhibit at the World's Columbian Exposition, in which he was very enthusiastic and gave much time and energy to make the Nebraska exhibit a success. He will be greatly missed by his co-workers in horticulture, among whom he was held in the greatest respect.

Charles Lee Ingersoll was born November 1, 1844, in Perry, Wyoming county, New York; died December 15, 1895, in Grand Junction, Colorado; educated in the common schools of his native town and the neighboring town of Orangeville until eleven years of age, and after that for seven years in the public schools of Commerce, Michigan, to which place his parents moved in 1855. In 1862 he began his career as a teacher by conducting a country school for a winter, and again from 1865 to 1872. In the last named year he entered the Michigan Agricultural College, at Lansing, graduating in 1874 with the degree of Bachelor of Science. He continued his

studies another year in agriculture and chemistry, and was then elected foreman of the College Farm. Two years later he was awarded the degree of Master of Science, and a little later was elected to the professorship of agriculture, a position which he held until the latter part of 1879, when he accepted a similar chair in Purdue University, Lafayette, Indiana. From this position he was called to the presidency of the Colorado Agricultural College, Fort Collins, Colorado, in August, 1882. Here he remained nine years, in the later years serving also as director of the Experiment Station. On the 15th of May, 1891, he transferred his work to Nebraska, becoming professor of agriculture in the University of Nebraska, in which a month later he was made dean of the Industrial College. In 1892 (October 10) he was elected director of the Experiment Station. These offices he held until failing health compelled him to abandon all work in the spring of 1895. He ceased to be director of the Experiment Station in April, and completely severed his connection with the university June 30, 1895. In these years of service as a teacher Professor Ingersoll took active part, also, in public work, serving for three years as one of the officers of the Fair Association of Lafayette, Indiana, and three years as treasurer of the Board of Education of Fort Collins, Colorado. Earlier in life he rendered a service to his country, which doubtless must be regarded as the greatest of all. In 1863 he enlisted as a private in the Ninth Michigan cavalry regiment, and served to the end of the war. When mustered out of the service in August, 1865, he had been promoted to the office of orderly sergeant.

Among the published papers which came from his hand were many bulletins from the Colorado Experiment Station, notably those on "Alfalfa," "Sugar Beets," and the "Grasses of Colorado." After coming to Nebraska he published bulletins on the topics "Farm Notes," "Detasseling Corn," "The Cost of Farm Crops," "The Influence of Changes of Food and Temperature on the Quantity and Quality of the Milk of Dairy Cows," "Wheat and Some of Its Products," and "Alfalfa." He issued also the Sixth, Seventh, and Eighth Annual Reports of the Experiment Station.

It remains for us to say a few words of Professor Ingersoll personally. Physically he was a tall, straight, soldierly man, and before the attack of the dread disease (*locomotor ataxia*), which eventually caused his death, no man walked more erect upon the university

campus. A kindly, genial, gentle man; a gentleman in the true meaning of this noble word; a scholarly man, who had always a kind word for every one who came to him,—such was the friend who has gone from us. May the memory of his kindly life prove a benediction to those who knew him, and who tarry a little longer in life's vineyard.

HENRY T. KELSEY, of St. Joseph, Missouri, whose death occurred during the latter part of 1895, was an honorary annual member of the Nebraska State Horticultural Society, and was always greatly interested in horticultural matters in this state. For many years Mr. Kelsey conducted a large nursery business at St. Joseph, under the style Kelsey & Co. Mr. Kelsey's business dealings were always conducted on a basis of the highest integrity, and the death of few men outside the state would cause a feeling of such personal loss to Nebraska nurserymen and horticulturists.

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